



TECHNICAL FILE

**TECHNICAL GUIDANCE FOR EXCAVATION
SAFETY AND SHORING PRODUCTS**





MGF Engineering Centre,
Foundation House in Astley,
Manchester



INVESTORS IN PEOPLE®
We invest in people Standard



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WALERS AND STRUTS
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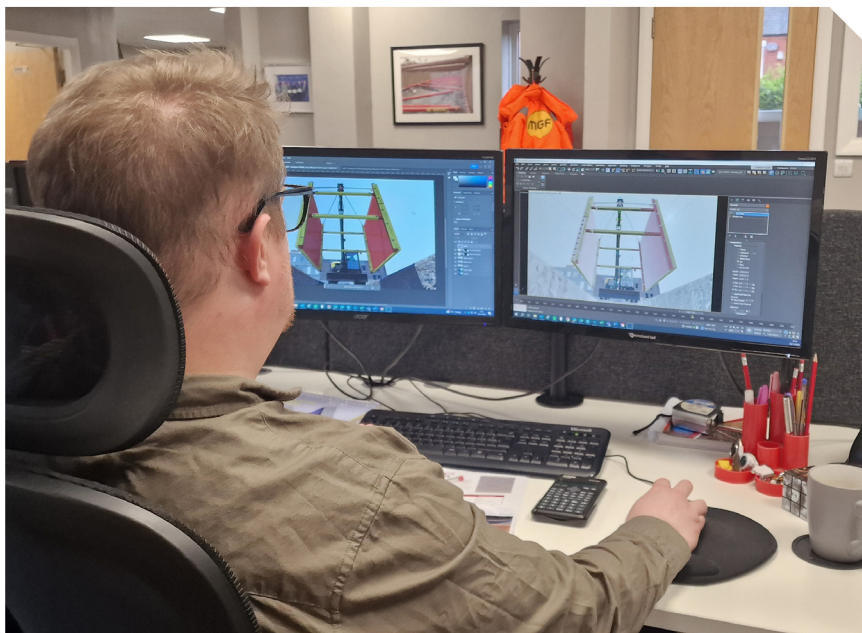
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CREATING SAFE WORKING ENVIRONMENTS

MGF provide specialist excavation safety solutions to the construction industry.

Our aim is to assist our customers in creating safe working environments for their employees. We offer a wide range of shoring products including trench boxes, trench sheets, hydraulic bracing, and struts as well as accompanying lifting and safety products to ensure safe access and egress to excavations. We can also provide a range of structural support solutions and offer a temporary works design service, carried out by our team of highly qualified engineers to ensure risk managed, value driven solutions for our customers.

OUR VALUES

Our core values are engrained within our culture and give MGF its unique identity.

- **Commitment** to deliver exceptional customer service and support.
- **Innovation** in products, processes, service and support.
- **Sustainability** by adopting a responsible approach to business.



LATEST PRODUCTS AND DOWNLOADS mgf.co.uk

OUR SERVICE

Our mission is to become the leading supplier of excavation safety products, structural support solutions and lifting and safety products. With this comes an exceptional customer service experience.

We provide national coverage through our network of strategically placed locations and our in-house transport fleet vehicles gives us the flexibility to meet our customers' needs. The hire and sale of our products is fully supported by our team of qualified engineers, experienced technical sales representatives, hire desk and operational staff. Our depots provide the focal point for service delivery.

WE CAN ASSIST WITH ALL ASPECTS OF YOUR REQUIREMENTS INCLUDING:

- **Site visits to provide advice and guidance**
- **Assistance in the production of a design brief**
- **Temporary Works Design solutions**
- **Safe Systems of Work guidance for the installation of our products**
- **Provision of equipment demonstrations and training sessions**
- **Efficient delivery and collection of our equipment**



*Our Engineering Centre produce over
4000 temporary works designs per year
as well as managing Standard Solutions*



ENGINEERING DESIGN





SPECIALIST MAJOR PROJECTS SERVICE

MGF have a specialist service dedicated to the design and supply of temporary shoring solutions to basements and large civil engineering excavations.

With an emphasis on early engagement and value engineering, our experienced Major Projects team can offer the reassurance of:

- Eurocode compliant, detailed analysis and calculations
- Bespoke steelwork design and manufacture
- BIM collaborations and 3D visualisation
- Site support through toolbox talks, demonstrations and inspection

CONTACT US TO SPEAK TO A MEMBER OF OUR TEAM:

 **enquiries@mgf.co.uk**  **08083 028 832**



ENGINEERING DESIGN SERVICES

Our Engineering Team provides a comprehensive temporary works design service in support of the hire and sale of our products. In addition, we offer a bespoke design service to assist clients with technical tender submissions for major projects; including basement propping and other large scale excavations.

The team, based at our Engineering Centre in Manchester, comprises of qualified civil, structural and mechanical engineers who produce over 4000 temporary works designs per year. MGF have achieved Level 2 Supply Chain BIM Compliance and we are constantly striving to enhance our digital capability further through our in-house development team.

Design calculations, integrated design and installation drawings, 3D visualisations and residual risk registers are all included (where appropriate) as standard in order to maximise the safe use of our equipment. MGF also provide risk assessments, installation guidelines and technical data sheets in accordance with current Health and Safety legislation and best practice.

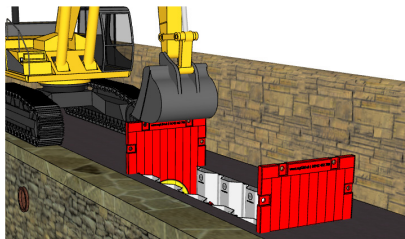
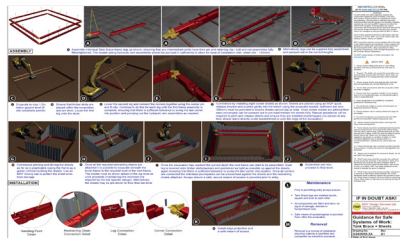


OUR DESIGN SERVICES

Our Design Services are carried out through simple yet robust quality procedures to ISO 9001 and in accordance with all relevant design codes and legislation, ensuring that we provide our customers with solutions that balance safety and practicality with good value.

MGF have invested in bespoke design management software allowing us to operate a paperless quality system. The Design Management System (DMS) allows us to produce Key Performance Indicators (KPIs) for our individual customers, ensuring we are meeting their expectations.

DIGITAL CAPABILITIES



CAD CENTRE

Our products are available to download as 2D AutoCAD blocks or BIM Compliant Autodesk Revit components, with a number of additional products available as 3D AutoCAD blocks.

GUIDANCE FOR SAFE SYSTEMS OF WORK

Available for our shoring equipment and ancillaries, our pictorial installation and use guidelines are available for download from our website.

 mgf.co.uk

DIGITAL ANIMATED INSTALLATION GUIDES

Our award-winning animated installation guidelines demonstrate best practice and are available on our YouTube channel.

 youtube.com/mgfltd

 mgf.co.uk

SKETCHUP COMPONENTS

Our products are available for download through Trimble 3D Warehouse. Ideal for use in conceptual design or creating 3D visualisations for use in planning, programmes, method statements, toolbox talks or lifting plans.

SUPPORT IT AND SPAN CUSTOMER SOFTWARE

Our design software is available for use by customers to specify our equipment. Please contact us for a license key and an engineer will visit to give a demonstration of the software.



VIEW OUR LATEST CASE STUDIES

Committed to improving site safety, MGF has been supplying the UK construction industry with shoring solutions for over 40 years. We have vast experience across a range of sectors including Major Projects, Water and Utilities, Housing and Transport.

FOR OUR LATEST RANGE OF CASE STUDIES VISIT:

 mgf.co.uk/case-studies





PROVIDING WORLD CLASS DIGITAL ENGINEERING

WHAT IS A STANDARD SOLUTION?

A standard solution is a pre-engineered, calculated solution for specification by the customer through their own temporary works process.

Over recent years MGF has experienced an exponential growth in design requests and customer demands for faster turnaround times.

The MGF Design Team embarked on a research project to find ways to further support our customers and continue to deliver a high quality service; whilst fully complying with the latest safety legislation and design standards.

Research found that 60% of the designs produced showed similarities, so there was scope to create pre-engineered BS5975 compliant solutions which can be used on projects with repetitive groundwork operations.

MGF provide a suite of standard solutions that cover a range of products covering trench boxes, manhole boxes, walers and sheets, manhole brace and our GRiPSHORE® range.

MGF STANDARD SOLUTIONS ARE:

- Presented in a drawing format with supporting calculations
- Takes the user through a step-by-step process
- Incorporates a checklist style process to ensure the solution is assessed against the site conditions
- Provides a sign off section to ensure the responsibility is with the user



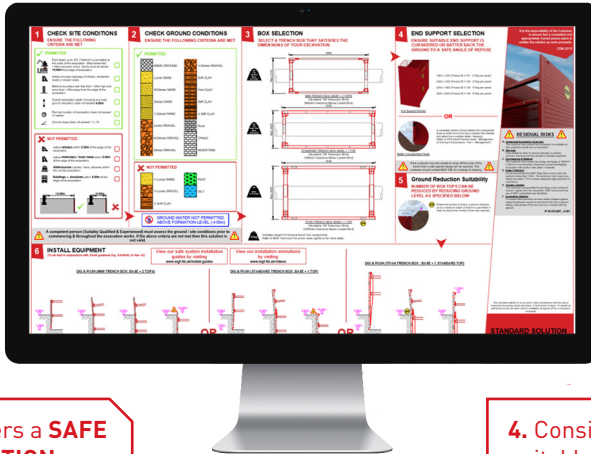
BENEFITS

- Place orders directly with the Hire Desk
- Rapid response therefore appealing to utility / reactive works
- Assists with tender process – allowing temporary works equipment requirements to be estimated and costed without formal designs
- Simplified process to obtaining a design solution
- Provides controlled and informative steps to assessing site suitability which can be used as a training instrument for site teams – see below summary of steps

2. VALIDATES THE GROUND CONDITIONS against the appropriate soils

1. SITE CONDITIONS

3. Details the appropriate selection of MGF PRODUCT RANGE



6. Considers a **SAFE** INSTALLATION sequence

4. Considers suitable **END** SUPPORT

5. Provides guidance on **LOCAL GROUND** **REDUCTIONS** up to 0.50m deep to reduce unnecessary hiring of equipment

There must be a Designated Individual (DI) within the company who is responsible for ensuring that the people using or issuing the solutions are competent to do so. The standard solution provides a sign off section to ensure the responsibility is with the user, i.e. TWC / TWD.

For more information, visit: mgf.co.uk/standard-solutions

*MGF's Astley depot, located in Manchester
has been trading since 1981*



BOX SYSTEMS



DRAG BOXES	2.1
TRENCH BOXES	2.2
MANHOLE BOXES	2.3
HIGH CLEARANCE TRENCH BOX	2.4
ALUMINIUM TRENCH BOXES	2.5
UTILITY TRENCH BOX	2.6
KING POST AND PANELS	2.7

MGF Drag Box



SIMPLE TO ASSEMBLE, TWO SIDED SHIELD SYSTEM DESIGNED TO BE INSTALLED BY AN EXCAVATOR UTILISING THE EXCAVATE AND DRAG TECHNIQUE.

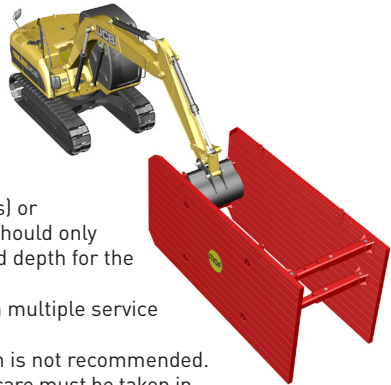
Normally selected for installing utility pipes in non-urban environments where high laying rates are required and ground movement is not critical. Size of systems specified is dependent upon max. depth requirements and size of individual pipe sections and bedding. The drag box utilises a raised strut system at the rear of the panel to allow the drag box to be dragged over and above the installed section of pipe. Generally suitable for trench depths of up to 3.25m and trench widths of up to 3.0m, pipe lengths of up to 6.6m and a pipe OD of up to 2.2m.

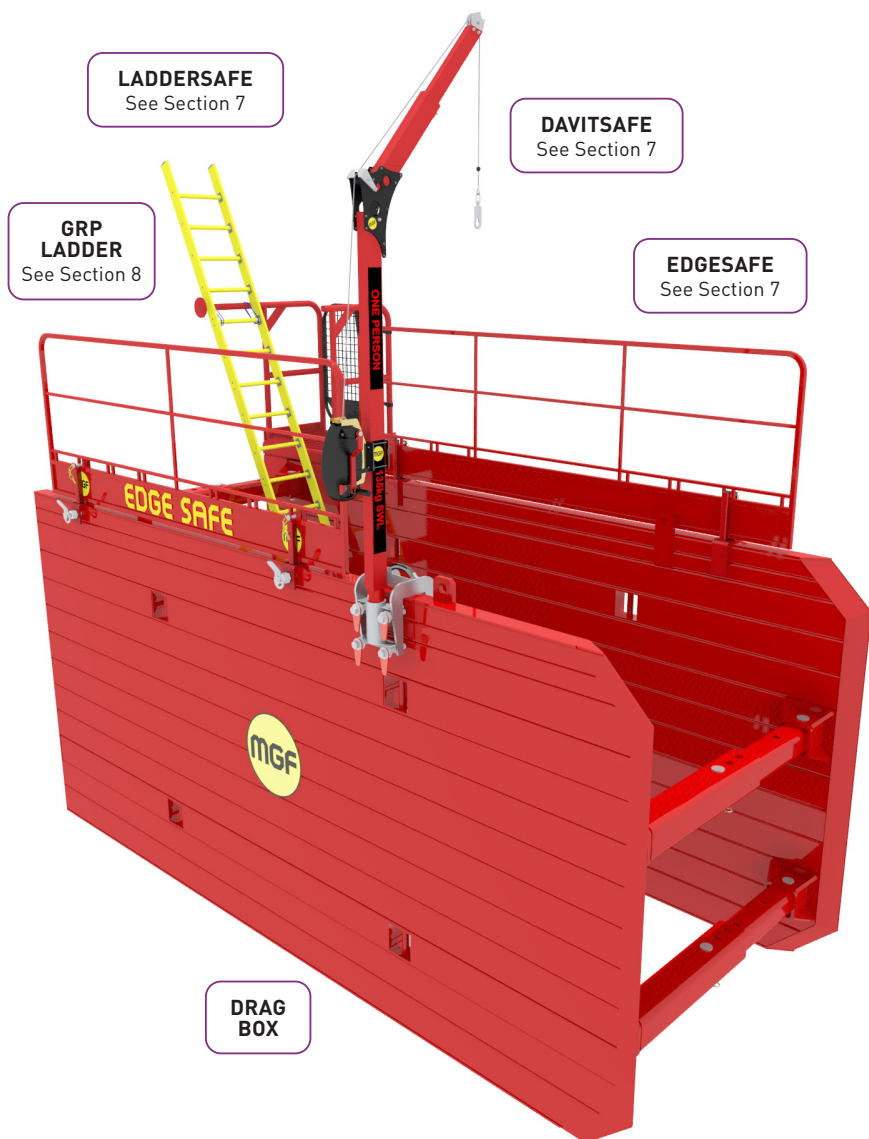
Fabricated from fully welded, Grade S355 120x60mm or 200x100mm steel box sections to form 60mm or 100mm thick panels, the system comprises drag box panels in a variety of lengths and heights. The panels are propped off each other by robust telescopic struts available in a variety of lengths to suit the required width. All components in the system are connected together via simple pin and r-clip assemblies.

MGF can supply the drag boxes with a full range of suitable installation / removal accessories and safety equipment, such as Edgesafe edge protection panels, Laddersafe access platforms and pole ladders, Davitsafe retrieval / fall arrest systems, Endsafes end protection panels, trench road plates and confined spaces equipment. Manufactured and designed in accordance with BS EN 13331: 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Boxes should only be used in the configurations shown in ground assessed as self supporting by competent persons following MGF installation guidelines.
2. Drag boxes should not be used in weak ground (especially soft clays, running sand, silts or peats) or where significant groundwater is present. They should only be used in ground that will stand to the excavated depth for the anticipated duration of the works.
3. Boxes are not suitable for usage in trenches with multiple service crossings.
4. Flying of the box above the base of the excavation is not recommended.
5. Drag box systems are extremely heavy and great care must be taken in selecting a suitable excavator for handling, installing and extracting these systems. As a general guide excavators should be sized to be at least 5 x weight of assembled drag box. If stacking panels on site, timber packers must be used to separate the panels.
6. The box must only be moved by pre-digging ahead of the box and then carefully lifting and dragging the unit via the front struts using the bucket of the excavator. Care must be taken to ensure that the outside faces of the box are not side loaded by the ground.
7. Always use MGF specified extraction chains to release a stuck drag box from the ground prior to any attempt to lift the box out of the trench. Always use MGF specified lifting chains when lifting and handling the boxes or components. N.B. If a drag box becomes stuck extraction / drag forces of up to 300kN (30t) can be required to release the box.
8. Always enter box via a ladder located within the box and never from an unsupported edge.
9. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
10. During lifting or extraction operations ensure personnel are well clear of the equipment.

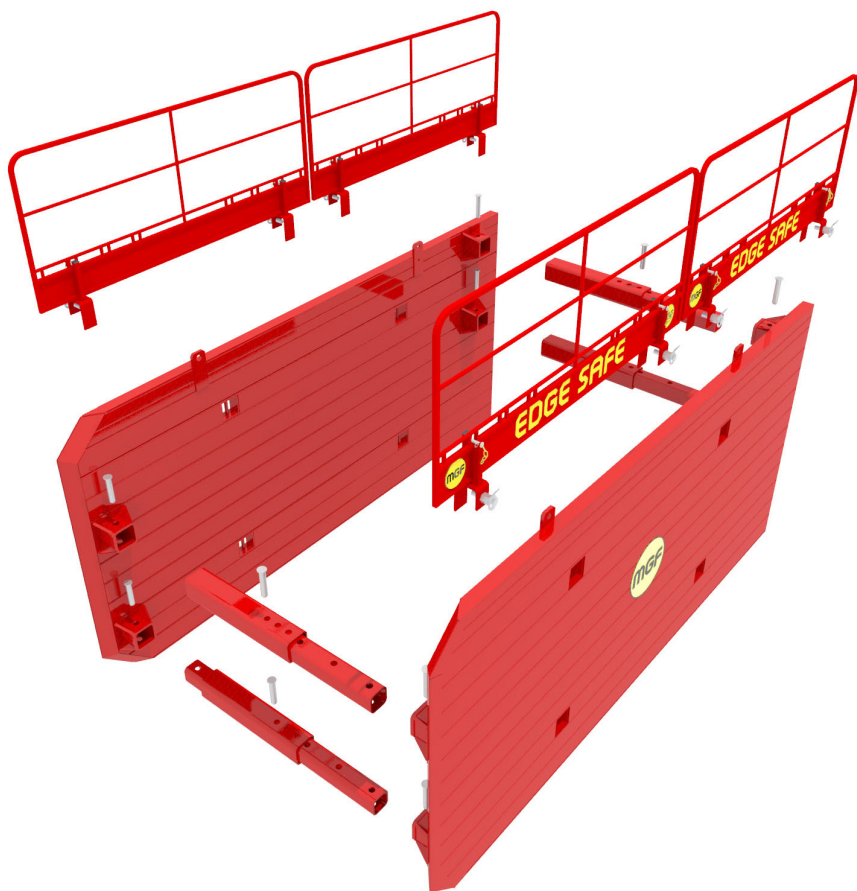




**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF DRAG BOXES**

mgf.co.uk/products/drag-box





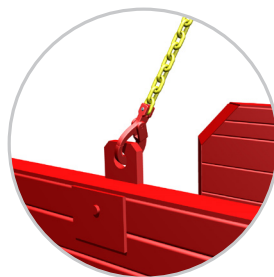
TELESCOPIC STRUT DETAIL

Telescopic strut inners and outers are connected using a pin and r-clip detail.



STRUT POCKET PIN DETAIL

Telescopic struts are connected to the panel pockets using a pin and r-clip detail.



HANDLING POINT

All drag boxes are lifted and handled by attaching MGF lifting chains to the handling points as shown.

	Product ID						
	4.701	4.702	4.703*	4.704	4.705	4.706*	4.707
Description L x H	3220 x 1460 Drag Box	4000 x 2060 Drag Box	5100 x 1824 Drag Box**	5100 x 2424 Drag Box	5100 x 3260 Drag Box	7500 x 2048 Drag Box	7500 x 2460 Drag Box†
Panel Resistance SWL (kN/m²)	40	30	30	40	30	20	20
Panel Thick / Weight T(mm)/(kg)	60 / 452	60 / 854	100 / 1146	100 / 1433	100 / 2200	100 / 2400	100 / 2800
Approx Assembled Weight (kg)	1004	2028	2612	3186	4720	5120	5920
Internal Trench Widths*** Wi(mm)	600-3000	600-3000	600-3000	600-3000	600-3000	600-3000	600-3000
Trench Width*** We(mm)	720-3120	720-3120	800-3200	800-3200	800-3200	800-3200	800-3200
Clearance Below Bottom Strut**** Cv(mm)	790	1150	1072	1372	2258	1496	1500
Clearance Between Struts Li(mm)	2590	2970	4220	4220	4220	6620	6620
Telescopic Strut Type	100	150	150	150	150	150	150

* These boxes can be used as top units to achieve depths of up to 5.10m in conjunction with a design issued by our technical department.

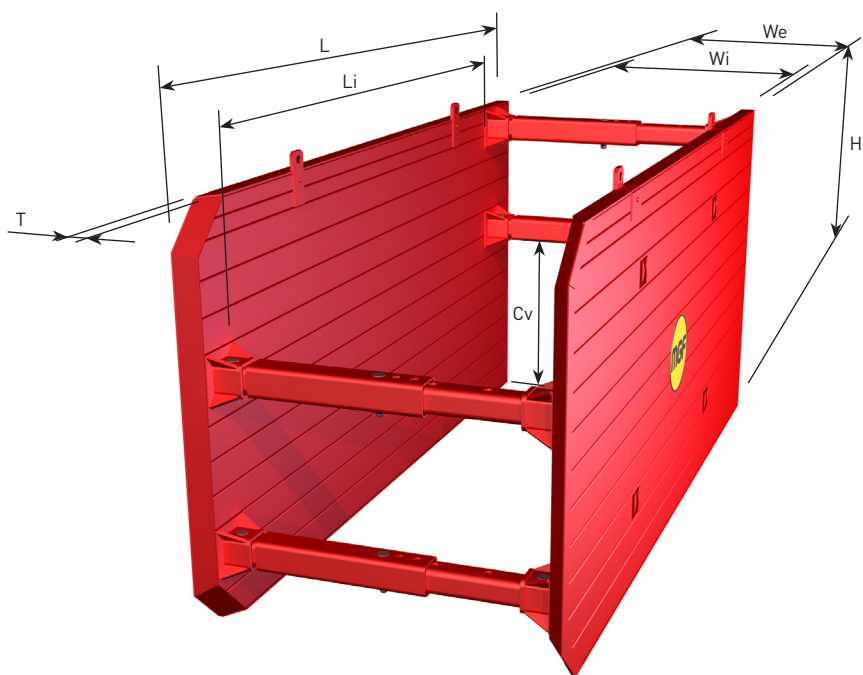
** This drag box only features 1 rear strut.

*** Greater widths (up to 5m) possible utilising telescopic strut adaptors.

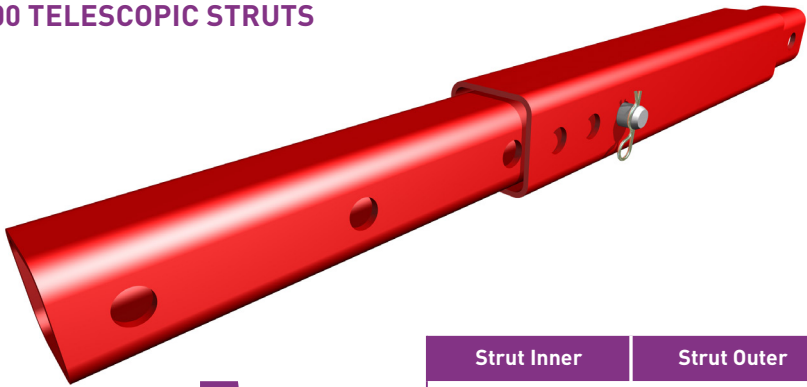
**** Based on rear strut - additional clearance possible utilising strut adaptors.

† Panels may include additional strengthening plates underneath the rear pockets, which may impact trench width requirements. If trench widths are restrictive please contact MGF.



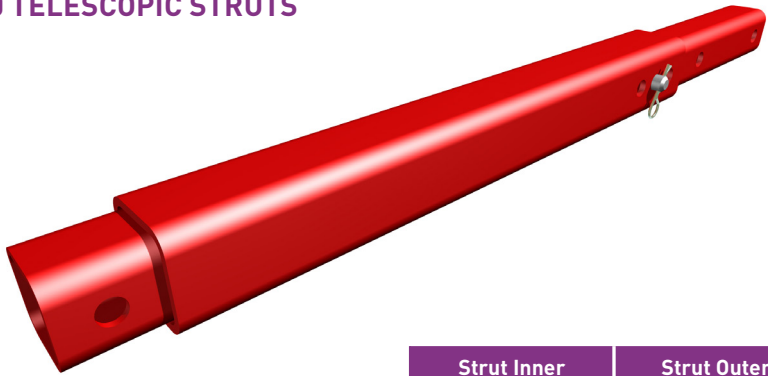


100 TELESCOPIC STRUTS



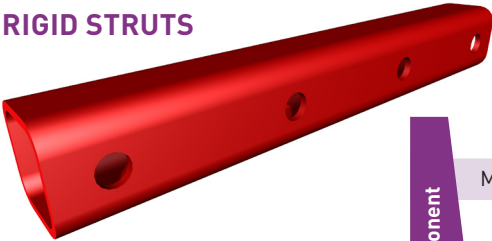
		Strut Inner	Strut Outer
Component	Specification	100x100x10 SHS	120x120x8 SHS
	Material Grade	S355	S355
	Axial SWL	228kN	228kN
	Moment SWL	9.9kNm	9.9kNm
	Hole Details	Φ30mm holes	Φ30mm holes
	Unit Mass	27.4kg/m	26.4kg/m

150 TELESCOPIC STRUTS



		Strut Inner	Strut Outer
Component	Specification	150x150x12.5 SHS	180x180x10 SHS
	Material Grade	S355	S355
	Axial SWL	492kN	492kN
	Moment SWL	38.9kNm	38.9kNm
	Hole Details	Φ48mm holes	Φ48mm holes
	Unit Mass	52.7kg/m	50.7kg/m

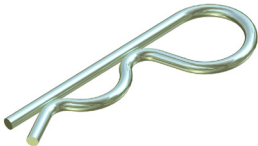
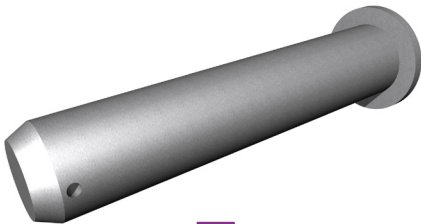
RIGID STRUTS



Rigid Strut	
Component	Specification
	150x150x12.5
	Material Grade
	S355
	Axial SWL
	492kN
	Moment SWL
	38.9kNm
	Hole Details
	Ø48mm holes
	Unit Mass
	52.7kg/m

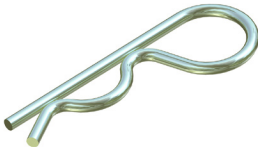
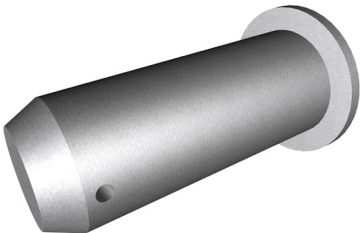
Rigid struts cannot be used with the 3220 x 1460 drag box.

STRUT PINS AND RETAINING CLIPS



		100 Strut Pin	150 Strut Pin
Component	Specification	Ø28mm round bar, 160mm long	Ø45mm round bar, 220mm long
	Material Grade	080M40 (EN8)	080M40 (EN8)
	Shear SWL	228kN	492kN
	Weight	1kg	3kg

DRAG BOX CONNECTOR PINS AND RETAINING CLIPS



Component	Specification	Ø45mm round bar, 150mm long
	Material Grade	080M40 (EN8)
	Weight	2kg

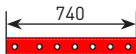
100 TELESCOPIC STRUT COMBINATIONS

STRUT INNERS (100x100x10 SHS)

4.602
12kg



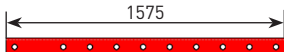
4.603
18kg



4.604
27kg



4.605
39kg

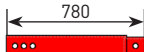


STRUT OUTERS (120x120x8 SHS)

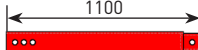
4.611
14kg



4.612
19kg



4.613
30kg



4.614
43kg



4.615
54kg



Internal Trench Width	Inner Type	Outer Type	Assembled Weight
(mm)	Product ID	Product ID	(kg)
625 – 855	4.602	4.611	27
890 – 1240	4.603	4.612	38
1295 – 1745	4.604	4.613	58
1795 – 2745	4.605	4.614	83
2195 – 3000	4.605	4.615	94

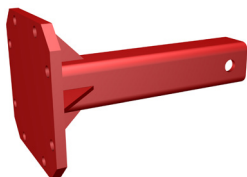
If the above 100 telescopic strut combinations cannot be achieved a minimum overlap of at least 150mm must be provided between the inner and outer. Struts should only be assembled using 1 inner and 1 outer.

100 telescopic struts are only compatible with 3220 x 1460 Drag Boxes.

100 TELESCOPIC STRUT ADAPTORS

200 x 200 SHS - TRENCH BOX STRUT ADAPTOR (500MM LONG)

This adaptor will allow MGF 200 Series strut extensions to be used as 3220 x 1460 Drag Box struts.



Specification	Internal Range (mm)	3000 - 5000
	Product ID	9.200
	Weight (kg)	27
	Section	100x100x10 SHS
	Material Grade	S355
	Bolting Details	8No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers

150 TELESCOPIC STRUT COMBINATIONS

RIGID STRUTS (150x150x12.5 SHS)

4.821 29kg	
4.822 31kg	
4.823 33kg	
4.802 36kg	
4.824 39kg	
4.825 44kg	

STRUT INNERS (150x150x12.5 SHS)

4.802 36kg	
4.803 50kg	
4.804 79kg	

STRUT OUTERS (180x180x10 SHS)

4.812 43kg	
4.813 63kg	
4.814 88kg	
4.815 129kg	

Internal Trench Width (mm)	Inner Type Product ID	Outer Type Product ID	Assembled Weight (kg)
1020 – 1320	4.802	4.812	82
1420 – 1820	4.803	4.813	116
1920 – 2920	4.804	4.814	170
2720 – 3000	4.804	4.815	211

If the above 150 telescopic strut combinations cannot be achieved a minimum overlap of at least 250mm must be provided between the inner and outer. Struts should only be assembled using 1 inner and 1 outer.

150 TELESCOPIC STRUT ADAPTORS



200 x 200 SHS - DRAG BOX STRUT ADAPTOR (500MM & 600MM LONG)

These adaptors will allow MGF 200 Series strut extensions to be used as drag box struts.

Specification	Internal Range (mm)	3000 – 5000
	Product ID	9.206 (500mm) 9.207 (600mm)
	Weight (kg)	40 (500mm) 45 (600mm)
	Section	150x150x12.5 SHS
	Material Grade	S355
	Bolting Details	8No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers



HOG BACK DRAG BOX STRUT ADAPTOR (2300MM LONG)

This adaptor provides an additional 375mm clearance beneath the bottom strut. To be used with 600mm to 1050mm strut inners.

Specification	Internal Range (mm)	3050 – 3500
	Product ID	4.840
	Weight (kg)	155
	Section	180x180x10 SHS
	Material Grade	S355



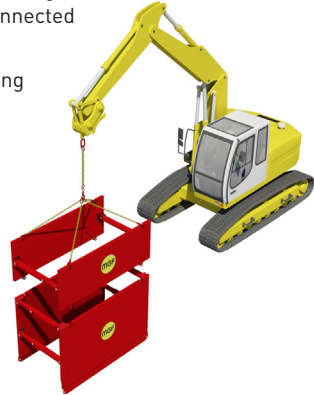
Drag Box

SIMPLE TO ASSEMBLE, ROBUST, TWO SIDED EXCAVATION SUPPORT SYSTEM DESIGNED TO BE INSTALLED BY AN EXCAVATOR UTILISING THE DIG AND PUSH OR EXCAVATE AND LOWER IN PLACE TECHNIQUES.

Normally selected for installing utility pipes where ground movement is not critical, with the size of systems specified dependent upon max. depth requirements and size of individual pipe sections and bedding. The system is generally suitable for trench depths of up to 7.16m, widths of up to 3.92m, pipe lengths of up to 3.7m and a pipe OD of up to 2.3m.

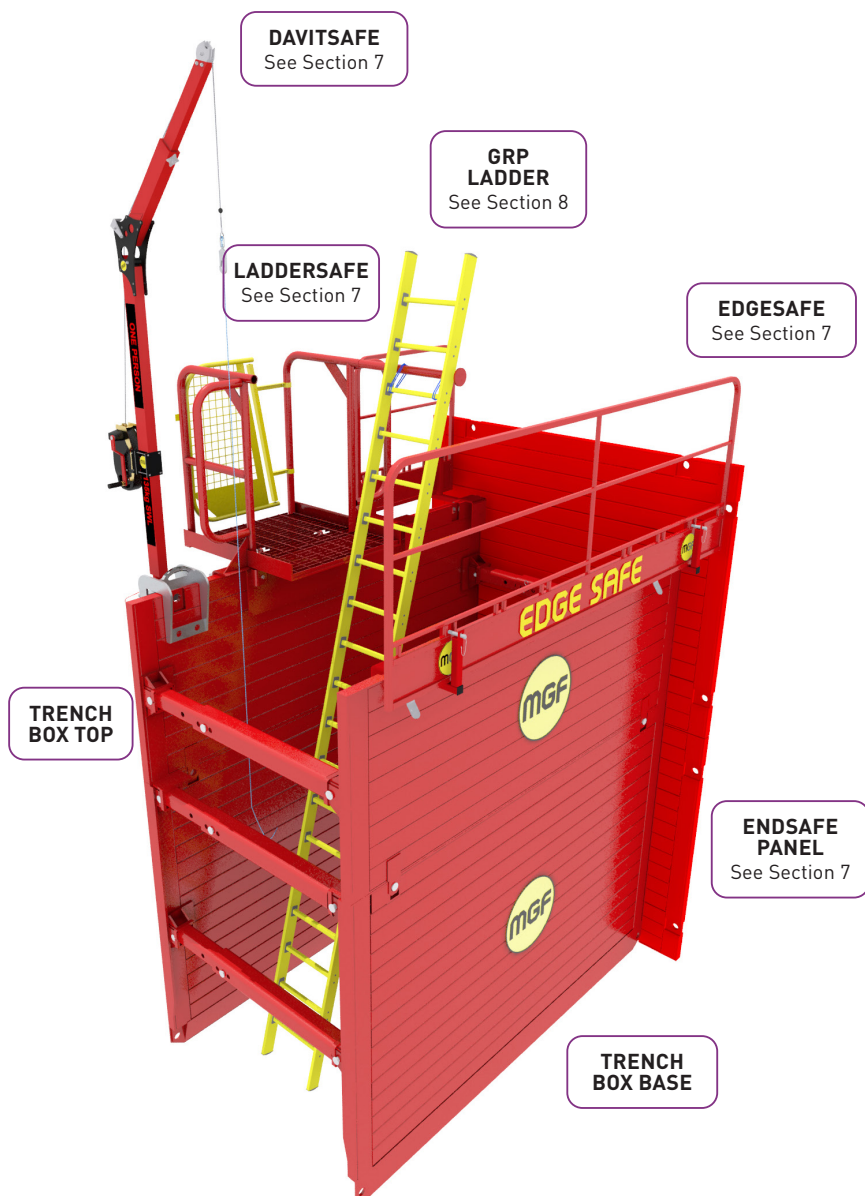
Fabricated from fully welded, Grade S355 120x60mm or 200x100mm steel box sections to form 60mm or 100mm thick panels, the system comprises trench box bases to which up to 2 No. trench box tops may be added to achieve additional depth. The panels are propped off each other by robust telescopic struts available in a variety of lengths to suit the required width. All components in the system are connected together via simple pin and r-clip assemblies.

MGF can supply the systems with a full range of suitable lifting and extraction chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, Endsafe end protection panels, trench road plates and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 13331 : 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.



PRODUCT NOTES

1. Boxes should only be used in the configurations shown by competent persons following MGF installation guidelines.
2. Boxes should not be used in very weak ground (especially very soft clays and peats) or where significant groundwater is present.
3. Boxes are not normally suitable for usage where ground movement is an issue and are therefore not recommended for use in live carriageway situations or adjacent existing buildings or structures.
4. Flying of the box above the base of the excavation is not recommended.
5. Box systems are very heavy and great care must be taken in selecting a suitable excavator for handling, installing and extracting these systems. If stacking panels on site, timber packers must be used to separate the panels.
6. Boxes should not be left in-situ for extended periods within cohesive or very weak soils as earth pressures / adhesion on the panel surfaces may increase significantly with time requiring additional extraction forces to release the panels.
7. Always use MGF specified extraction chains to release an in-situ box from the ground prior to any attempt to lift the box out of the trench. Always use MGF specified lifting chains when lifting and handling the boxes or components. N.B. If a box becomes stuck extraction forces of up to 500kN (50t) can be required to release each corner.
8. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
9. Always enter trench box via a ladder located within the box and never from an unsupported edge.
10. During lifting or extraction operations ensure personnel are well clear of the equipment.
11. Ends of trench runs should always be battered back at a safe angle or end protection panels should be used.



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF TRENCH BOXES**

mgf.co.uk/products/trench-box





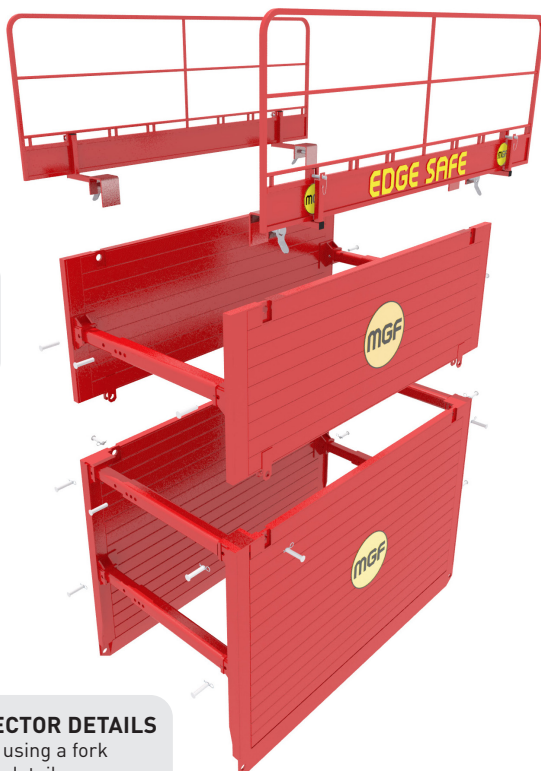
TELESCOPIC STRUT DETAIL

Telescopic strut inners and outers are connected using a pin and r-clip detail.



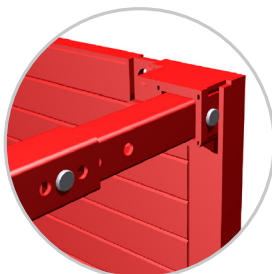
MINI AND 4.2M PANEL CONNECTOR DETAILS

Panels connect to each other using a fork connector, pin and r-clip detail.



STANDARD AND TITAN PANEL CONNECTOR DETAILS

Panels connect to each other using a drop down connector, a pin and r-clip detail.



STRUT POCKET PIN DETAIL

Telescopic struts are connected to the panel pockets using a pin and r-clip detail.



HANDLING POINT

All trench boxes are lifted and handled by attaching MGF lifting chains to the handling points as shown.

	Product ID								
	4.120	4.125	4.140	4.160	4.1603†	4.180	4.190	4.1905	4.1906
Description L x H	3000 x2010 Base	3000 x2010 LW Base	3000 x1100 Top	3530 x2462 Base	3530 x 2462 High Clearance Base	3530 x1624 Top	3530 x3910 Base	4200 x2890 Base	4200 x1420 Top
Alternative Name	Mini Base	Lightweight Mini Base	Mini Top	Standard Base	High Clearance Standard Trench Box Base	Standard Top	Titan Base	N/A	N/A
Max. Depth** (m)	4.19	4.19	N/A	5.71	5.71 / 4.08	N/A	7.16	5.73	N/A
Panel Resistance SWL (kN/m²)	45	45	45	50	50 / 30	50	50	50/45***	50
Panel Thick / Weight T(mm)/(kg)	60 / 586	60 / 435	60 / 320	100 / 970	100 / 1080	100 / 686	108 / 2193	100 / 1775	100 / 835
Approx Assembled Weight (kg)	1270 -1630	970 -1330	690 -870	2040 -2400	2260 -2620	1420 -1630	4770 -5480	3876 -4422	1833 -2106
Internal Trench Width* Wi(mm)	605 -3625	605 -3625	605 -3625	605 -3625	605 -3625	605 -3625	600 -3700	1210 -3910	1210 -3910
Trench Width* We(mm)	725 -3745	725 -3745	725 -3745	805 -3825	805 -3825	805 -3825	820 -3920	1410 -4110	1410 -4110
Clearance Below Bottom Struts C(mm)	903	903	N/A	1225	1225/1525	N/A	2358	1650 / 1850***	N/A
Clearance Between Struts Li(mm)	2716	2716	2716	3246	3246	3246	3076	3720	3720
Telescopic Strut Type	100	100	100	100	100	100	150	150	150

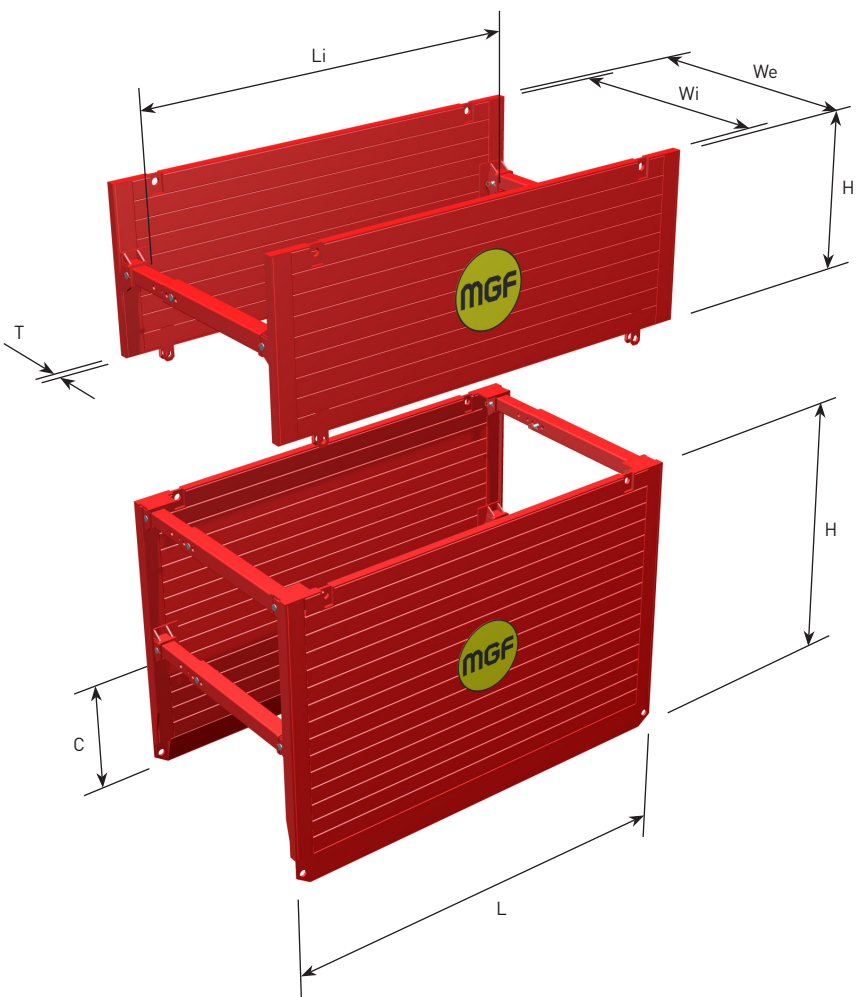
* Greater widths (up to 5m) possible utilising telescopic strut adaptors.

** Max. depths achievable using a base and 2 tops.

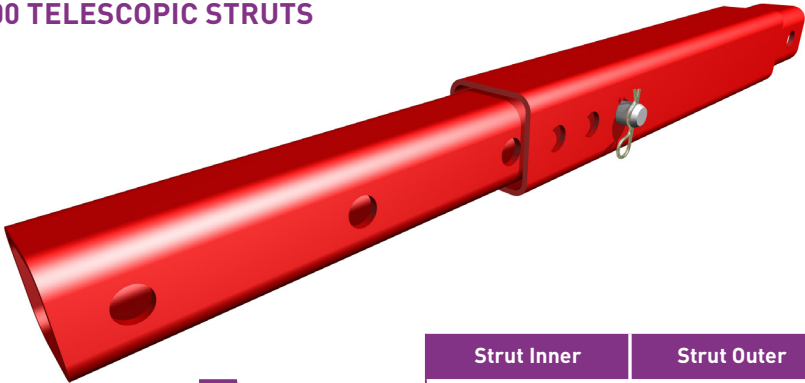
*** 4.2m Trench Box base panel offers 2 lower strut locations which give different panel resistance SWLs. When C = 1650mm the SWL is 50kN/m², when C = 1850mm the SWL is 45kN/m².

† 3530 x 2462 High Clearance Base offers 2 lower strut locations which give different panel resistance SWLs. When C = 1225mm the SWL is 50kN/m² and the system can utilise up to 2 Standard Top panel only, when C = 1525mm the SWL is 30kN/m² and the system can utilise 1 Standard Top panel only. In addition, when C = 1525mm the system must not have sheets or Endsafes bearing up against the telescopic struts to close off open ends, instead Endsafes must be installed so they bear on the panel ends a minimum of 75mm each side.



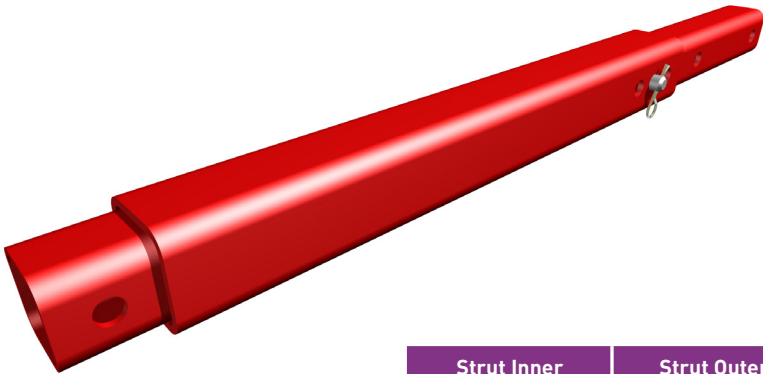


100 TELESCOPIC STRUTS



Component		Strut Inner	Strut Outer
	Specification	100x100x10 SHS	120x120x8 SHS
	Material Grade	S355	S355
	Axial SWL	228kN	228kN
	Moment SWL	9.9kNm	9.9kNm
	Hole Details	Φ30mm holes	Φ30mm holes
	Unit Mass	27.4kg/m	26.4kg/m

150 TELESCOPIC STRUTS



Component		Strut Inner	Strut Outer
	Specification	150x150x12.5 SHS	180x180x10 SHS
	Material Grade	S355	S355
	Axial SWL	492kN	492kN
	Moment SWL	38.9kNm	38.9kNm
	Hole Details	Φ48mm holes	Φ48mm holes
	Unit Mass	52.7kg/m	50.7kg/m

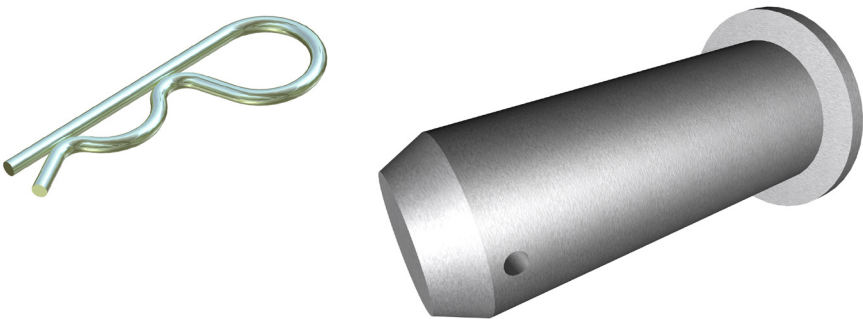


TELESCOPIC STRUT PINS AND RETAINING CLIPS



Component		100 Strut Pin	150 Strut Pin	4.2m Trench Box Panel Strut Pin
	Specification	Ø28mm round bar, 160mm long	Ø45mm round bar, 220mm long	Ø45mm round bar, 250mm long
	Material Grade	080M40 (EN8)	080M40 (EN8)	709M40 (EN19T)
	Shear SWL	228kN	492kN	492kN
	Weight	1kg	3kg	3.2kg

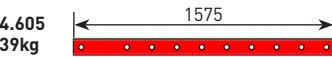
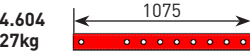
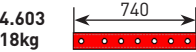
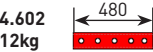
TRENCH BOX CONNECTOR PINS AND RETAINING CLIPS



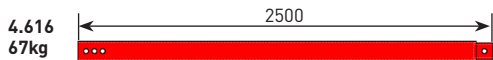
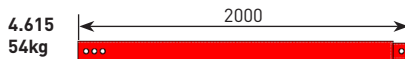
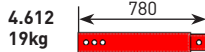
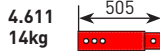
Component		60 Thick Panels	100 Thick Panels	4.2m Trench Box Connecting Pin
	Specification	Ø40mm round bar, 100mm long	Ø32mm round bar, 210mm long	Ø50mm bar, 150mm long
	Material Grade	080M40 (EN8)	080M40 (EN8)	708M40 (EN19A)
	Shear SWL	384kN	308kN	600kN
	Weight	1kg	1kg	3kg

100 TELESCOPIC STRUT COMBINATIONS

STRUT INNERS (100x100x10 SHS)



STRUT OUTERS (120x120x8 SHS)



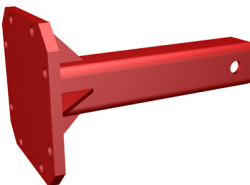
Internal Trench Width	Inner Type	Outer Type	Assembled Weight
(mm)	Product ID	Product ID	(kg)
625 – 855	4.602	4.611	27
890 – 1240	4.603	4.612	38
1295 – 1745	4.604	4.613	58
1795 – 2745	4.605	4.614	83
2195 – 3145	4.605	4.615	94
2695 – 3625	4.605	4.616	107

If the above 100 telescopic strut combinations cannot be achieved a minimum overlap of at least 150mm must be provided between the inner and outer. Struts should only be assembled using 1 inner and 1 outer.

100 TELESCOPIC STRUT ADAPTORS

200 x 200 SHS - TRENCH BOX STRUT ADAPTOR (500MM LONG)

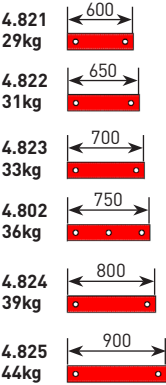
This adaptor will allow MGF 200 Series strut extensions to be used as trench box struts.



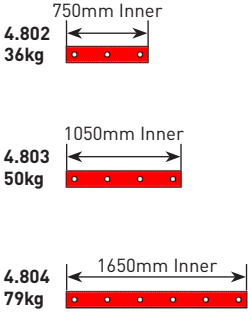
Specification	Internal Range (mm)	2000 - 5000
	Product ID	9.200
	Weight (kg)	27
	Section	100x100x10 SHS
	Material Grade	S355
	Bolting Details	8No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers

150 TELESCOPIC STRUT COMBINATIONS

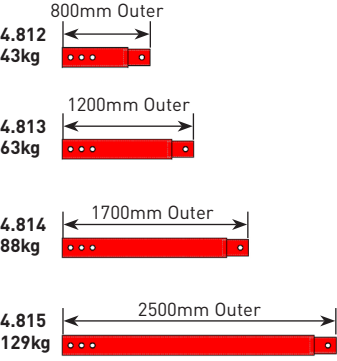
RIGID STRUTS (150x150x12.5 SHS)



STRUT INNERS (150x150x12.5 SHS)



STRUT OUTERS (180x180x10 SHS)



Internal Trench Width	Inner Type	Outer Type	Assembled Weight
(mm)	Product ID	Product ID	(kg)
1020 – 1320	4.802	4.812	82
1420 – 1820	4.803	4.813	116
1920 – 2920	4.804	4.814	170
2720 – 3700	4.804	4.815	211

If the above 150 telescopic strut combinations cannot be achieved a minimum overlap of at least 250mm must be provided between the inner and outer. Struts should only be assembled using 1 inner and 1 outer.

150 telescopic struts are only compatible with 3530 x 3910 Trench Box Base (Titan Base) and 4.2m Trench Box system.

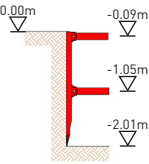
150 TELESCOPIC STRUT ADAPTORS



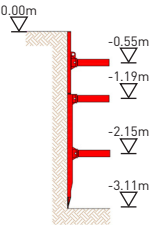
200 x 200 SHS - TITAN TRENCH BOX STRUT ADAPTOR (500MM AND 600MM LONG)	
This adaptor will allow MGF 200 Series strut extensions to be used as Titan Trench Box struts.	
Specification	Internal Range (mm)
	2000 - 5200
	Product ID
	9.206 (500mm) 9.207 (600mm)
	Weight (kg)
	40 (500mm) 45 (600mm)
	Section
	150x150x12.5 SHS
	Material Grade
	S355
	Bolting Details
	8No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers

MAXIMUM RECOMMENDED DEPTHS / CONFIGURATIONS

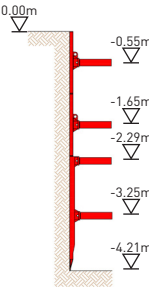
MGF 3000 x 2010 BASE



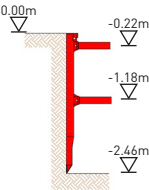
**MGF 3000 x 2010 BASE
& MGF 3000 x 1100 TOP**



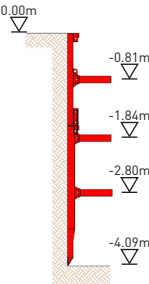
**MGF 3000 x 2010 BASE
& 2 NO. MGF 3000 x 1100 TOPS**



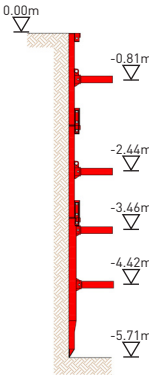
MGF 3530 x 2462 BASE



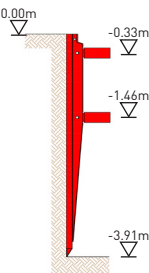
**MGF 3530 x 2462 BASE
& MGF 3530 x 1624 TOP**



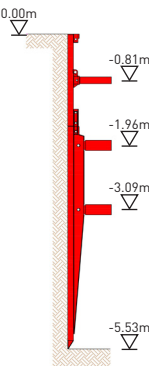
**MGF 3530 x 2462 BASE
& 2 NO. MGF 3530 x 1624 TOPS**



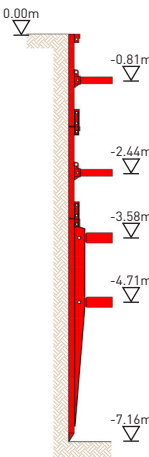
MGF 3530 x 3910 BASE



**MGF 3530 x 3910 BASE
& MGF 3530 x 1624 TOP**



**MGF 3530 x 3910 BASE
& 2 NO. MGF 3530 x 1624 TOPS**

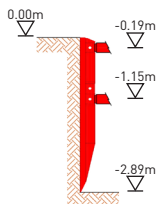


MGF 4200 x 2890 TRENCH BOX BASE PANEL FEATURES 2 LOWER STRUT POSITIONS.

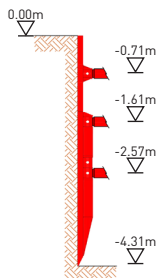
***IN THE LOWER POSITION (1.65m CLEARANCE) THE PANEL SWL = 50kN/m²**

****IN THE UPPER POSITION (1.85m CLEARANCE) THE PANEL SWL = 45kN/m²**

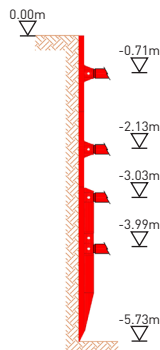
MGF 4200 x 2890 BASE*



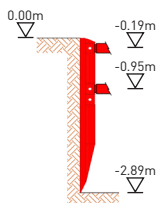
**MGF 4200 x 2890 BASE
& MGF 4200 x 1420 TOP***



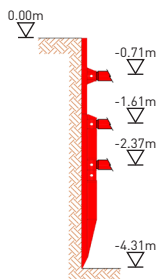
**MGF 4200 x 2890 BASE
& 2 NO. MGF 4200 x 1420 TOPS***



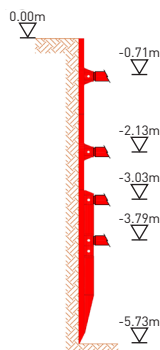
MGF 4200 x 2890 BASE**



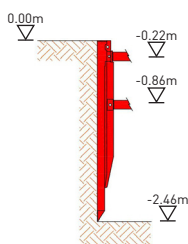
**MGF 4200 x 2890 BASE
& MGF 4200 x 1420 TOP****



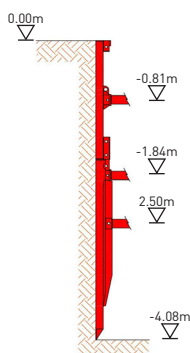
**MGF 4200 x 2890 BASE
& 2 NO. MGF 4200 x 1420 TOPS****



**MGF 3530 x 2462 HIGH
CLEARANCE BASE*****



**MGF 3530 x 2462 HIGH CLEARANCE
BASE & 3530 x 1624 TOP*****



***These details are when the understrut clearance, $C = 1525\text{mm}$, when $C = 1225\text{mm}$ refer to the details for MGF 3530 x 2462 Base and MGF 3530 x 1624 Top on page 2.2.10



Typical application showing a manhole box combined with run of trench boxes.

SIMPLE TO ASSEMBLE, ROBUST, FOUR SIDED EXCAVATION SUPPORT SYSTEM DESIGNED TO BE INSTALLED BY AN EXCAVATOR UTILISING THE DIG AND PUSH OR EXCAVATE AND LOWER IN PLACE TECHNIQUES.

Normally selected for installing precast concrete manholes, small chambers or tanks where ground movement is not critical. The size of the systems specified is dependent upon max. depth requirements and plan dimensions of structure including allowances for backfilling / formwork etc. The system is generally suitable for depths of up to 5.81m and structures of max. plan dimension / diameter up to 4.5m.

Fabricated from fully welded, Grade S355 120x60mm or 200x100mm steel box sections to form 60mm or 100mm thick panels, the system comprises manhole box bases to which up to 2 No. manhole box tops may be added to achieve additional depth. The panels are propped off each other by robust telescopic struts available in a variety of lengths to suit the required width. Panel gaps are provided on two faces to accommodate trench runs into the manhole box. All components in the system are connected together via simple pin and r-clip assemblies. The system is designed to be used in conjunction with MGF trench boxes.

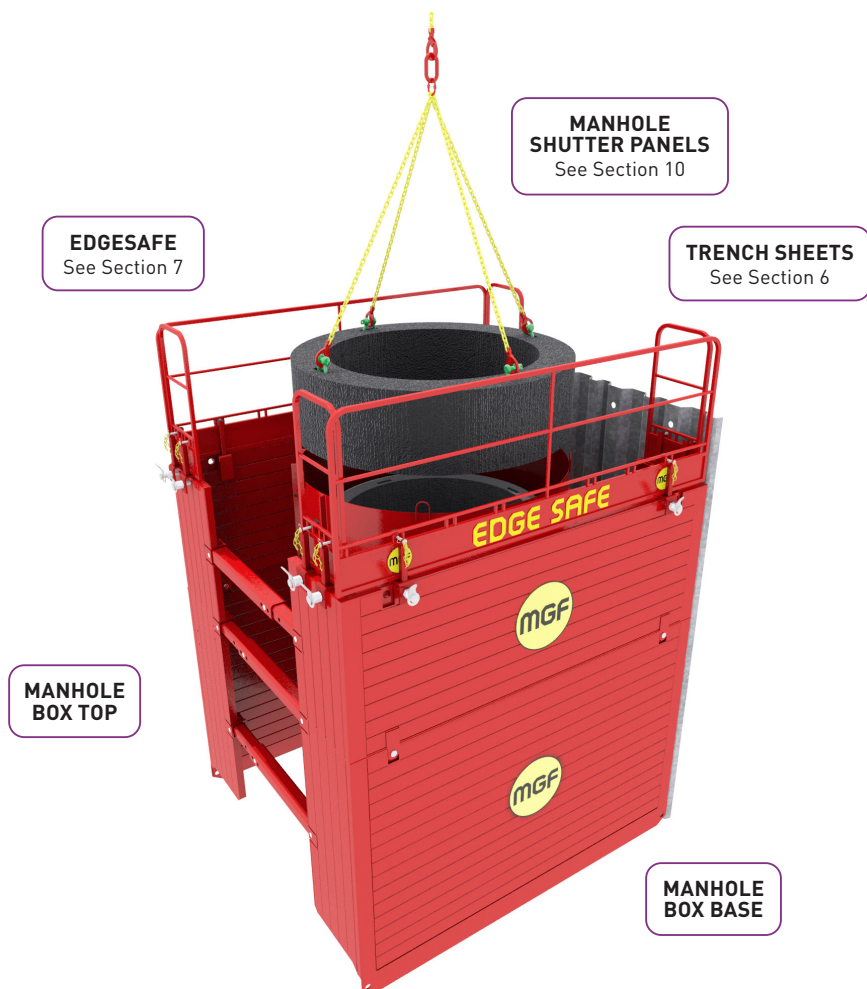
MGF can supply manhole boxes with a full range of suitable lifting and extraction chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, Endsafes end protection panels, trench road plates and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 13331 : 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Boxes should only be used in the configurations shown by competent persons following MGF installation guidelines.
2. In a standard square plan format the boxes can have their returns closed using Endsafes Panels bearing onto the panel returns, or sheets bearing directly onto the struts. If the box is extended beyond its standard square format the telescopic struts should not be laterally loaded.
3. Sheets must not be used to load the struts of the 5.2m Manhole Box system, Endsafes Panels must be used and installed bearing up against the panel returns.
4. Boxes should not be used in very weak ground (especially very soft clays and peats) or where significant groundwater is present.
5. Boxes are not normally suitable for usage where ground movement is an issue and are therefore not recommended for use in live carriageway situations or adjacent existing buildings or structures.
6. Flying of the box above the base of the excavation is not recommended.
7. Box systems are very heavy and great care must be taken in selecting a suitable excavator for handling, installing and extracting these systems. If stacking panels on site, timber packers must be used to separate the panels.
8. Boxes should not be left in-situ for extended periods within cohesive or very weak soils as earth pressures / adhesion on the panel surfaces may increase significantly with time requiring additional extraction forces to release the panels.
9. Always use MGF specified extraction chains to release an in-situ box from the ground prior to any attempt to lift the box out of the trench. Always use MGF specified lifting chains when lifting and handling the boxes or components. N.B. If a box becomes stuck extraction forces of up to 500kN (50t) can be required to release each corner.



10. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
11. Always enter manhole box via a ladder located within the box and never from an unsupported edge.
12. During lifting or extraction operations ensure personnel are well clear of the equipment.



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF MANHOLE BOXES**

mgf.co.uk/products/manhole-box





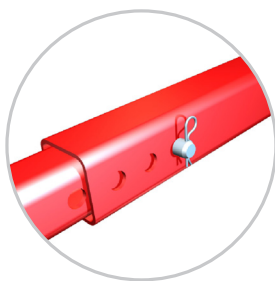
HANDLING POINT

All manhole boxes are lifted and handled by attaching MGF lifting chains to the handling points as shown.



60 / 100 THICK PANEL CONNECTOR DETAILS

60 / 100 thick panels connect to each other using a fork connector, pin and r-clip detail.



TELESCOPIC STRUT DETAIL

Telescopic strut inners and outs are connected using a pin and r-clip detail.



STRUT POCKET PIN DETAIL

Telescopic struts are connected to the panel pockets using a pin and r-clip detail.



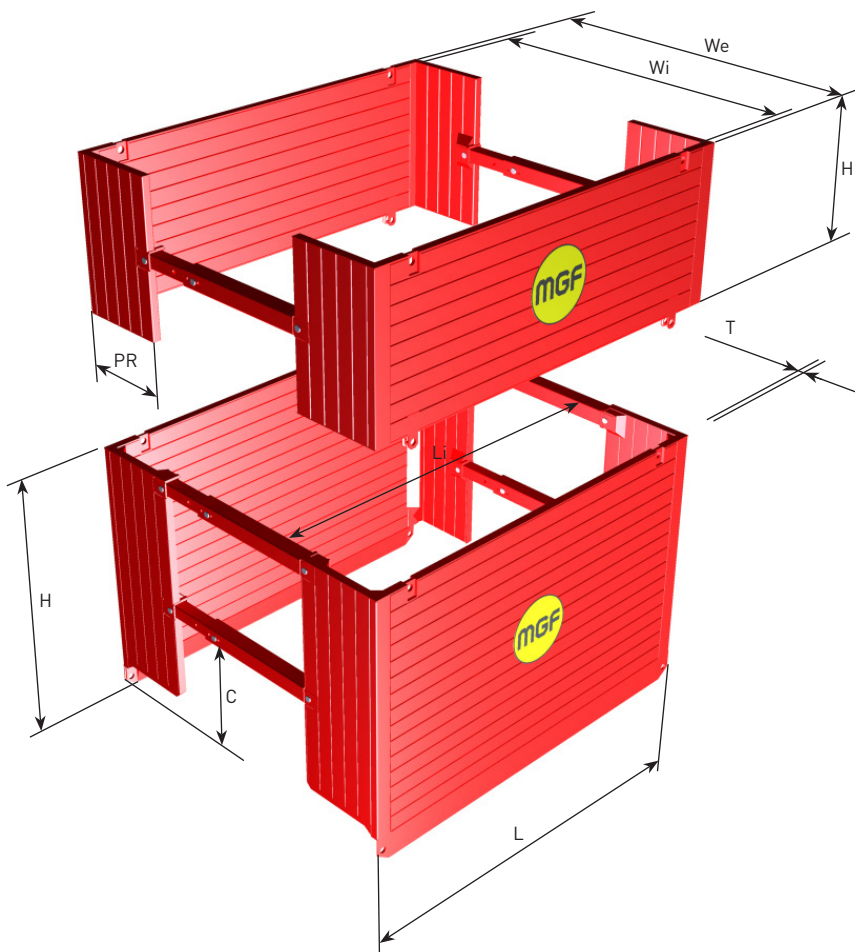
	Product ID												
	4.203	4.201	4.202	4.210	4.220	4.230	4.240	4.250	4.260	4.270	4.280	4.290***	4.295***
Description L x H	2000 x 1780 LW Base	2000 x 1780 Base	2000 x 1100 Top	2500 x 2020 Base	2500 x 1100 Top	3000 x 2020 Base	3000 x 1100 Top	3500 x 2562 Base	3500 x 1624 Top	4400 x 2562 Base	4400 x 1624 Top	5200 x 2510 Base	5200 x 1620 Top
Alternative Name	Lightweight Micro Base	Micro Base	Micro Top	Mini Base	Mini Top	Midi Base	Midi Top	Standard Base	Standard Top	Titan Base	Titan Top	N/A	N/A
Max. Depth** [m]	3.98	3.98	N/A	4.22	N/A	4.22	N/A	5.81	N/A	5.81	N/A	5.75	N/A
Panel Resistance SWL (kN/m ²)	45	45	45	45	45	45	45	45	45	45	45	40	40
Panel Thick / Weight T(mm)/(kg)	60 / 380	60 / 488	60 / 341	60 / 684	60 / 414	60 / 767	60 / 459	100 / 1340	100 / 939	100 / 1797	100 / 1222	100 / 2646	100 / 2016
Approx Assembled Weight (kg)	908	1122	714	1540	938	1692	1018	2762	1996	3824	2964	5997	4384
Internal Trench Width* Wi(mm)	1880	1880	1880	2380	2380	2880	2880	3300	3300	4130	4130	5060	5060
Trench Width* We(mm)	2000	2000	2000	2500	2500	3000	3000	3500	3500	4330	4330	5260	5260
Clearance Below Bottom Struts Cl(mm)	810	810	N/A	923	N/A	923	N/A	1316	N/A	1300	N/A	1600	N/A
Clearance Between Struts Li(mm)	1751	1751	1751	2251	2251	2751	2751	3251	3251	4151	4151	4840	4840
Panel Return PR(mm)	550	550	550	670	670	670	670	912	912	1312	1312	1600	1600
Telescopic Strut Type	100	100	100	100	100	100	100	100	100	100	100	150	150

* Greater widths (up to 5m) possible utilising 100 telescopic struts provided struts are not laterally loaded by return sheets / panels.

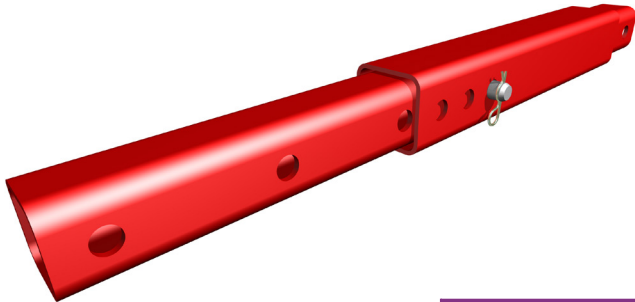
** Max. depths achievable using a base and 2 tops.

***5.2m manhole box system must not have sheets or Endsafe Panels bearing up against the telescopic struts to close off open ends, instead Endsafe Panels must be installed so they bear on the panel returns a minimum of 75mm each side.



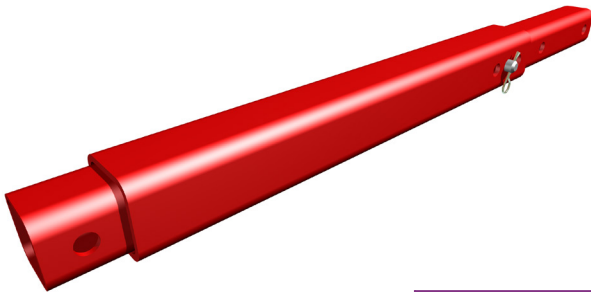


100 TELESCOPIC STRUTS



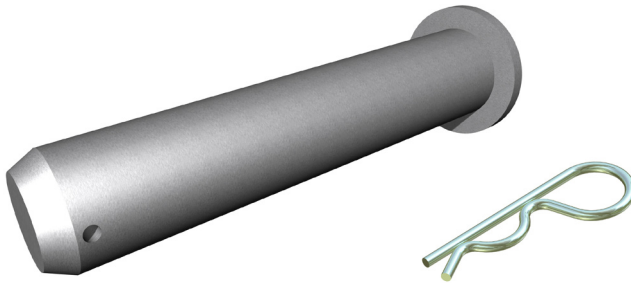
Component		Strut Inner	Strut Outer
	Specification	100x100x10 SHS	120x120x8 SHS
	Material Grade	S355	S355
	Axial SWL	160kN	160kN
	Moment SWL	20kNm	20kNm
	Hole Details	Φ30mm holes	Φ30mm holes
	Unit Mass	27.4kg/m	26.4kg/m

150 TELESCOPIC STRUTS



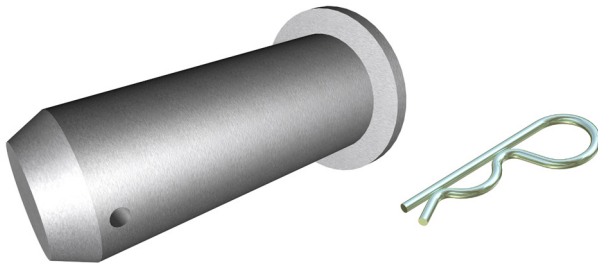
Component		Strut Inner	Strut Outer
	Specification	150x150x12.5 SHS	180x180x10 SHS
	Material Grade	S355	S355
	Axial SWL	492kN	492kN
	Moment SWL	38.9kNm	38.9kNm
	Hole Details	Φ48mm holes	Φ48mm holes
	Unit Mass	52.7kg/m	50.7kg/m

TELESCOPIC STRUT PINS AND RETAINING CLIPS



Component		100 Strut Pin	150 Strut Pin
	Specification	Ø28mm round bar, 160mm long	Ø45mm round bar, 220mm long
	Material Grade	080M40 (EN8)	080M40 (EN8)
	Shear SWL	228kN	492kN
	Weight	1kg	3kg


MANHOLE BOX CONNECTOR PINS AND RETAINING CLIPS




Component		Manhole Box Connector Pin	203/254 UC Connecting Pin
	Compatible Manhole Box Product ID	4.203, 4.201, 4.202, 4.210, 4.220, 4.230, 4.240, 4.250, 4.260, 4.270, 4.280	4.290, 4.295
	Specification	Φ40mm round bar, 100mm long	Φ50mm bar, 150mm long
	Material Grade	080M40 (EN8)	708M40 (EN19A)
	Shear SWL	308kN	600kN
	Weight	1kg	3kg

100 TELESCOPIC STRUT COMBINATIONS

STRUT INNERS (100x100x10 SHS)

4.602  12kg

4.603  18kg

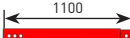
4.604  27kg

4.605  39kg

STRUT OUTERS (120x120x8 SHS)

4.611  14kg

4.612  19kg

4.613  30kg

4.614  43kg

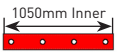
Strut Length	Inner Type	Outer Type	Assembled Weight
(mm)	Product ID	Product ID	(kg)
605 - 835	4.602	4.611	27
870 - 1220	4.603	4.612	38
1275 - 1725	4.604	4.613	58
1775 - 2725	4.605	4.614	83

If the above 100 telescopic strut combinations cannot be achieved a minimum overlap of at least 150mm must be provided between the inner and outer. Struts should only be assembled using 1 inner and 1 outer.

150 TELESCOPIC STRUT COMBINATIONS


STRUT INNERS (150x150x12.5 SHS)

4.802  36kg


4.803  50kg


4.804  79kg

STRUT OUTERS (180x180x10 SHS)

4.812  43kg

4.813  63kg

4.814  88kg

4.815  129kg

Strut Length	Inner Type	Outer Type	Assembled Weight
(mm)	Product ID	Product ID	(kg)
1020 - 1320	4.802	4.812	82
1420 - 1820	4.803	4.813	116
1920 - 2620	4.804	4.814	170
2720 - 3000	4.804	4.815	211

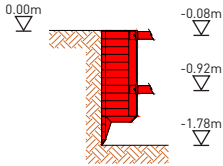
If the above 150 telescopic strut combinations cannot be achieved a minimum overlap of at least 250mm must be provided between the inner and outer. Struts should only be assembled using 1 inner and 1 outer.

150 telescopic struts are only compatible with 5200 Manhole Box Base and Top.

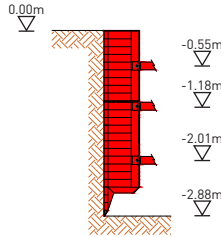


MAXIMUM RECOMMENDED DEPTHS / CONFIGURATIONS

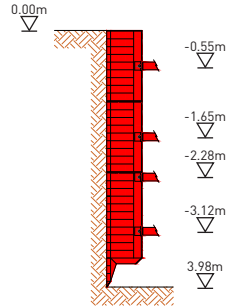
MGF 2000 x 1780 BASE



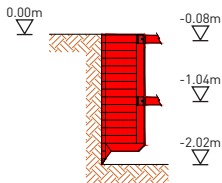
MGF 2000 x 1780 BASE
& MGF 2000 x 1100 TOP



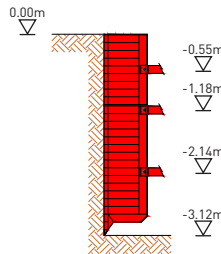
MGF 2000 x 1780 BASE
& 2 NO. MGF 2000 x 1100 TOPS



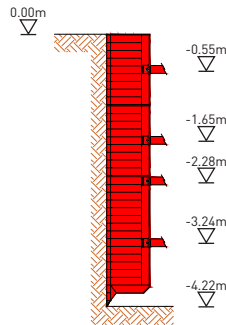
MGF 2500 x 2020 BASE
OR
MGF 3000 x 2020 BASE



MGF 2500 x 2020 BASE
& MGF 2500 x 1100 TOP
OR
MGF 3000 x 2020 BASE
& MGF 3000 x 1100 TOP

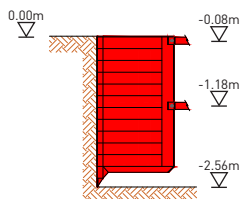


MGF 2500 x 2020 BASE
& 2 NO. MGF 2500 x 1100 TOPS
OR
MGF 3000 x 2020 BASE
& 2 NO. MGF 3000 x 1100 TOPS

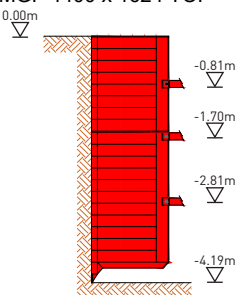


MAXIMUM RECOMMENDED DEPTHS / CONFIGURATIONS

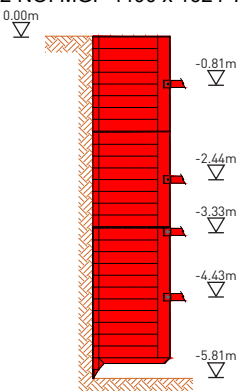
MGF 3500 x 2562 BASE
OR
MGF 4400 x 2562 BASE



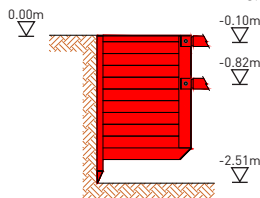
MGF 3500 x 2562 BASE
& MGF 3500 x 1624 TOP
OR
MGF 4400 x 2562 BASE
& MGF 4400 x 1624 TOP



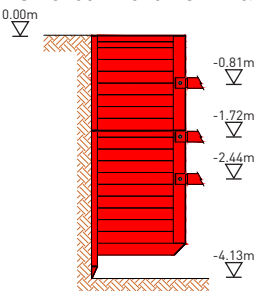
MGF 3500 x 2562 BASE
& 2 NO. MGF 3500 x 1624 TOPS
OR
MGF 4400 x 2562 BASE
& 2 NO. MGF 4400 x 1624 TOPS



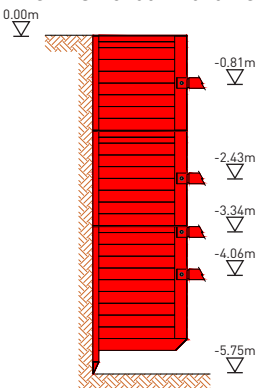
MGF 5200 x 2510 BASE



MGF 5200 x 2510 BASE
& MGF 5200 x 1620 TOP



MGF 5200 x 2510 BASE
& 2 NO. MGF 5200 x 1620 TOPS



SIMPLE TO ASSEMBLE, ROBUST, TWO SIDED EXCAVATION SUPPORT SYSTEM DESIGNED TO BE INSTALLED BY A MIN. 40T - 45T EXCAVATOR UTILISING THE DIG AND PUSH OR EXCAVATE AND LOWER IN PLACE TECHNIQUES.

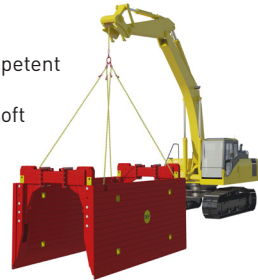
Normally selected for installing utility pipes where ground movement is not critical, with the size of systems specified dependent upon max. depth requirements and size of individual pipe sections and bedding. The system is generally suitable for trench depths of up to 5.0m, widths of up to 5.9m, pipe lengths of up to 6.0m and a pipe OD of up to 3.0m.

Fabricated from fully welded, Grade S355 200x150mm steel box sections to form 150mm thick panels, the system comprises trench box bases to which up to 1 No. trench box top may be added to achieve additional depth. The panels are propped off each other by robust high clearance 400 Series steel struts available in a variety of lengths to suit the required width. Alternatively if a high clearance is not required, and a top is not to be added, lighter MGF 200 Series struts can be connected to the panel using adaptors. All high clearance and 200 Series struts are connected to each other using bolts and nuts, and connected to the panels using simple pin and clip assemblies. The top panel can also use 200 Series struts or 150 Series telescopic struts, which are connected together using pins and r-clips. For all strut configurations see pages 2.4.5 – 2.4.8.

MGF can supply high clearance trench boxes with a full range of suitable lifting and extraction chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, Endsafes end protection panels, trench road plates and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 13331 : 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Boxes should only be used in the configurations shown by competent persons following MGF installation guidelines.
2. Boxes should not be used in very weak ground (especially very soft clays and peats) or where significant groundwater is present.
3. Boxes are not normally suitable for usage where ground movement is an issue and are therefore not recommended for use in live carriageway situations or adjacent existing buildings or structures.
4. Flying of the box above the base of the excavation is not recommended.
5. Box systems are extremely heavy and great care must be taken in selecting a suitable excavator for handling, installing and extracting these systems. If stacking panels on site, timber packers must be used to separate the panels.
6. Boxes should not be left in-situ for extended periods within cohesive or very weak soils as earth pressures / adhesion on the panel surfaces may increase significantly with time requiring additional extraction forces to release the panels.
7. Always use MGF specified extraction chains to release an in-situ box from the ground prior to any attempt to lift the box out of the trench. Always use MGF specified lifting chains when lifting and handling the boxes or components. N.B. If a box becomes stuck extraction forces of up to 500kN (50t) can be required to release each corner.
8. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
9. Where possible always enter trench box via a ladder located within the trench box.
10. During lifting or extraction operations ensure personnel are well clear of the equipment.
11. Ends of trench runs should always be battered back at a safe angle.



LADDERSAFE
See Section 7

DAVITSAFE
See Section 7

EDGESAFE
See Section 7

**HIGH
CLEARANCE
TRENCH
BOX TOP**

**HIGH
CLEARANCE
TRENCH BOX
BASE**

**FOR SAFE SYSTEM OF WORKS GUIDANCE FOR
MGF HIGH CLEARANCE TRENCH BOXES**

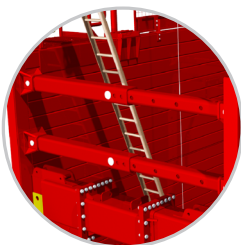
mgf.co.uk/products/high-clearance-trench-box





TOP PANEL 150 SERIES STRUT POCKET PIN DETAIL

Top panel struts are connected to the panel pockets using a pin and r-clip detail.



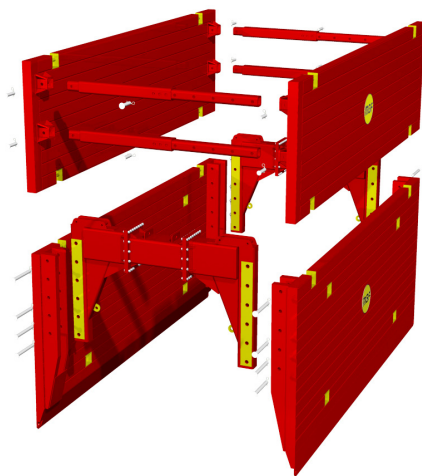
TOP PANEL TELESCOPIC STRUT DETAIL

Telescopic strut inners and outers are connected using a pin and r-clip detail.



BASE TO TOP PANEL CONNECTOR

The high clearance trench box base and top are connected to each other using a connector that hooks around the handling point, it is secured in place using an M30 bolt.



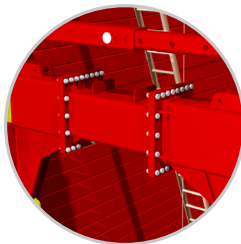
HANDLING POINT

The high clearance trench box base and top are lifted and handled by attaching MGF lifting chains to the handling points as shown.



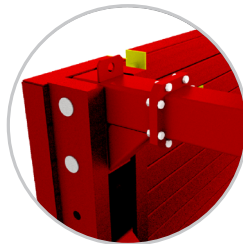
BASE PANEL HIGH CLEARANCE 400 SERIES STRUT SOLDIER PIN DETAIL

Base panel struts are connected to the panel soldier using pins and r-clips. Each high clearance strut requires 4 No. pins each side and the strut can be slid down and locked in position to assist transport / handling / storage.



BASE PANEL HIGH CLEARANCE 400 SERIES STRUT DETAIL

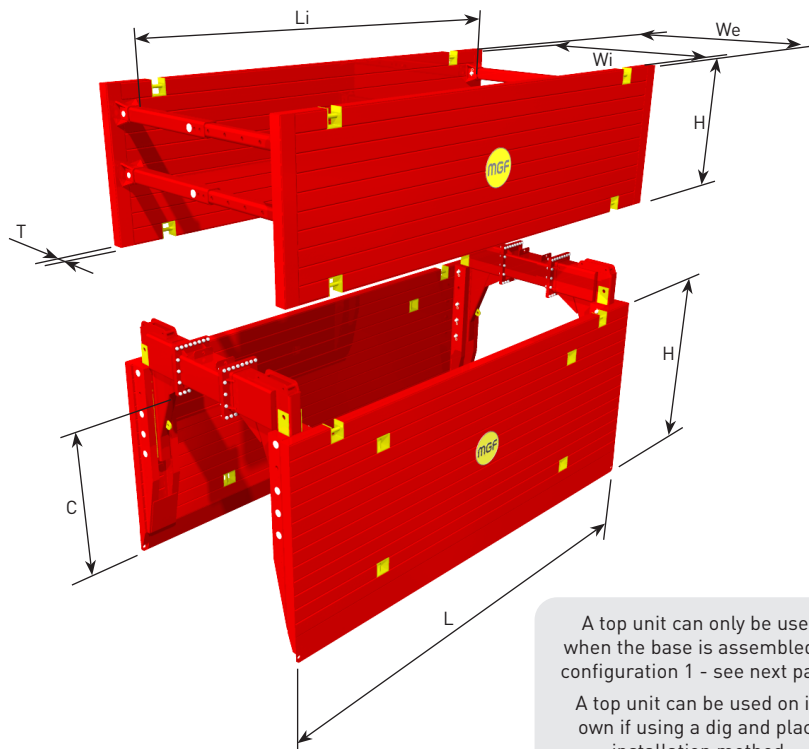
The base struts and extensions are connected using 20No. M24x100 (min.) bolts c/w nuts and washers.



200 SERIES STRUT DETAIL

The 200 Series strut extensions are connected to the relevant base or top panel adaptors using 8No. M20x65 (min.) bolts c/w nuts and washers. Each 200 Series base panel strut adaptor requires 2 pins either side, the top panel adaptor requires 1 pin either side.





A top unit can only be used when the base is assembled to configuration 1 - see next page.

A top unit can be used on its own if using a dig and place installation method.

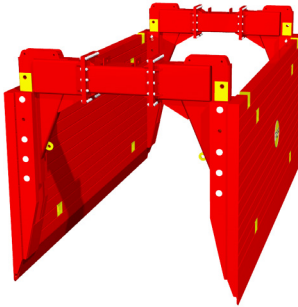
Product ID	Description L x H	Max. Depth (m)	Panel Resistance SWL (kN/m ²)	Panel Thick / Weight T (mm)/(kg)	Approx Assembled Weight* (kg)	Internal Trench Width Wi (mm)	Trench Width We (mm)	Max. Clearance Below Bottom Struts C (mm)	Min. Clearance Between Struts Li (mm)	Strut Type
4.199	7000 x 3000 Base	5.0	40	150 / 3500	9720-11550	2100-5600	2400-5900	3000	5960	High Clearance / 200 Series
4.1995	7000 x 2000 Top	2.0	40	150 / 2250	4826-5581	2100-5600	2400-5900	800	6200	150 telescopic / 200 Series

* These weights correspond to strut configuration 1 as detailed on pg 2.4.5 and strut configuration 5 on pg 2.4.7.



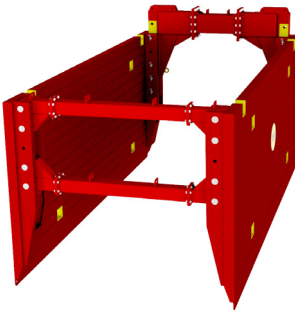
BASE PANEL STRUTS

1



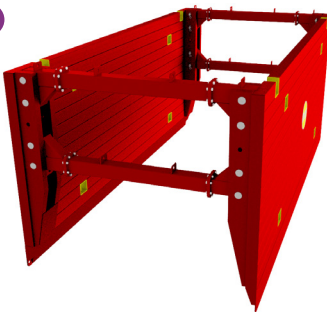
Suitable for trench widths
2.4m – 5.9m.

2



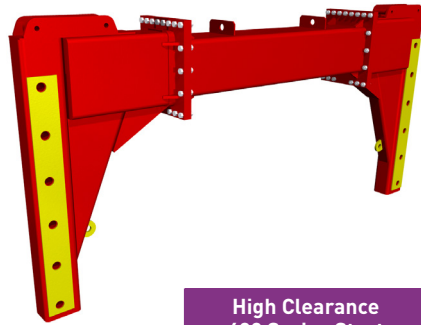
Suitable for trench widths 2.4m – 5.4m
cannot be used with top unit.

3



Suitable for trench widths 2.4m – 5.4m
cannot be used with top unit.

HIGH CLEARANCE STEEL STRUTS



Component	High Clearance 400 Series Strut	
	Specification	400x400x16 SHS
	Material Grade	S355
	Axial SWL	2500kN
	Moment SWL	703kNm
	Bolting Details	20 No. M24x100 (min.) grade 8.8 bolts and nuts c/w washers
	Unit Mass	191kg/m

200 SERIES STEEL STRUTS C/W ADAPTORS

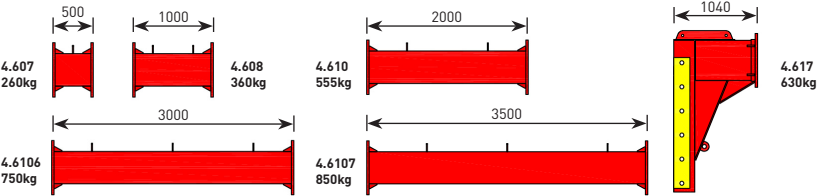


Component	200 Series Strut	
	Specification	200x200x8 SHS
	Material Grade	S355
	Axial SWL	600kN
	Moment SWL	100kNm
	Bolting Details	8 No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers
	Unit Mass	47.7kg/m

BASE PANEL STRUT COMBINATIONS

HIGH CLEARANCE 400 SERIES STRUT

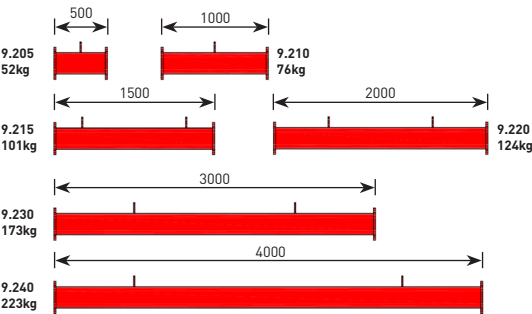
HIGH CLEARANCE 400 SERIES STRUT EXTENSIONS (400x400x16 SHS)



		Trench Width	Strut Extension	Assembled Weight
		(mm)	Product ID	(kg)
Strut End	4.617	2400	NONE	1260
	4.617	2900	4.607	1520
	4.617	3400	4.608	1620
	4.617	3900	4.607 & 4.608	1880
	4.617	4400	4.610	1815
	4.617	4900	4.610 & 4.607	2075
	4.617	5400	4.6106	2010
	4.617	5900	4.6107	2110

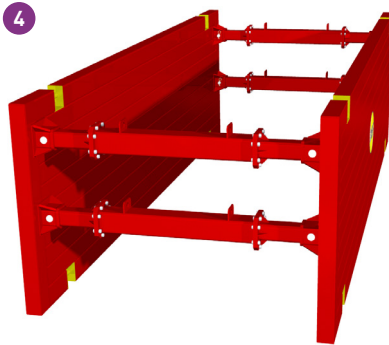
BASE PANEL 200 SERIES STRUTS

200 SERIES STRUT EXTENSIONS (200x200x8 SHS)

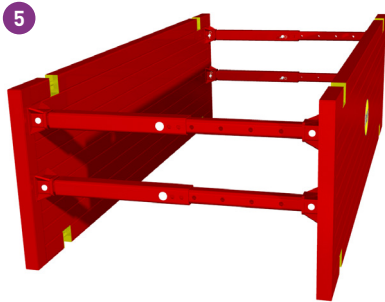


		Trench Width	Strut Extension	Assembled Weight
		(mm)	Product ID	(kg)
Strut End	4.6075	2400	9.210	226
	4.6075	2900	9.215	251
	4.6075	3400	9.220	274
	4.6075	3900	9.220 & 9.205	326
	4.6075	4400	9.230	323
	4.6075	4900	9.230 & 9.205	375
	4.6075	5400	9.240	373

TOP PANEL STRUTS

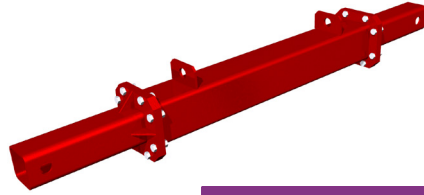


Suitable for trench widths 2.4m – 5.9m



Suitable for trench widths 2.4m - 3.9m

200 SERIES STRUTS C/W ADAPTOR



200 Series Strut	
Specification	200x200x8 SHS
Material Grade	S355
Axial SWL	600kN
Moment SWL	100kNm
Bolting Details	8 No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers
Unit Mass	47.7kg/m

150 SERIES TELESCOPIC STEEL STRUTS

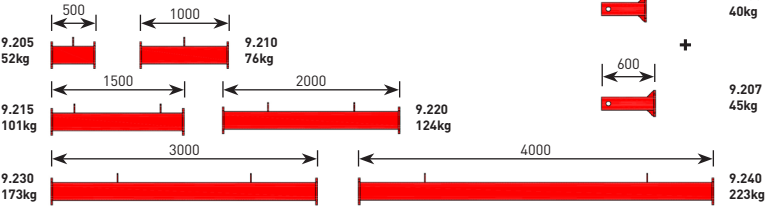


		Strut Inner	Strut Outer
Component	Specification	150x150x12.5 SHS	180x180x10 SHS
	Material Grade	S355	S355
	Axial SWL	492kN	492kN
	Moment SWL	38.9kNm	38.9kNm
	Hole Details	Φ48mm holes	Φ48mm holes
	Unit Mass	52.7kg/m	50.7kg/m

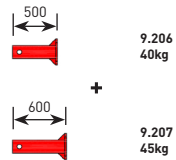
TOP PANEL STRUT COMBINATIONS

200 SERIES STRUTS

200 SERIES STRUT EXTENSIONS (200x200x8 SHS)



200 SERIES TOP PANEL STRUT ADAPTOR



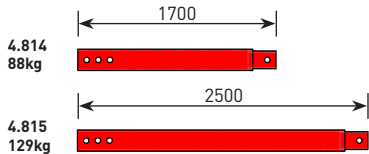
		Trench Width	Strut Extension	Assembled Weight
		(mm)	Product ID	(kg)
Strut End	9.206 & 9.207	2400	9.210	162
	9.206 & 9.207	2900	9.215	187
	9.206 & 9.207	3400	9.220	210
	9.206 & 9.207	3900	9.220 & 9.205	262
	9.206 & 9.207	4400	9.230	259
	9.206 & 9.207	4900	9.230 & 9.205	311
	9.206 & 9.207	5400	9.240	309
	9.206 & 9.207	5900	9.240 & 9.205	361

150 TELESCOPIC STRUT COMBINATIONS

150 SERIES TELESCOPIC STRUT INNERS (150x150x12.5 SHS)



150 SERIES TELESCOPIC STRUT OUTER (180x180x10 SHS)



Trench Width	Inner Type	Outer Type	Assembled Weight
(mm)	Product ID	Product ID	(kg)
2400 - 2900	4.804	4.814	170
3400 - 3900	4.804	4.815	211

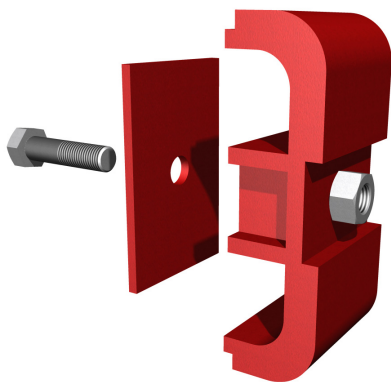
If the above 150 telescopic strut combinations cannot be achieved a minimum overlap of at least 250mm must be provided between the inner and outer. Struts should only be assembled using 1 inner and 1 outer.

STRUT CONNECTING PINS AND RETAINING CLIPS



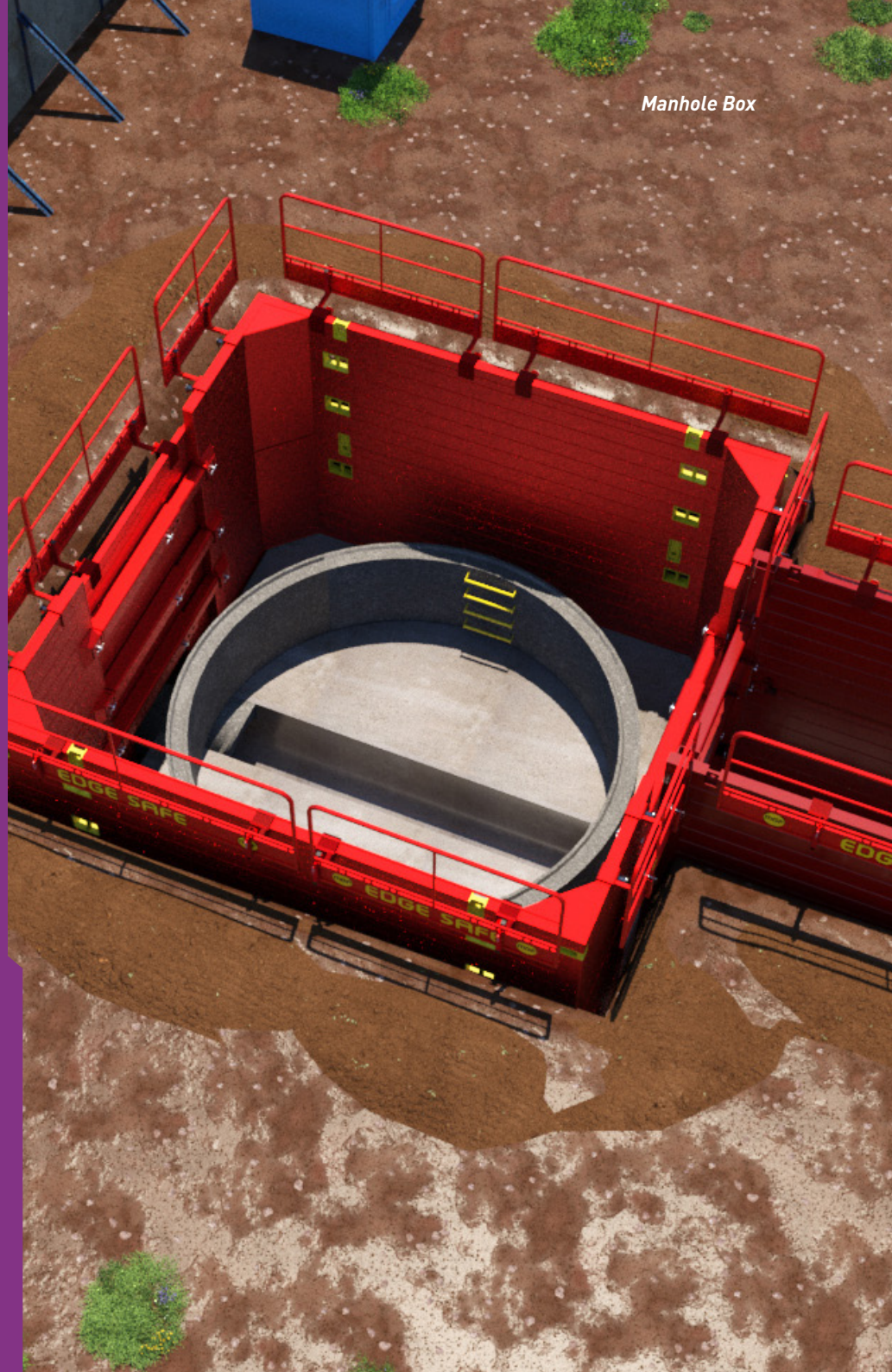
Component		Base Panel Strut Connecting Pin	Top Panel Strut Connecting Pin
	Specification	Ø50mm round bar, 350mm long	Ø45mm round bar, 220mm long
	Material Grade	708M40 (EN19A)	080M40 (EN8)
	Shear SWL	500kN	492kN
	Weight	6kg	3kg

PANEL BASE TO TOP CONNECTOR



Component		Base to Top Connector
	Product ID	4.1026
	Material Grade	S355
	Hole Details	Ø32mm hole
	Weight	20kg
	Bolting Details	M30x130 (min.) grade 8.8 bolt

Manhole Box



SIMPLE TO ASSEMBLE, LIGHT WEIGHT, ROBUST, TWO SIDED MECHANICAL EXCAVATION SUPPORT SYSTEM DESIGNED TO BE INSTALLED BY AN EXCAVATOR UTILISING THE EXCAVATE AND LOWER IN PLACE TECHNIQUE.

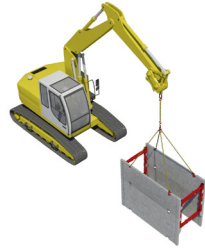
Normally selected for installing shallow utility pipes where ground movement is not critical and where the use of a small excavator restricts the max. weight of the systems specified. The system is generally suitable for trench depths of up to 2.42m, widths of up to 1.75m, pipe lengths of up to 2.5m and a pipe OD of up to 0.75m.

Fabricated from Grade 6082T6 120x60mm aluminium box sections to form 60mm thick panels, the system comprises trench box bases to which up to 1 No. trench box top may be added to achieve additional depth. The panels are propped off each other by robust struts available in a variety of lengths to suit the required width. All components in the system are connected together via simple pin and r-clip assemblies.

MGF can supply aluminium trench boxes with a full range of suitable lifting and extraction chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Endsafe protection panels, trench road plates and confined spaces regime equipment. Manufactured and designed in general accordance with BS EN 13331 : 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Boxes should only be used in the configurations shown by competent persons following MGF installation guidelines.
2. Boxes should not be used in very weak ground (especially very soft clays and peats) or where significant groundwater is present.
3. Boxes are not normally suitable for usage where ground movement is an issue and are therefore not recommended for use in carriageway situations adjacent existing buildings or structures.
4. Flying of the box above the base of the excavation is not recommended.
5. Box systems are heavy and great care must be taken in selecting a suitable excavator for handling, installing and extracting these systems.
6. If stacking panels on site, timber packers must be used to separate the panels.
7. Always ensure box strut on the base unit is fitted with horizontal strut lowest as shown in assembly drawings.
8. Boxes should not be left in-situ for extended periods within cohesive or very weak soils as earth pressures / adhesion on the panel surfaces may increase significantly with time requiring additional extraction forces to release the panels.
9. Always use MGF specified extraction chains to release an in-situ box from the ground prior to any attempt to lift the box out of the trench. Always use MGF specified lifting chains when lifting and handling the boxes or components. N.B. If a box becomes stuck extraction forces of up to 100kN (10t) can be required to release each corner.
10. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
11. Always enter trench box via a ladder located within the box and never from an unsupported edge.
12. During lifting or extraction operations ensure personnel are well clear of the equipment.
13. Ends of trench runs should always be battered back at a safe angle or closed off using sheets or Endsafe panels.
14. Wet concrete can react with aluminium. Panels should be protected from exposure to wet concrete and any splashes cleaned off immediately.



**GRP
LADDER**
See Section 8

LADDERSAFE
See Section 7

EDGESAFE
See Section 7

**ALUMINIUM
TRENCH
BOX TOP**

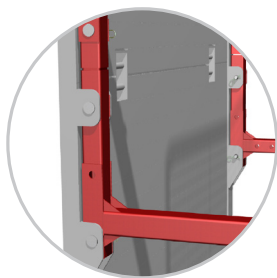
**ALUMINIUM
TRENCH
BOX BASE**



**FOR SAFE SYSTEM OF WORKS GUIDANCE
FOR MGF ALUMINIUM TRENCH BOXES**

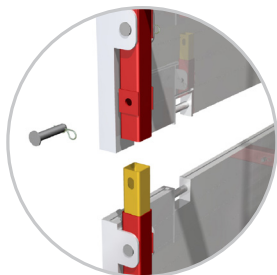
mgf.co.uk/products/aluminium-trench-box





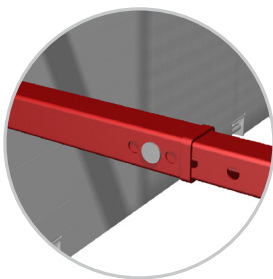
STRUT POCKET PIN DETAIL

Telescopic struts are connected to the panel pockets using a pin and r-clip detail.



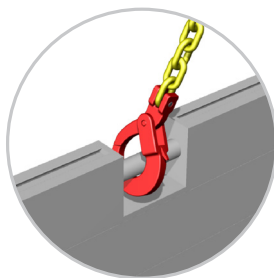
ALUMINIUM PANEL CONNECTOR DETAIL

Panels can be connected together using a connector piece that pins the panel struts together.



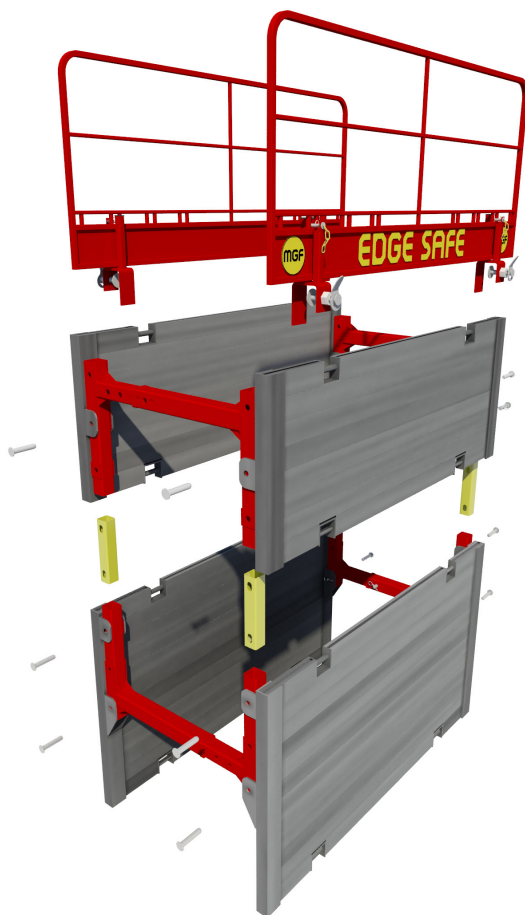
TELESCOPIC STRUT DETAIL

Telescopic strut inners and outers are connected using a pin and r-clip detail.



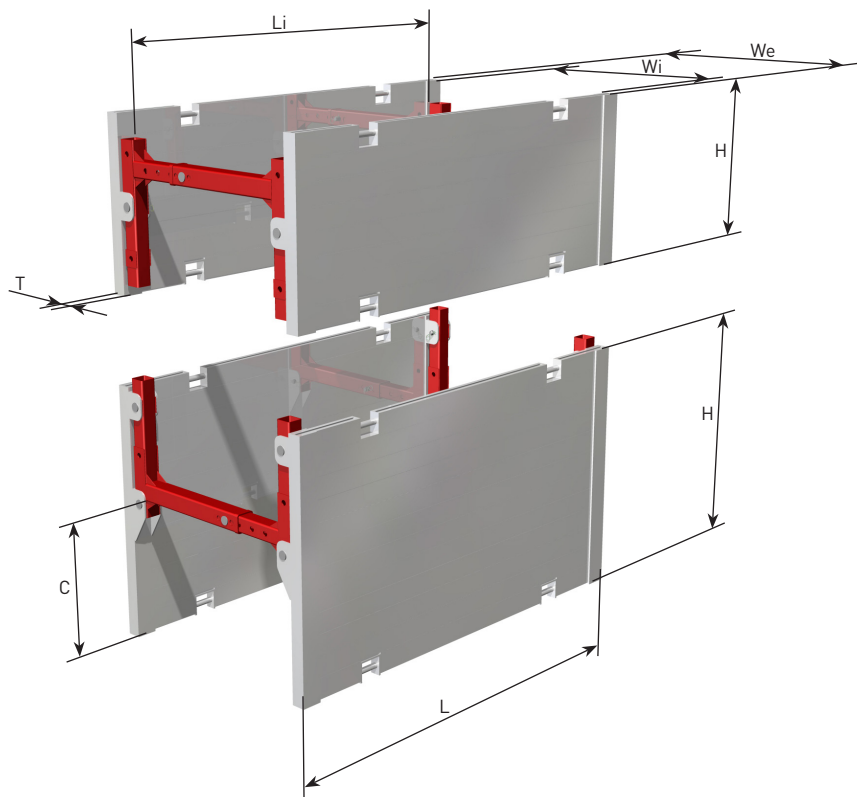
HANDLING POINT

All aluminium trench boxes are lifted and handled by attaching MGF lifting chains to the handling points as shown.



	Product ID					
	4.901	4.9015	4.900	4.9005	4.902	4.9025
Description L × H	2000 × 1450 Base	2000 × 970 Top	2500 × 1450 Base	2500 × 970 Top	3000 × 1450 Base	3000 × 970 Top
Max. Depth* (m)	2.42	2.42	2.42	2.42	2.42	2.42
Panel Resistance SWL (kN/m²)	30	30	30	30	25	25
Panel Thick / Weight T(mm)/(kg)	60 / 145	60 / 98	60 / 168	60 / 112	60 / 191	60 / 126
Approx Assembled Weight (kg)	336	242	382	270	428	298
Internal Trench Width Wi(mm)	735-1635	735-1635	735-1635	735-1635	735-1635	735-1635
Trench Width We(mm)	855-1755	855-1755	855-1755	855-1755	855-1755	855-1755
Clearance Below Bottom Struts C(mm)	825	N/A	825	N/A	825	N/A
Clearance Between Struts Li(mm)	1790	1790	2290	2290	2790	2790
Telescopic Strut Type	U	U	U	U	U	U

* Max. depths achievable using a base and 1 top.



U-TYPE TELESCOPIC STEEL STRUTS



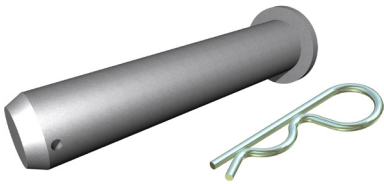
Product ID	Strut Type		Strut Weight
			(kg)
	4.904	U 590 Inner	17
	4.905	U 890 Inner	20
	4.906	U 545 Outer	16
	4.907	U 845 Outer	19

Internal Trench Width	Inner Type	Outer Type
(mm)		
735 - 1035	4.904	4.906
1035 - 1635	4.905	4.907

Component	Strut Inner		Strut Outer
	Specification	90x90x5 SHS	100x100x4 SHS
	Material Grade	S355	S355
	Axial SWL	80kN	80kN
	Moment SWL	12kNm	12kNm
	Hole Details	Ø30mm holes	Ø30mm holes
	Unit Mass	13.1kg/m	11.9kg/m

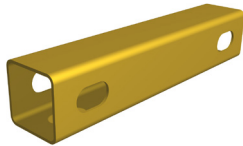
If the above U-Type strut combinations cannot be achieved a minimum overlap of at least 150mm must be provided between the inner and outer.

U-TYPE TELESCOPIC STRUT PINS AND RETAINING CLIPS



Component	U-Type Strut Pin	
	Specification	Ø28mm round bar, 160mm long
	Material Grade	080M40 (EN8)
	Shear SWL	80kN
	Weight	1kg

PANEL BASE TO TOP CONNECTOR



The base and top panels are connected via 4 No. short lengths of box that slot within the vertical sections of the trench struts.

Component	Base to Top Connector	
	Product ID	4.903
	Specification	80x80x3.6 SHS
	Material Grade	S355
	Hole Details	Ø30mm slotted holes
	Weight	7kg
	Shear SWL	70kN

SIMPLE TO ASSEMBLE, ROBUST, TWO SIDED EXCAVATION SUPPORT SYSTEM DESIGNED TO BE INSTALLED BY AN EXCAVATOR UTILISING THE EXCAVATE AND LOWER IN PLACE TECHNIQUE.

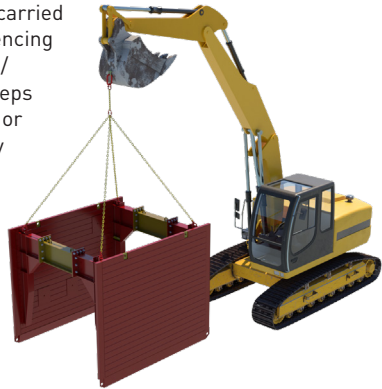
Specifically designed for utility repairs, where ground movement is not critical, the system is suitable for trench depths of up to 2.5m and widths of up to 3.85m. The system has 2.18m clearance between the struts and a max. understrut clearance of 1.95m, making it suitable for pipe sizes of up to DN1500.

Fabricated from fully welded, Grade S355 120x60mm steel box sections to form 60mm thick panels, the system comprises 2.5m tall panel sections which are propped off each other with 2 high clearance, bolted struts, available in a variety of combinations to enable internal trench widths from 1.5m up to 3.85m.

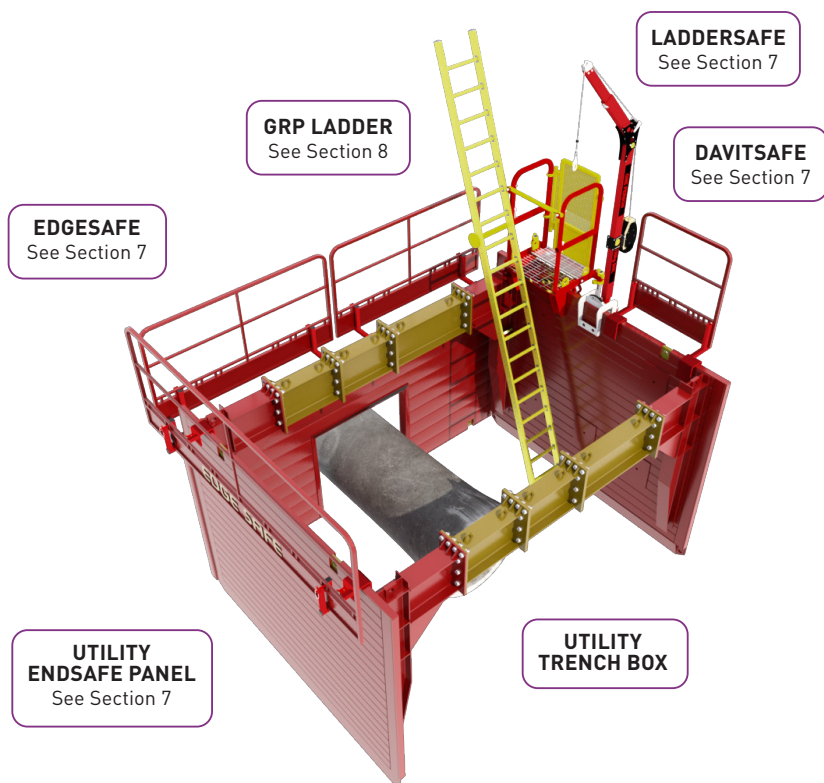
MGF can supply the systems with a full range of suitable lifting and extraction chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, Endsafes end protection panels, trench road plates and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 13331 : 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. MGF Utility Trench Boxes should only be installed using an excavate and lower in place technique and must not be driven.
2. A Risk Assessment / Method Statement must be carried out at site level by the user prior to works commencing to identify and control site / task specific hazards / risks including ensuring suitable and sufficient steps are taken to prevent any person, work equipment or any accumulation of material from falling into any excavation.
3. MGF Utility Trench Box should only use the strut configurations as detailed on page 2.6.5 in ground assessed as self-supporting by competent persons following MGF installation guidelines.
4. Boxes should not be used in very weak ground (especially very soft clays and peats) or where significant groundwater is present.
5. Boxes are not normally suitable for usage where ground movement is an issue and are therefore not recommended for use in live carriageway situations or adjacent to existing buildings or structures.
6. Flying of the box above the base of the excavation is not recommended.
7. Keep hands and fingers away from pinch points when making connections.
8. MGF Utility Trench Box systems are heavy and great care must be taken in selecting a suitable excavator for handling, installing and extracting these systems.
9. If stacking panels on site, timber packers must be used to separate the panels.
10. Boxes should not be left in-situ for extended periods within cohesive or very weak soils as earth pressures / adhesion on the panel surfaces may increase significantly with time requiring additional extraction forces to release the panels.



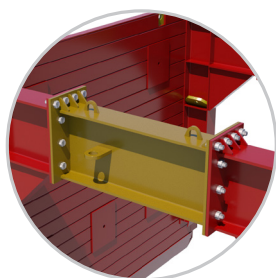
11. Always use MGF specified extraction chains to release a stuck box from the ground prior to any attempt to lift the box out of the trench. Always use MGF specified lifting chains when lifting and handling the boxes or components. N.B. If a box becomes stuck extraction forces of up to 100kN (10t) can be required to release each corner.
12. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
13. Always enter the Utility Trench Box via a ladder located within the box and never from an unsupported edge.
14. During lifting or extraction operations ensure personnel are well clear of the equipment.
15. Ends of trench runs should always be battered back at a safe angle or closed off using MGF Endsafe Panels.
16. Ensure all strut connecting bolts are installed and fully torqued prior to installing the box.
17. Avoid standing on steel panels, especially when wet.



**FOR SAFE SYSTEM OF WORKS GUIDANCE
FOR MGF UTILITY TRENCH BOXES**

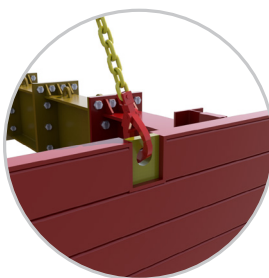
mgf.co.uk/products/utility-trench-box





STRUT EXTENSION DETAIL

Utility Trench Box struts are simply bolted together using 10No. grade 8.8 M24X70 bolts and nuts.

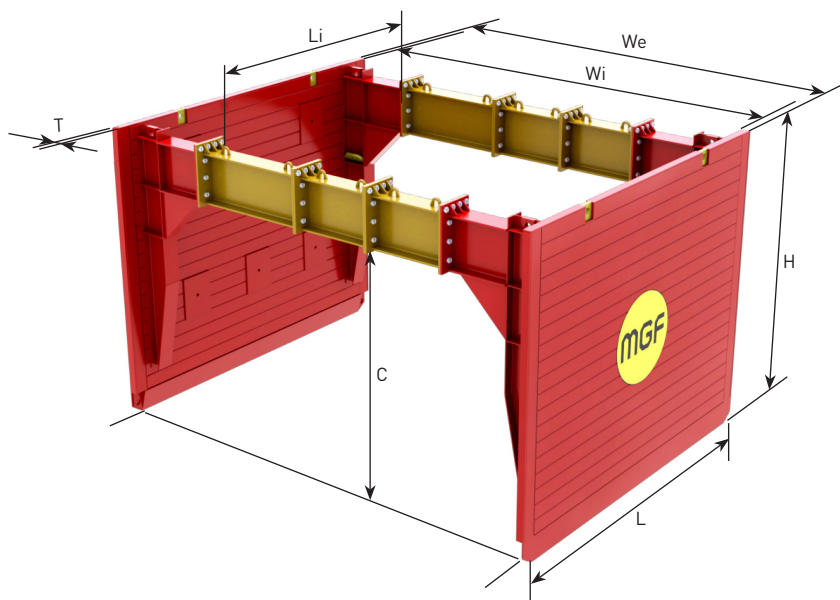


HANDLING POINT
All Utility Trench Boxes are lifted and handled by attaching MGF lifting chains to the handling points as shown.



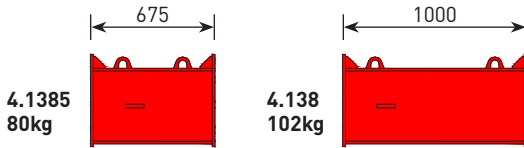
STRUT HANDLING POINTS

Utility Trench Box strut extensions feature 2 types of lifting points, enabling horizontal and vertical lifts. When installing struts onto panels they should be lowered vertically onto the panel connecting plates.

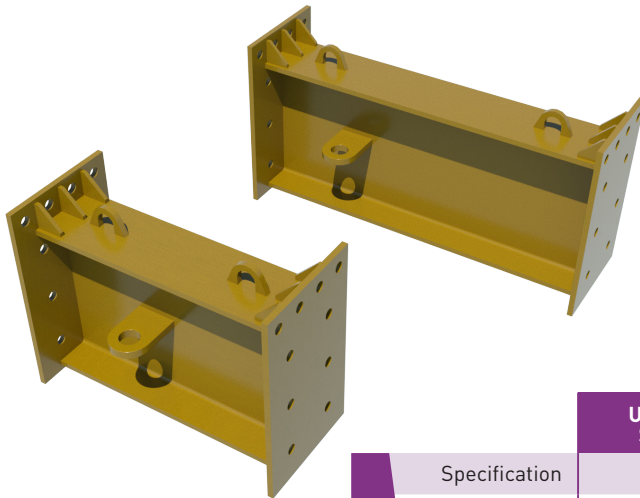


Product ID	4.135
Description L x H (mm)	3000 x 2500
Max. Depth (m)	2.5
Panel Resistance SWL (kN/m²)	45
Panel Thick/ Weight T(mm)/(kg)	60 / 900
Approx Assembled Weight (kg)	1800 - 2324
Internal Trench Width Wi(mm)	1500 - 3850
Trench Width We(mm)	1620 - 3970
Clearance Below Bottom Struts C(mm)	1950
Clearance Between Struts Li(mm)	2180



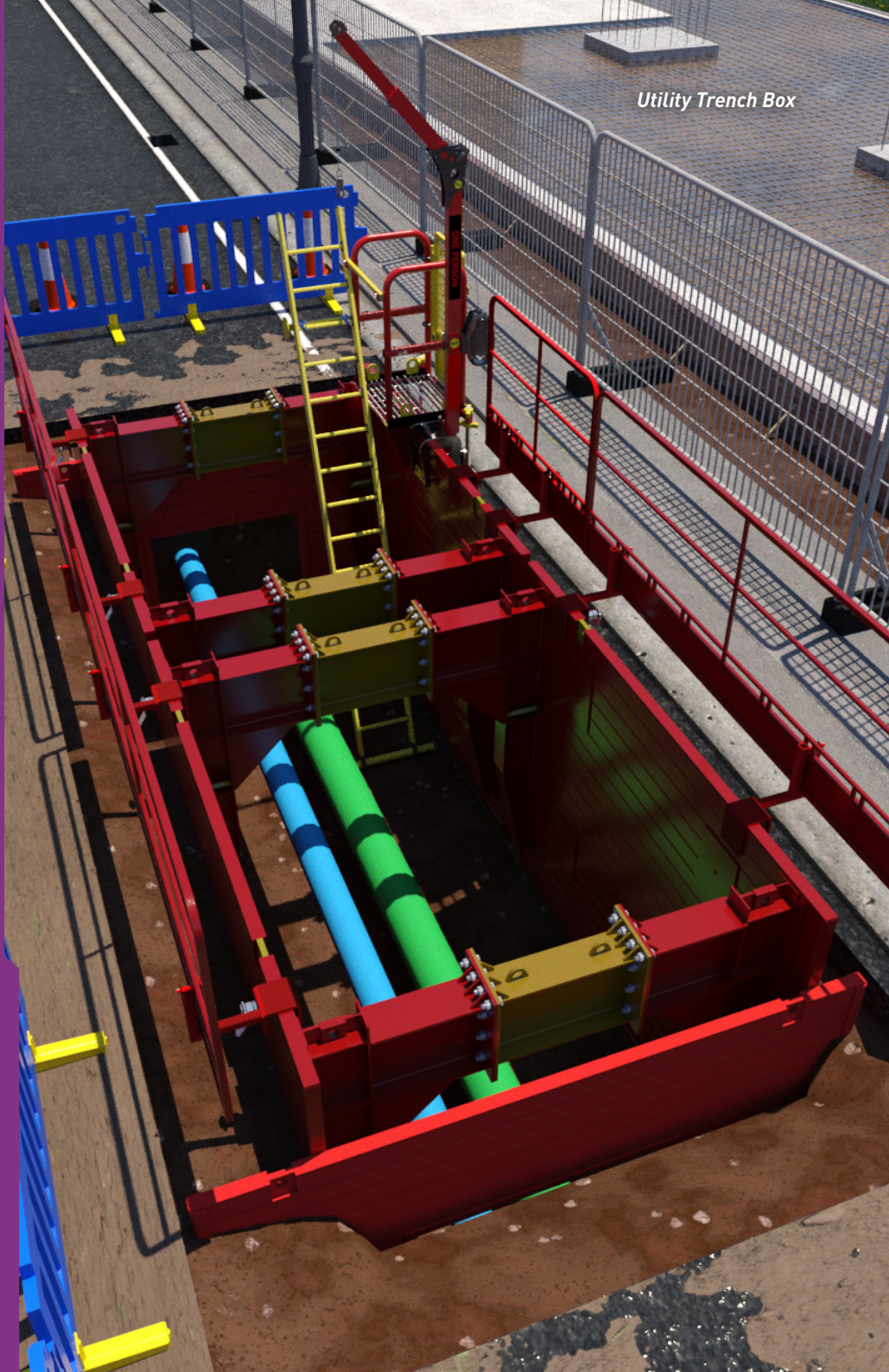


External Trench Width	Internal Trench Width	Strut Extension Components	Assembled Weight
(mm)	(mm)	(per strut)	(kg)
1620	1500	None	1800
2300	2180	1No. 675mm (4.1385)	1960
2620	2500	1No. 1000mm (4.138)	2004
2970	2850	2No. 675mm (4.1385)	2120
3300	3180	1No. 675mm (4.1385) & 1No. 1000mm (4.138)	2164
3620	3500	2No. 1000mm (4.138)	2208
3970	3850	2No. 675mm (4.1385) & 1No. 1000mm (4.138)	2324



Utility Trench Box Strut Extension	
Specification	406x178x67 UB
Material Grade	S355
Axial SWL	170kN
Hole Details	10No. holes for M24x70 bolts and nuts
Unit Mass	67kg/m

Utility Trench Box



MGF KING POSTS AND INFILL LINING PANELS ARE AN IDEAL SOLUTION WHEN IT IS NOT FEASIBLE TO INSTALL SHEET PILES DUE TO HARD GROUND CONDITIONS.

The system is made up of steel king posts, generally UC sections that are dropped into augured holes, below formation level and cast in concrete (the toe-in and centres of the posts are given by design calculation). MGF steel infill lining panels are provided between the posts to support the retained earth. The posts are usually lowered within the hole, which is filled to formation level with concrete and allowed to set, prior to excavating and installing the panels. The installation method includes pre-auguring, post install, concrete cured to formation level prior to excavating and panel installation.

The posts commonly range in section size from 203UC to 406UC and the range of infill panels measure from 1.2m up to 4.0m in length and two can be joined together to assist removal. The required auger size usually ranges from 450mm to 900mm in diameter.

The infill lining panels are manufactured from fully welded, Grade S355 120x60mm or 200x100mm steel box sections to form 60mm or 100mm thick panels. The range of panels can be connected to achieve additional retained heights, subject to design check.

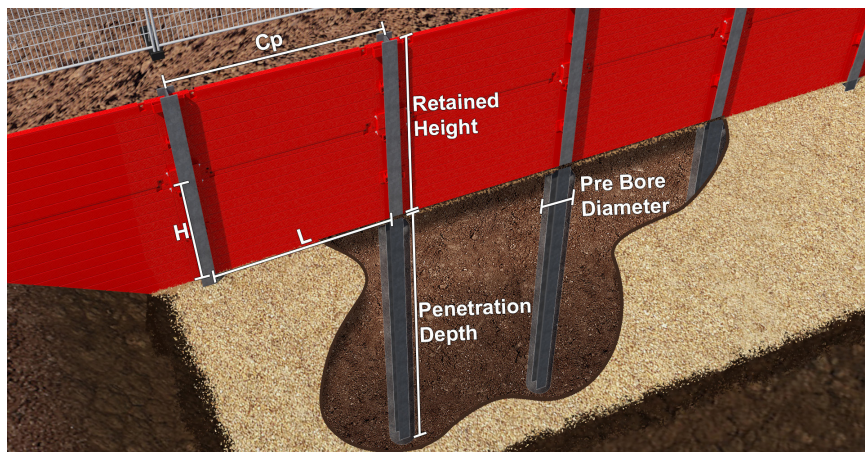
MGF can supply the systems with a full range of suitable lifting and extracting chains.

Manufactured and designed in accordance with BS EN 13331 : 2002 Parts 1 & 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. The systems should only be used in the configurations shown by competent persons following MGF detailed design and drawings.
2. King posts must be installed vertically to the specified depths and centres.
3. King post panels must be installed in line with each other. They can be connected, stacking panels on top of each other using pins and r-clips.
4. King post and panel components can be heavy, therefore care must be taken in selecting a suitable excavator for handling, installing and extracting these systems. If stacking panels on site, timber packers must be used to separate the panels.
5. Prior to any lifting operation all panel lifting points must be carefully inspected by a competent person for evidence of damage.
6. During lifting or extraction operations ensure personnel are well clear of the equipment.
7. The installation of the king post panels must only commence once the concrete has achieved sufficient strength.
8. If the king post panels have pockets they should be located on the retained side of the excavation. The pockets will act as a guide between the flanges of the king post. Otherwise timber packing may be required depending on the design for the panel and the UC section.
9. Excavation should cease at formation level, this will correspond with the top of concrete surrounding the king posts.





Panel (L x H)	Panel Thickness	Product ID	Weight	Panel SWL	Required King Post Centres, Cp
(mm)	(mm)		(kg)	(kN/m ²)	(m)
3000 x 2010 LW Base	60	4.125	435	45	3.1
3000 x 2010 Base	60	4.120	586	45	3.1
3000 x 1100 Top	60	4.140	320	45	3.1
3500 x 2462 Base	100	4.160	970	50	3.6
3500 x 1624 Top	100	4.180	686	50	3.6
1800 x 1200 Endsafe	60	4.191	225	45	1.9
2400 x 1200 Endsafe	60	4.192	290	45	2.5
2400 x 1800 Endsafe	60	4.193	410	45	2.5
3000 x 2000 Endsafe	60	4.194	510	45	3.1
2400 x 2400 Endsafe	60	4.196	380	45	2.5
4000 x 2000 Endsafe	100	4.195	845	45	4.1

Base and top units can be connected to achieve additional height.
Endsafe panels cannot be connected to achieve additional height.





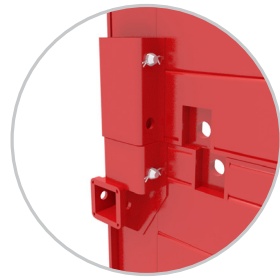
HANDLING POINT

All panels are lifted and handled by attaching MGF lifting chains to the handling points as shown.



60MM THICK BASE TO TOP CONNECTION DETAIL

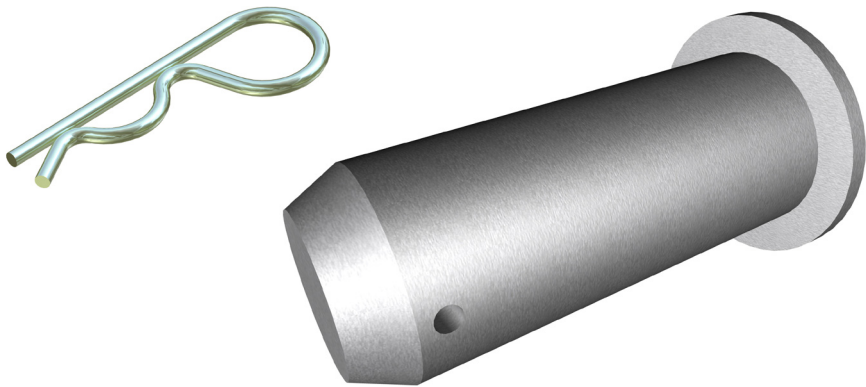
Panels connect to each other using a fork connector, pin and r-clip detail.



100MM THICK BASE TO TOP CONNECTION DETAIL

Panels connect to each other using a drop-down connector, a pin and r-clip detail.

INFILL PANELS CONNECTOR PINS AND RETAINING CLIPS



		60 Thick Panels	100 Thick Panels
Component	Specification	Ø40mm round bar, 100mm long	Ø32mm round bar, 210mm long
	Material Grade	080M40 (EN8)	080M40 (EN8)
	Shear SWL	384kN	308kN
	Weight	1kg	1kg

King post and panels



WALERS AND STRUTS



WALERS AND STRUTS	3.1
ENDSAFE STRUTS	3.2
ALUMINIUM VERTISHORE	3.3

Walers and Struts



MGF WALERS AND STRUTS ARE SIMPLE TO ASSEMBLE, TWO SIDED, HYDRAULIC BRACING SYSTEMS DESIGNED TO BE USED WITH STEEL TRENCH SHEETS TO HORIZONTALLY BRACE SMALL TRENCHES FOR THE SAFE INSTALLATION OF UTILITIES.

The range comprises 5 types of waler rail and two sizes of hydraulic waler strut together with 0.25m, 0.5m and 1.0m strut extension bars. The systems can support trench widths of 0.6m to 6.0m and are normally installed using excavators. MGF also provide aluminium vertishore, a lightweight hydraulic system used to brace small trenches vertically.

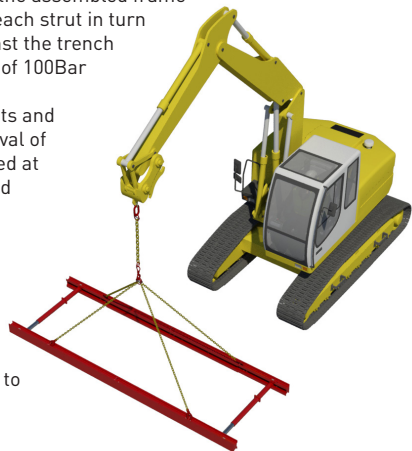
Fabricated from either grade S355 / S460 / S700 steel profiles or grade 6082T6 aluminium profiles, the waler rails are attached to the hydraulic struts and extensions, depending on width, using simple pin and r-clip assemblies. The 250kN hydraulic struts attach to the 152 UC Waler using clamps or cleats. Each strut contains a hydraulic ram with between 300mm and 670mm of stroke. Connecting the rams (via hydraulic hoses) to an MGF hand operated hydraulic pump unit containing hydraulic shoring fluid allows the waler system to be quickly and easily adjusted to suit the excavation dimensions. Once the trench frames are fully assembled and located at the correct line and level, the rams are pre-loaded against the trench sheets using a hydraulic pump. Pre-loading of the struts ensures the frame cannot slip and minimises the extent of potential ground movements. Self sealing quick release valves and mechanical isolation valves ensure that the hydraulic ram pressure cannot be accidentally released once installed. Handling and restraining points are provided on each waler to assist assembly / removal and to allow the brace to be supported off MGF restraining chains attached to the trench sheets by hooks.

MGF can supply the systems with a full range of suitable handling and restraining chains, Edgesafe edge protection panels, Endsafe end protection struts, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces equipment.

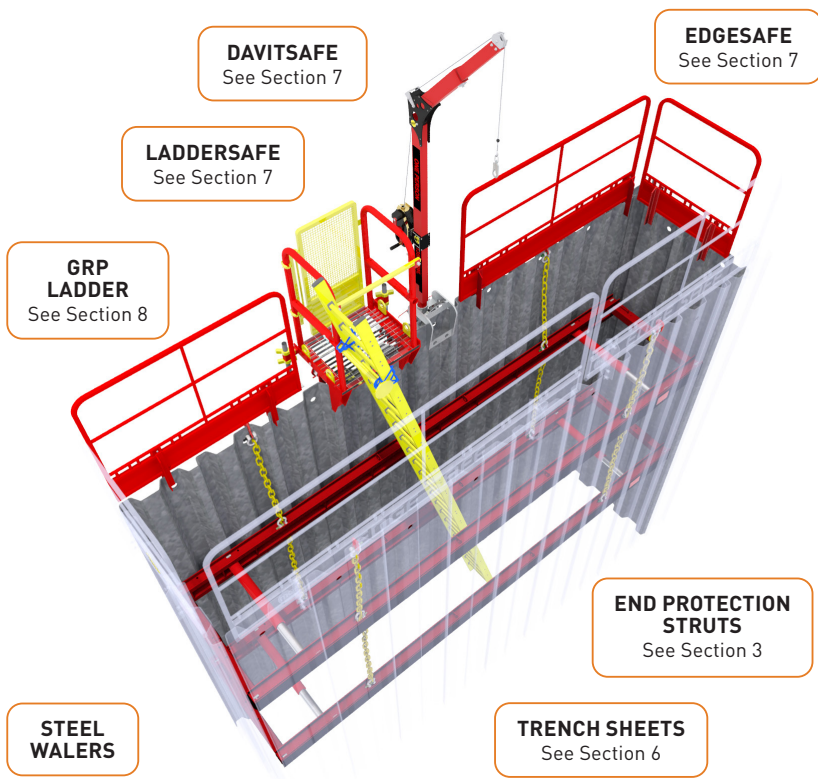
Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Waler and trench strut systems should only be installed and removed by competent persons in accordance with a site specific detailed design and installation sequence and MGF installation guidelines. Struts can be located at a variety of positions along the length of the waler. The exact location of the struts will determine the safe working load of the waler system.
2. Installation is normally carried out by lowering the assembled frame to the correct installation level and preloading each strut in turn to ensure that the frame is pressed firmly against the trench sheets and cannot slip. Max. pre-load pressure of 100Bar (1500psi) must not be exceeded.
3. Restraining chains are hung off the trench sheets and attached to the waler to assist assembly / removal of the frame and ensure vertical support is provided at all times. The supplied restraining chains should be installed (min 2 per waler) and adjusted to ensure an even vertical load distribution. Restraining chains should never be used for lifting nor solely relied upon to suspend loads above personnel.
4. Ensure all hydraulic ram isolation valves are closed and all strut pins in place and secured using the retaining clips provided prior to commencing works.



5. Individual walers and struts should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
6. Walers and struts should always be installed square and plumb to the excavation walls ensuring contact with all the inward facing trench sheet pans. If this is not possible any gaps must be securely packed by using hardwood wedges prior to final pre-loading of the hydraulic rams.
7. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
8. Prior to removal of systems all hydraulic rams must be released and retracted to avoid the need for excessive extraction forces and to avoid damaging the struts.
9. No matter how much care is taken during the installation and removal of the waler and strut trench systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.
10. Ends of trench runs should always be battered back at a safe angle. Alternatively, Endsafe end protection struts and trench sheets should be utilised (see section 3.2).



**FOR SAFE SYSTEM OF WORKS GUIDANCE
FOR MGF WALERS AND STRUTS**

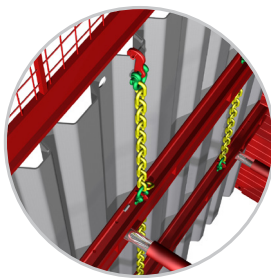
mgf.co.uk/products/walers-and-struts





HANDLING POINT WLL = 2.0T*

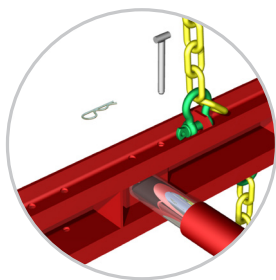
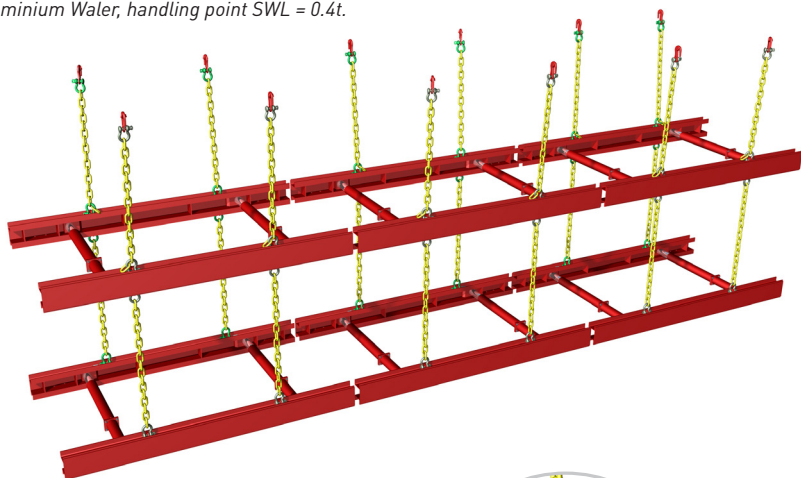
Walers are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



STANDARD DUTY/ UTILITY CHAIN TO SHEET CONNECTION DETAIL

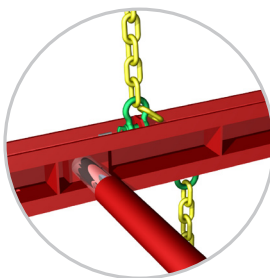
The hook fits over the sheet.

**Except for Utility Waler, handling point SWL = 0.5t and Aluminium Waler, handling point SWL = 0.4t.*



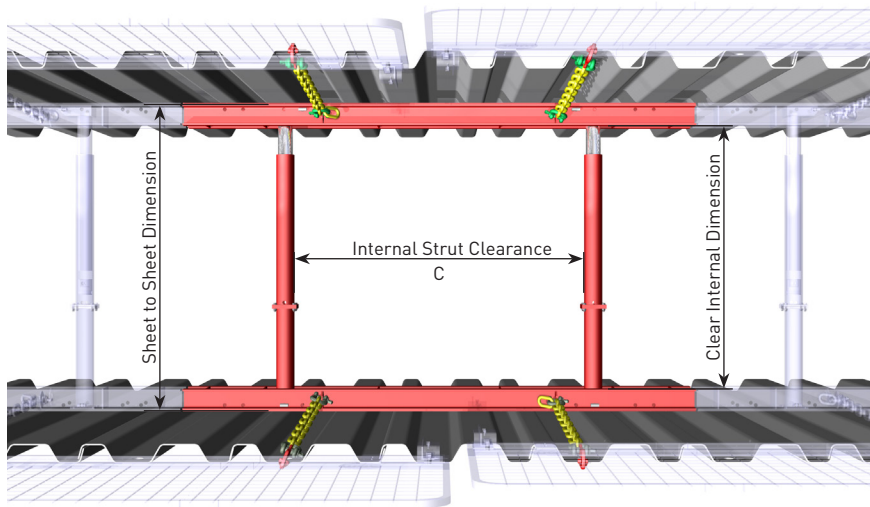
WALER STRUT CONNECTION DETAIL

Waler struts are connected to the waler via a pin and r-clip detail.

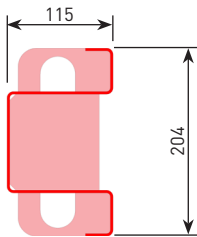


STANDARD DUTY/UTILITY RESTRAINING CHAIN CONNECTION DETAIL

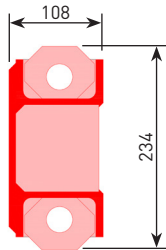
There are 2 types of chains used, the top frame will use shackle to hook type, while lower frames will use shackle to shackle type. Individual chain links selected to ensure all restraining chains are evenly loaded.



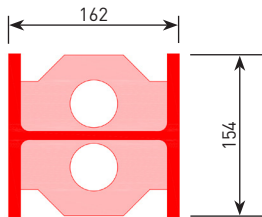
STEEL PROFILES



Component	Type	Utility Waler
	Waler Lengths	2.0m - 4.0m
	Material Grade	S700
	Moment Capacity	19.1kNm
	Section Modulus	45.5cm ³
	Second Moment of Area	276cm ⁴

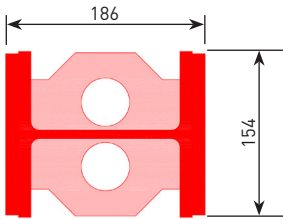


Component	Type	Heavy Duty Steel
	Waler Lengths	3.0m - 5.0m
	Material Grade	S460
	Moment Capacity	40.5kNm
	Section Modulus	132cm ³
	Second Moment of Area	686cm ⁴



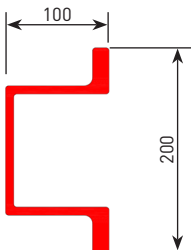
Component	Type	152UC
	Waler Lengths	5.0m
	Material Grade	S355
	Moment Capacity	73.1kNm
	Section Modulus	309cm ³
	Second Moment of Area	2210cm ⁴





Component	Type	152UC
	Waler Lengths	6.0m
	Material Grade	S355
	Moment Capacity	147.2kNm
	Section Modulus	622cm³
	Second Moment of Area	4936cm⁴

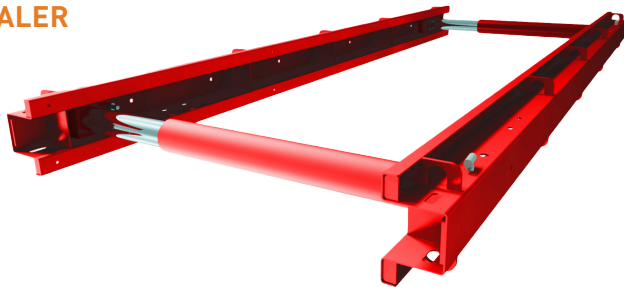
ALUMINIUM PROFILES



Component	Type	Aluminium
	Waler Lengths	1.5m – 4.0m
	Material Grade	6082T6
	Moment Capacity	18.6kNm
	Section Modulus	111cm³
	Second Moment of Area	529cm⁴



UTILITY WALER

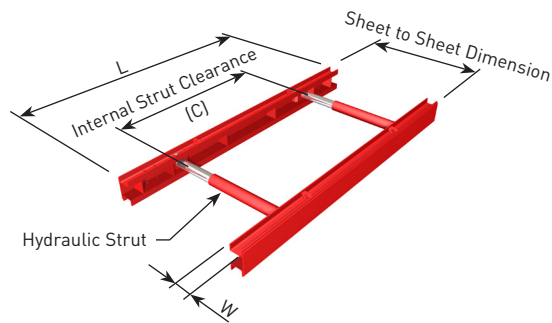


Description	Waler Weight (kg)	Product ID	L (mm)	W (mm)	C*Max (mm)	Sheet to Sheet		Assembled Weight** (kg)
						Min.	Max.	
2000	31.0	1.420	2000	115	1510	575	3800	98
2500	37.0	1.425	2500	115	2010	575	3800	110
3000	43.0	1.430	3000	115	2510	575	3800	122
3500	48.0	1.435	3500	115	2760	575	3800	132
4000	55.0	1.440	4000	115	3380	575	3800	146

*Depends on strut locations. **Assembled weight includes 2 No. type 800 struts without extensions.



HEAVY DUTY
STEEL WALER



Description	Waler Weight (kg)	Product ID	L (mm)	W (mm)	C*Max (mm)	Sheet to Sheet		Assembled Weight** (kg)
						Min. (mm)	Max. (mm)	
3000	112	1.330	3000	108	2420	565	3800	236
4000	148	1.340	4000	108	3420	565	3800	302
5000	184	1.350	5000	108	4420	565	3800	368

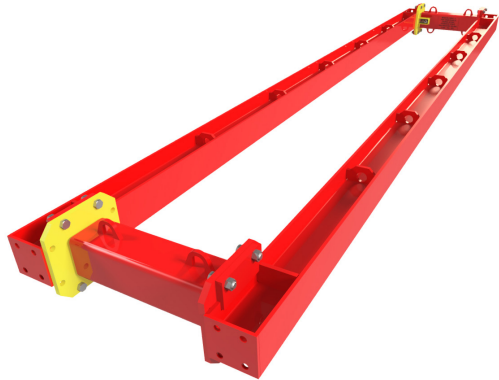
*Depends on strut locations. **Assembled weight includes 2 No. type 800 struts without extensions.

152UC STEEL WALER



FOR SAFE SYSTEM
OF WORKS GUIDANCE
FOR MGF 152UC
STEEL WALER

[mgf.co.uk/products/
152uc-waler](http://mgf.co.uk/products/152uc-waler)



Description	Waler Weight (kg)	Product ID	L (mm)	W (mm)	C*Max (mm)	Sheet to Sheet		Assembled Weight** (kg)
						Min. (mm)	Max. (mm)	
5000	205	1.0050	5000	162	4540	950	6000	640
6000	385	1.0060	6000	186	5540	975	6000	1000

*Depends on strut locations. **Assembled weight includes 2 No. 250kN Hydraulic Struts.

ALUMINIUM WALER



Description	Waler Weight (kg)	Product ID	L (mm)	W (mm)	C*Max (mm)	Sheet to Sheet		Assembled Weight** (kg)
						Min. (mm)	Max. (mm)	
1500	18	1.015	1500	100	1010	565	3800	72
2000	24	1.020	2000	100	1510	565	3800	84
2500	30	1.025	2500	100	1910	565	3800	96
3000	36	1.030	3000	100	2410	565	3800	108
3500	42	1.035	3500	100	2910	565	3800	119
4000	47	1.040	4000	100	3310	565	3800	130

**Depends on strut locations. **Assembled weight includes 2 No. type 800 struts without extensions.*



80kN SINGLE ACTING HYDRAULIC RAM ASSEMBLY

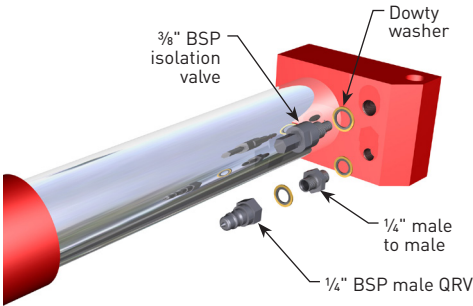


Hydraulic Cylinder		Single Acting
	Material	Aluminium
	Bore	50.8mm
	Max. Working Pressure	400 Bar (6000 psi)
	Test Pressure	400 Bar (6000 psi)
	Approx. Working Stroke	350mm / 600mm
	Axial SWL	80kN
	Min. FOS (by test)	2
	Working Temp Range	-20°C* to +50°C
	Approx. Pre-Load	20kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)

* Winter mix required for shoring fluid at low temps.

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV). Single acting cylinders cannot be retracted using a pump unit and have to be physically closed whilst releasing the male QRV.

Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



PUMP UNITS



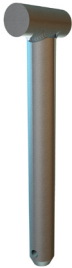
The pump is used to extend waler strut single acting hydraulic rams. The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 1500 psi (100 Bar).

Component	Product ID	1.602 (SA)
	Capacity	20 litres
	Weight	25kg
	Shoring Fluid	Houghto Safe SF25
	Working Pressure	0-1500 psi



WALER HYDRAULIC STRUT CONNECTION PIN

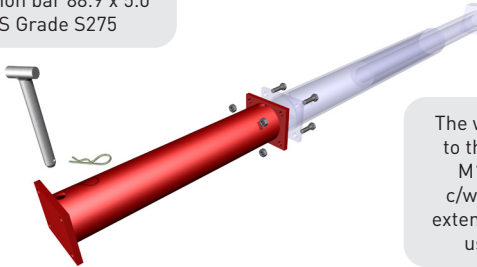
Component	Pin	Ø16 bar, 160mm long
	Material Grade	080M40 (EN8)
	Shear SWL	80kN
	Weight	1kg



The waler hydraulic strut is connected to the waler using a pin and r-clip detail.

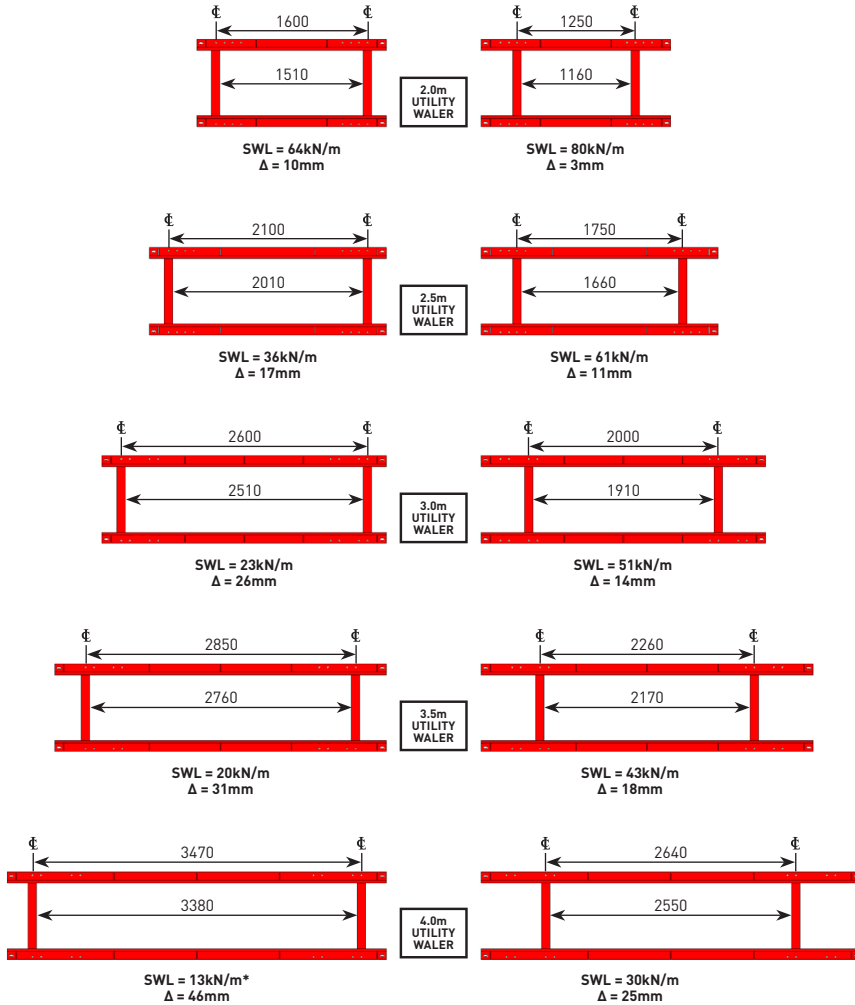
Waler Struts - Hydraulic		Single Acting (SWL=80kN)		
Type	Product ID	External Dimensions		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
550 (A)	1.455	550	900	13
800 (C)	1.480	800	1400	18
Ext.		Min.	Max.	Weight
1	1.525	250	N/A	5
2	1.550	500	N/A	10
3	1.510	1000	N/A	20

Extension bar 88.9 x 5.0
CHS Grade S275



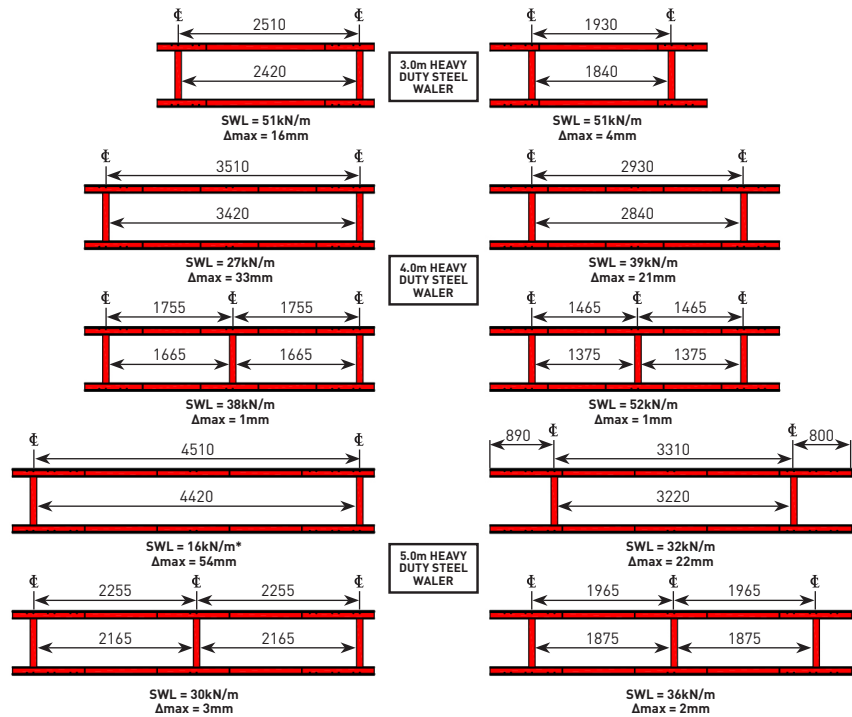
The waler strut extension is bolted to the hydraulic strut using 4 No. M10x40 (min.) grade 8.8 bolts c/w nuts and washers. The strut extension is connected to the waler using a pin and r-clip detail.

SWL FOR STEEL UTILITY WALERS AT VARIOUS STRUT POSITIONS

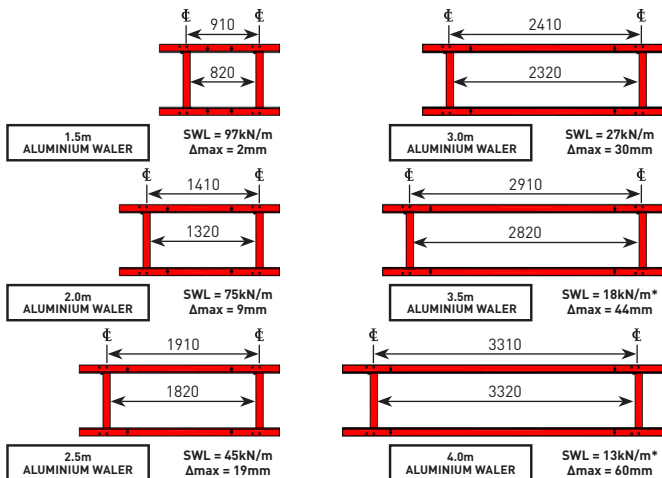


*BS EN 14653 recommends a minimum SWL of 20kN/m

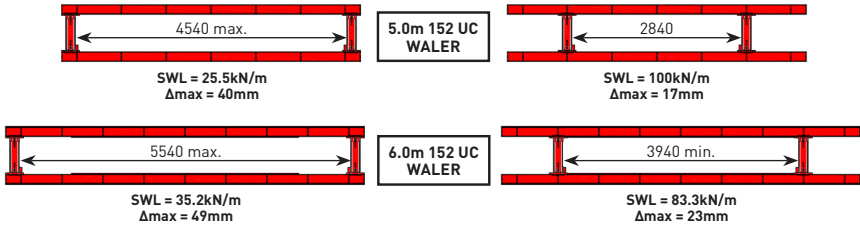
SWL FOR HEAVY DUTY STEEL WALERS AT VARIOUS STRUT POSITIONS



SWL FOR ALUMINIUM WALERS AT VARIOUS STRUT POSITIONS



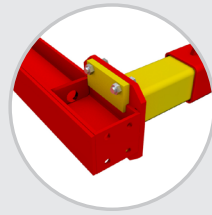
SWL FOR 152 UC STEEL WALER AT VARIOUS STRUT POSITIONS



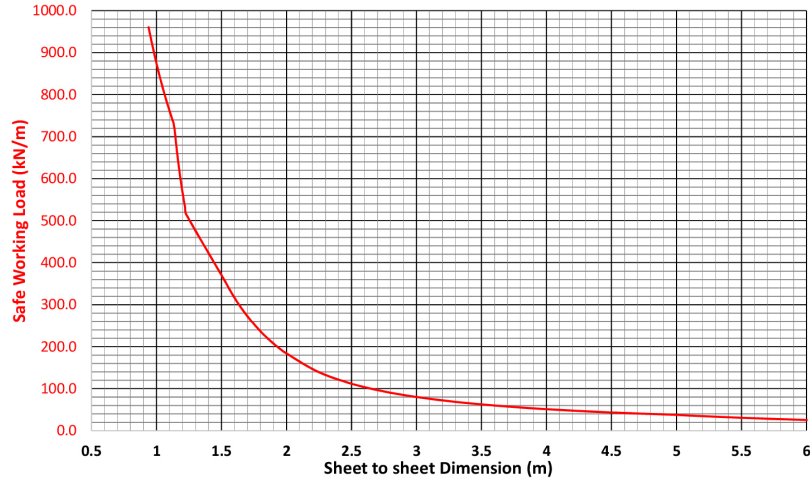
MGF's 152 UC Steel Waler is designed to be used with the 200 Series 250kN Hydraulic Strut in conjunction with 152 UC Waler clamps (5.1.11). The clamps simply bolt to the endplate using 2 No. M20 bolts. Prior to connecting the struts it is recommended to loosely bolt the top 152 UC clamp and then locate the strut on the waler, once positioned the top clamp can be fully tightened and the bottom clamp can then be installed.

On the 5.0m 152 UC Waler the struts can be positioned anywhere along the waler. On the 6.0m 152 UC Waler the struts can be positioned anywhere in between the min. and max. clearance, as shown above.

When the 200 Series strut is installed in its outer most positions it can also be used as an end protection strut, allowing sheets to be installed up against the strut, enabling up to 4 sided excavations.



SAFE WORKING LOAD FOR 200 SERIES STRUT AS WALER END PROTECTION STRUTS (kN/m)



The above graph is based on 200 Series struts being used as Endsafes Struts when clamped to 152UC Waler.

Endsafe



ENDSAFE STRUTS ARE USED IN CONJUNCTION WITH MGF WALER FRAMES WHEN IT IS NOT SUITABLE TO SAFELY BATTER BACK THE TRENCH ENDS TO GROUND LEVEL. THEY ARE DESIGNED TO BE QUICKLY AND EASILY INSTALLED, BY HAND, BY UP TO 2 OPERATIVES AT THE END OF A WALER RUN TO SUPPORT TRENCH SHEETS.

MGF can supply 2 Endsafes Strut systems – Light Duty Endsafes Struts and Heavy Duty Endsafes Struts. LD Endsafes is suitable for trench widths of between 0.7m and 2.0m, while the HD Endsafes Struts are suitable for trench widths from 1.65m up to 3.375m.

Both ranges are telescopic and include 1 outer section and a range of inner sections. They can be assembled and installed by hand, with the max. assembled weight of the LD system being 25kg, and 50kg for the HD system.

Fabricated from grade S355 steel box sections and plates the Endsafes Struts connect to MGF walers using waler pins and r-clips. A waler pin and r-clip should be used to connect the Endsafes Strut inner and outer together for handling but should be removed when installing within the waler frame prior to pre-loading the waler frame against the steel sheets. It is essential that all the waler struts are fully pre-loaded before putting any load onto or installing trench sheets against the Endsafes Struts.

PRODUCT NOTES

1. MGF Endsafes Struts are designed to be quickly and easily installed by hand to support the open end of a trench run created using MGF sheets and walers. 1 person can assemble and install LD Endsafes Struts, 2 people should assemble and install the HD Endsafes Struts.
2. MGF Endsafes Struts are supplied in accordance with BS EN 13331:2002 Parts 1 & 2 Trench Lining Systems.
3. Prior to use inspect the equipment for damage and make yourself familiar with its assembly.
4. The struts are telescopic and whenever being handled they should be fully closed with the central pin and r-clip secured to prevent any sliding / trapping of fingers. Always use the handles provided.
5. Always work from a position of safety and ensure that the soil beyond the end of the trench is stable / battered back and cannot collapse onto personnel installing the struts.
6. Offer the strut up to the walers and remove the central pin, extending the strut so that the end sits squarely within the waler rails. Install the pins through the waler rail locating holes and struts to secure the ends. Secure pins using the r-clips. The waler frame struts must now be pre-loaded.
7. Ensure the minimum overlap between inner and outer exceeds 150mm when the waler frame is pre loaded - refer to section 3.2.2 for recommended strut configuration details.
8. Trench sheets can now be installed against the outside face of the struts by carefully lowering down vertically.
9. Endsafes Struts are compatible with Heavy Duty and Utility Steel Walers, as well as Aluminium Walers. Ensure the Endsafes bearing bolts are present if the Endsafes Struts are being used with the Aluminium Walers.
10. Ensure that the correct Endsafes outer section is used for the desired capacity / range. LD Outer Strut must never be used with a HD Inner Endsafes Strut and vice versa. The Endsafes Strut ranges are coloured to suit the range. LD Endsafes Struts are painted red while the HD Endsafes Struts are painted yellow.



		Product Description	Trench Width		Weight
			Min.	Max.	
			(mm)	(mm)	(kg)
Product ID	1.700	550 LD Endsafe Outer Strut	-	-	7
	1.701	634 LD Endsafe Inner Strut	700	1060	8
	1.702	884 LD Endsafe Inner Strut	965	1310	10
	1.703	1134 LD Endsafe Inner Strut	1210	1560	13
	1.704	1384 LD Endsafe Inner Strut	1455	1810	15
	1.705	1584 LD Endsafe Inner Strut	1650	2010	17
	1.720	550 HD Endsafe Outer Strut	-	-	9
	1.721	1584 HD Endsafe Inner Strut	1650	2010	24
	1.722	1834 HD Endsafe Inner Strut	1900	2260	27
	1.723	2084 HD Endsafe Inner Strut	2150	2510	31
	1.724	2334 HD Endsafe Inner Strut	2400	2760	34
	1.725	2584 HD Endsafe Inner Strut	2650	3010	37
	1.726	2950 HD Endsafe Inner Strut	3015	3375	41

FOR SAFE SYSTEM OF WORKS GUIDANCE
FOR MGF ENDSAFE STRUTS

mgf.co.uk/products/waler-end-protection-struts



LIGHT DUTY ENDSAFE STRUTS

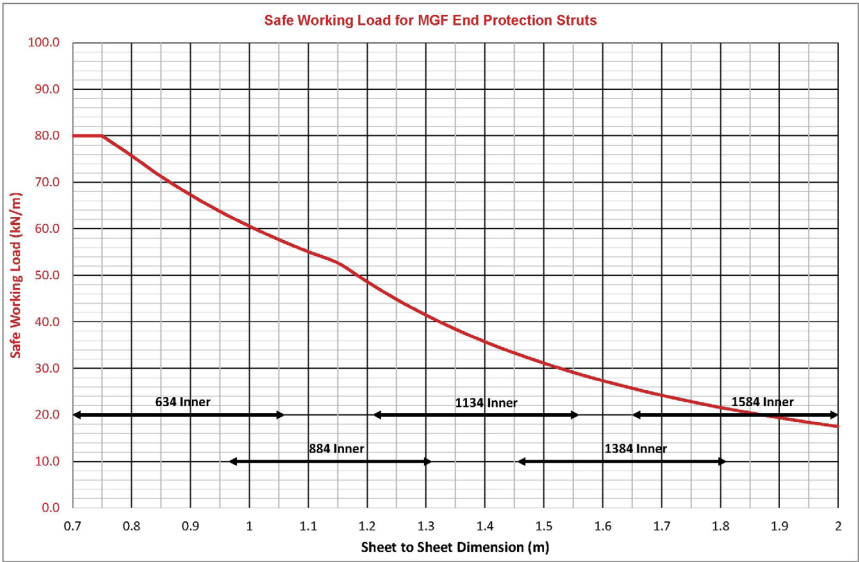
LD ENDSAFE STRUT INNERS
(90x90x4 SHS)

LD ENDSAFE STRUT OUTER
(100x100x4 SHS)



Component	Inner Material	90 x 90 x 4 SHS (S355)
	Inner Unit Mass	10.5kg/m
	Outer Material	100 x 100 x 4 SHS (S355)
	Outer Unit Mass	11.9kg/m

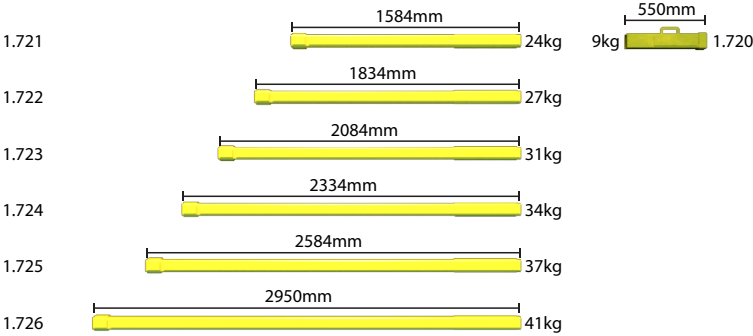
LIGHT DUTY ENDSAFE STRUT LOAD CHART



HEAVY DUTY ENDSAFE STRUTS

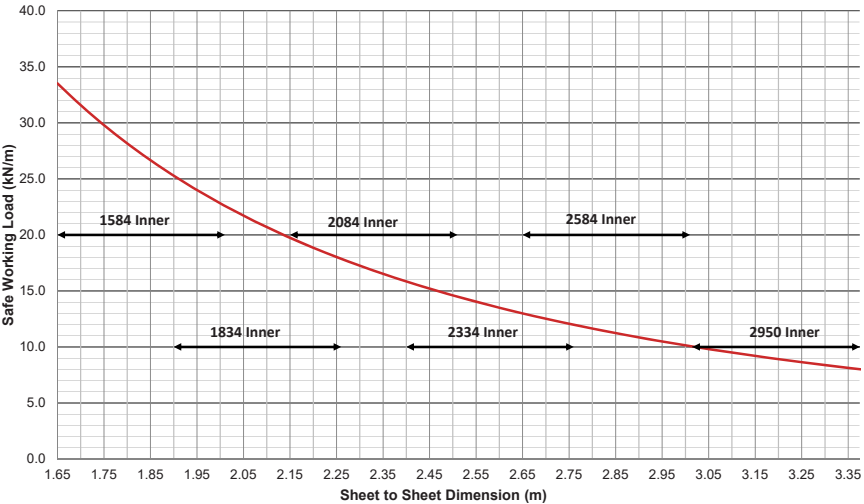
HD ENDSAFE STRUT INNERS
(80x80x4 SHS c/w 5 THK
STRENGTHENING PLATES)

HD ENDSAFE STRUT OUTER
(100x100x4 SHS c/w 4 THK
STRENGTHENING PLATES)



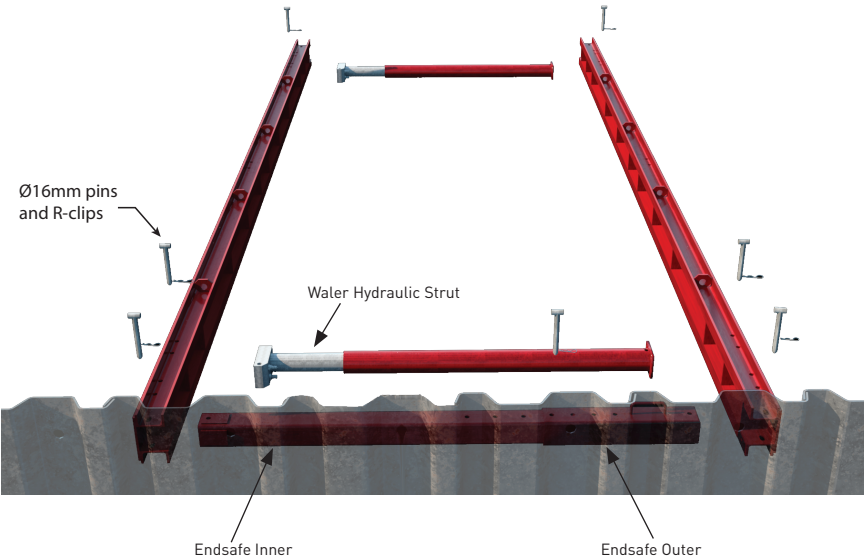
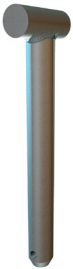
Component	Inner Material	80 x 80 x 4 SHS (S355) c/w 5thk. strengthening plates
	Inner Unit Mass	16.7kg/m
	Outer Material	100 x 100 x 4 SHS (S355) c/w 4thk. strengthening plates
	Outer Unit Mass	16.1kg/m

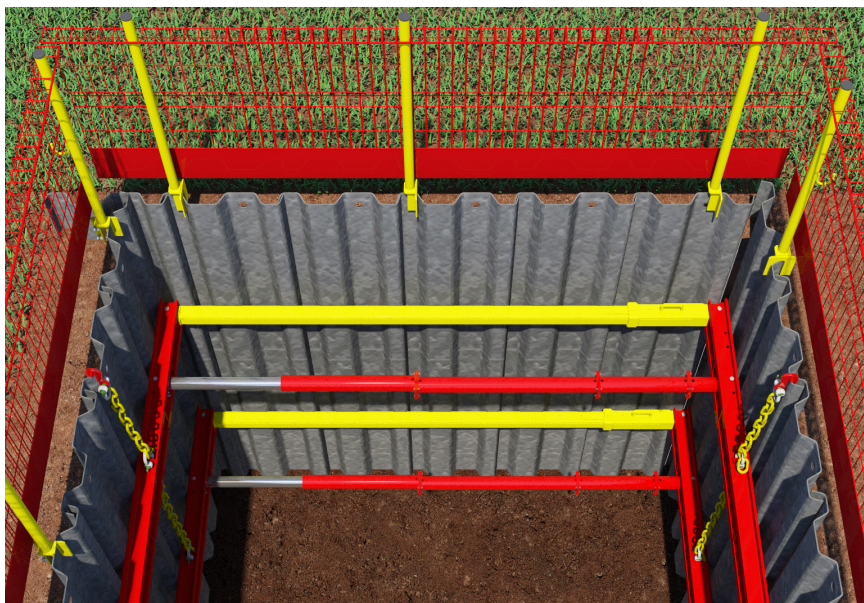
HEAVY DUTY ENDSAFE STRUT LOAD CHART



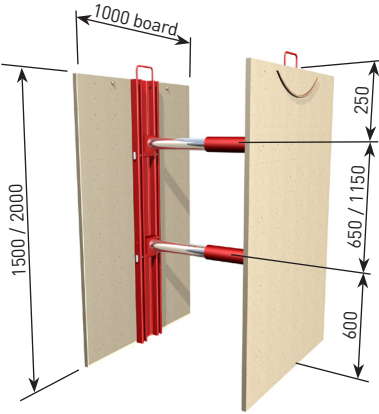
LD & HD ENDSAFE STRUT CONNECTING PIN

Component	Pin	Ø16 bar, 160mm long
	Material Grade	080M40 (EN8)
	Shear SWL	80kN
	Weight	1kg





ALUMINIUM VERTISHORE



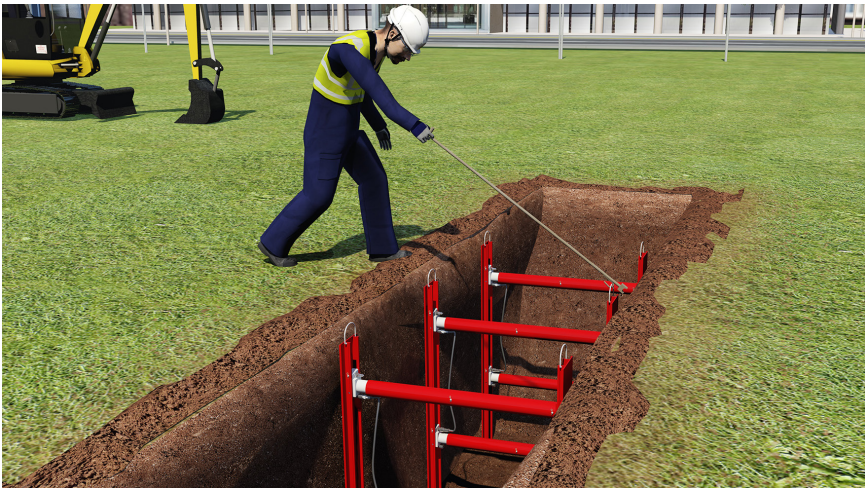
SWL = 20kN/m (on Vertishore)

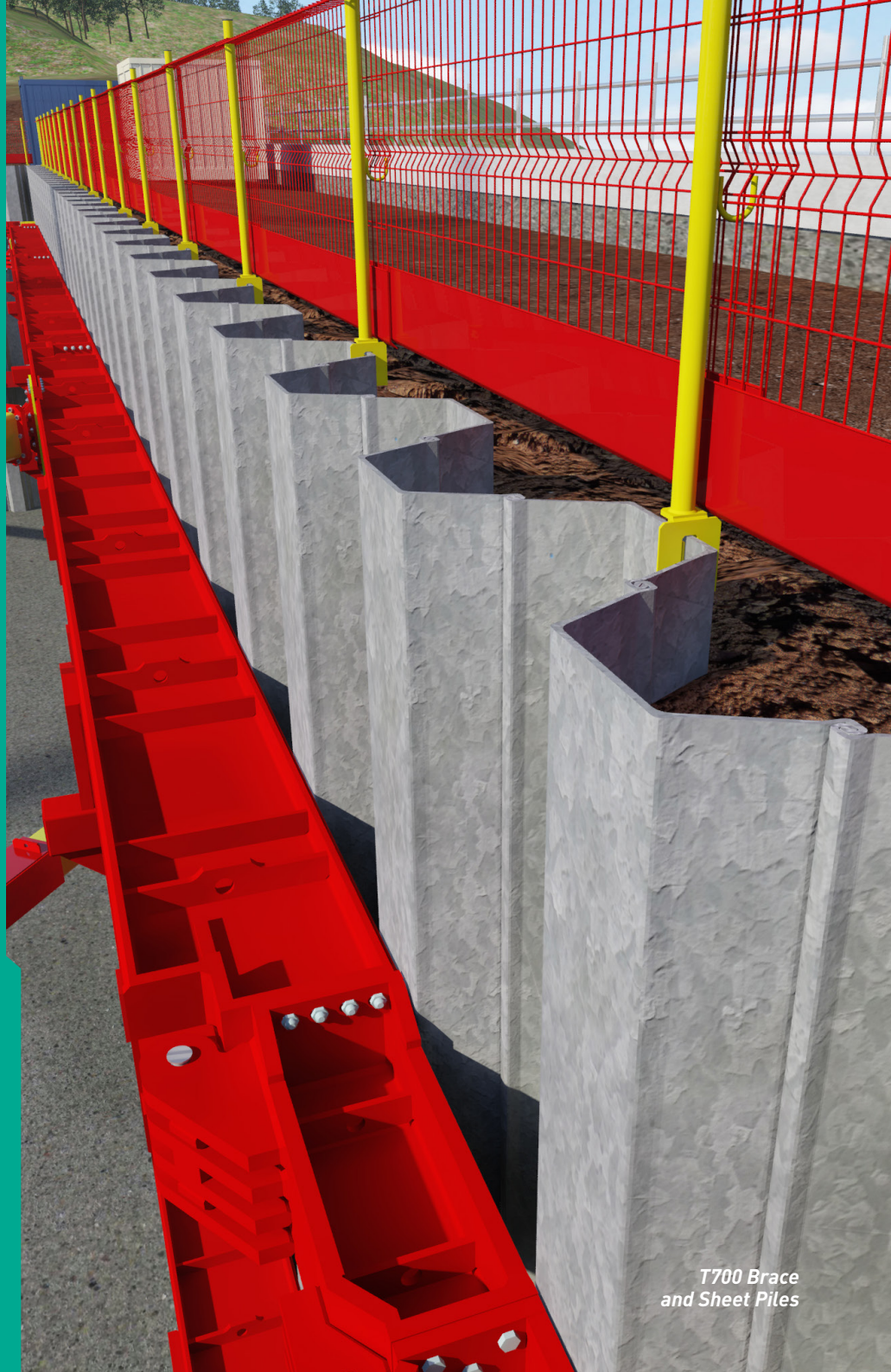
Description	Product ID	Weight*
		(kg)
1500	1.014	28
2000	1.0141	35

*Assembled weight (excluding boards) with type A struts.

Pre-assembled, lightweight, two sided hydraulic water strut system designed to be installed from ground level directly against a soil face in the vertical plane. Suitable for trenches up to 2.0m deep and 1.4m wide. The system can be installed by one person and is usually specified for short term utilities type trench work where the ground is considered self supporting and capable of arching a min 1.5m between preloaded hydraulic vertical supports for the duration of the works. Backing boards are available to prevent localised pockets of loose material entering the excavation. Personnel should only enter and work in the space between two vertishores. A competent person should always inspect the excavation before allowing access to ensure that all the struts are pre-loaded and bearing directly onto the soil, the exposed soil faces are self supporting with no evidence of water ingress or very loose material. Vertical support must be provided at a max. 1.5m horizontally. Always install and remove the system from ground level and away from any potentially unstable edges. Vertishores are supplied with an installation kit, including a pump unit, lowering hook and valve release tool.

Available hydraulic struts
Type A: 550-900mm
Type B1: 850-1375mm





*T700 Brace
and Sheet Piles*

HYDRAULIC BRACING



COMPATIBILITY GUIDE	4.0
MANHOLE BRACES	4.1
ALUMINIUM UTILITY MANHOLE BRACE	4.2
203 UC BRACE	4.3
203 UC+ BRACE	4.4
305 UC BRACE	4.5
406 UC BRACE	4.6
T700 BRACE	4.7

MGF MANHOLE BRACE COMPATIBILITY GUIDE

			Leg 1							
				120 Series		150 Series		200 Series		
			1500-2400 Aluminium Utility	1700 - 2500 (A Leg)	2200 - 3600 (B Leg)	1400 - 1900 (AB- Leg)	1900 - 3100 (AB Leg)	3000 - 4100 (BC Leg)	3600 - 4700 (CD Leg)	4900 - 6000 (D Leg)
Leg 2	150 Series	1500-2400 Aluminium Utility	✓	X	X	X	X	X	X	X
		1700-2500 (A Leg)	X	✓	✓	X	X	✓ (1)	✓ (1)	✓ (1)
		2200-3600 (B Leg)	X	✓	✓	X	X	✓ (1)	✓ (1)	✓ (1)
	150 Series	1400-1900 (AB- Leg)	X	X	X	✓	✓	✓ (2)	✓ (2)	✓ (2)
		1900-3100 (AB Leg)	X	X	X	✓	✓	✓ (2)	✓ (2)	✓ (2)
	200 Series	3000-4100 (BC Leg)	X	✓ (1)	✓ (1)	✓ (2)	✓ (2)	✓	✓	✓
		3600-4700 (CD Leg)	X	✓ (1)	✓ (1)	✓ (2)	✓ (2)	✓	✓	✓
		4900-6000 (D Leg)	X	✓ (1)	✓ (1)	✓ (2)	✓ (2)	✓	✓	✓

(1) 120-200 Series manhole brace adaptors required.

(2) 150-200 Series manhole brace adaptors required.

MGF TANK BRACE COMPATIBILITY GUIDE

		Leg 1				
		203 UC	203 UC+	305 UC	406 UC	T700 BRACE
Leg 2	203 UC	✓	✓	X	X	X
	203 UC+	✓	✓	X	X	X
	305 UC	X	X	✓	✓ (1)	✓ (1)
	406 UC	X	X	✓ (1)	✓	✓
	T700 Brace	X	X	✓ (1)	✓	✓

(1) Remove 406UC corner brackets.



203 UC



203 UC+



305 UC



406 UC



T700 BRACE



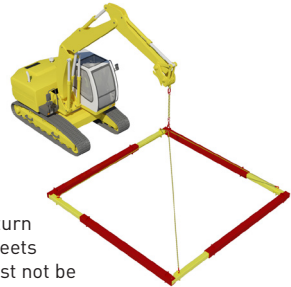
SIMPLE TO ASSEMBLE, FOUR SIDED, HYDRAULIC BRACING FRAME SYSTEMS DESIGNED TO BE USED WITH STEEL TRENCH SHEETS OR SHEET PILES TO BRACE SMALL COFFERDAMS FOR THE SAFE INSTALLATION OF MANHOLES, PITS AND TANKS. THE RANGE COMPRISES SEVEN SIZES OF HYDRAULIC BRACING FRAME LEGS RANGING IN LENGTH FROM 1.4M TO 6.0M AND IS NORMALLY INSTALLED USING EITHER EXCAVATORS OR CRANES.

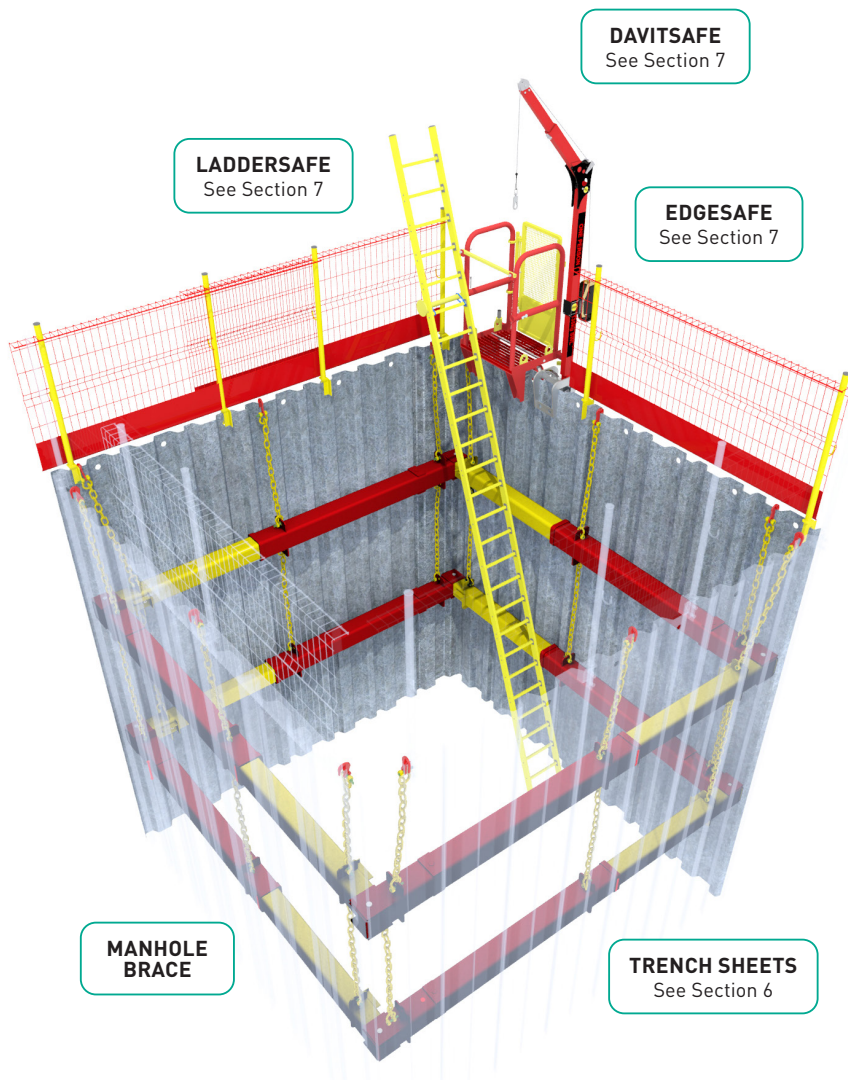
Fabricated from grade S355 SHS steel box sections the legs are assembled to form a frame using simple corner pin and retaining clip assemblies. Each leg contains a hydraulic ram with between 630mm and 1300mm of stroke. Connecting the rams (via hydraulic hoses) to an MGF hydraulic pump unit containing hydraulic shoring fluid allows the leg lengths to be quickly and easily adjusted to suit the excavation dimensions. Once the frames are fully assembled and located at the correct line and level, the rams are pre-loaded against the trench sheets using a hydraulic pump. Pre-loading of the legs ensures the frame cannot slip and minimises the extent of potential ground movements. Self sealing quick release valves and mechanical isolation valves ensure that the hydraulic ram pressure cannot be accidentally released once installed. Handling and restraining points are provided on each leg to assist assembly / removal and to allow the brace to be supported by MGF restraining chains attached to the trench sheets by hooks.

MGF can supply the systems with a full range of suitable handling and restraining chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 [2019] Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Manhole brace should only be installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines.
2. Installation is normally carried out by lowering either the assembled frame or individual legs (dependant upon lifting capacity of excavator / crane) to the correct installation level and once the frame is fully assembled, pre-loading each leg in turn to ensure that the frame is pressed firmly against the trench sheets and cannot slip. Max. pre-load pressure of 100Bar (1500psi) must not be exceeded.
3. Restraining chains are hung off the trench sheets and attached to the legs to assist assembly / removal of the frame and ensure vertical support is provided at all times. All the supplied restraining chains should be installed (min. 2 per leg) and adjusted to ensure an even vertical load distribution. Restraining chains should never be used for lifting nor solely relied upon to suspend loads above personnel.
4. Ensure all hydraulic ram isolation valves are closed and all corner pins in place and secured using the retaining clips provided prior to commencing works.
5. Individual brace legs should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
6. Legs should always be installed square and plumb to the excavation walls ensuring contact with all the inward facing trench sheet pans. If this is not possible any gaps must be securely packed by using hardwood wedges prior to final pre-loading of the hydraulic rams.
7. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
8. Prior to removal of systems all hydraulic rams must be released and retracted to avoid the need for excessive extraction forces and to avoid damaging corner joints.
9. No matter how much care is taken during the installation and removal of hydraulic bracing systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.

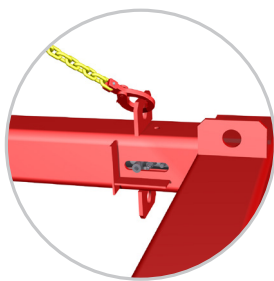




**FOR SAFE SYSTEM OF WORKS GUIDANCE
FOR MGF MANHOLE BRACE**

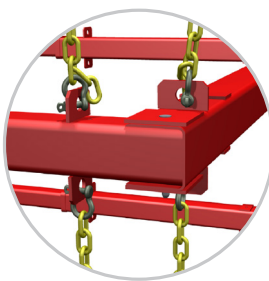
mgf.co.uk/products/manhole-brace





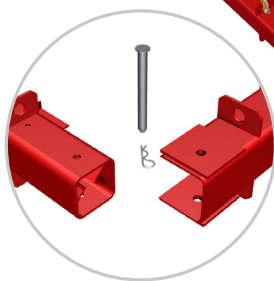
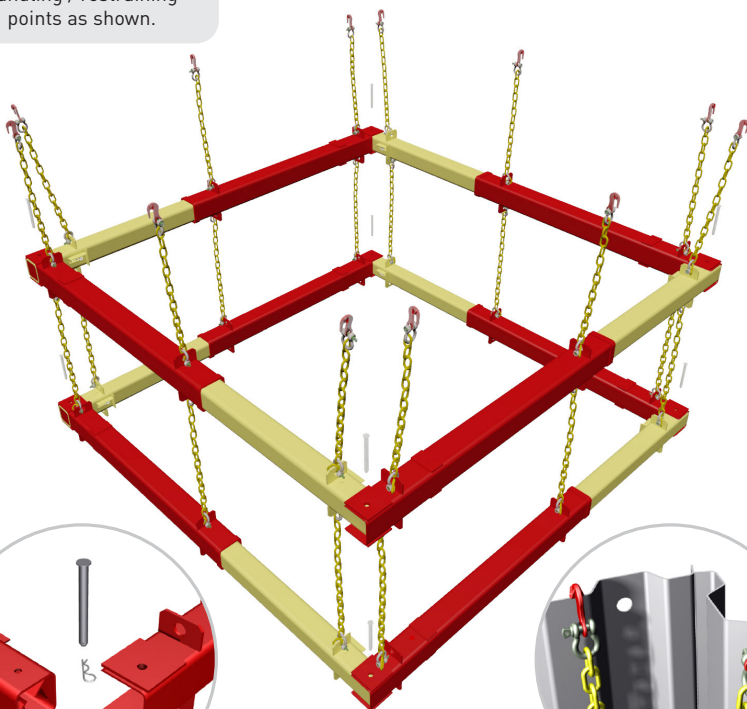
HANDLING POINT WLL = 2.0T

All manhole brace legs and frames are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



STANDARD DUTY RESTRAINING CHAIN CONNECTION DETAIL - WLL = 2.0T

There are 2 types of chains used, the top frame will use shackle to hook type, while lower frames will use shackle to shackle type. Individual chain links are selected to ensure all restraining chains are evenly loaded.



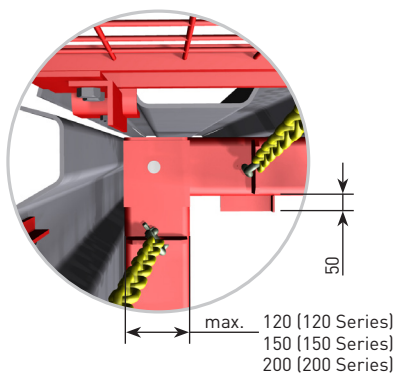
LEG CONNECTION DETAIL

Manhole brace legs are connected to each other using a pin and r-clip detail.

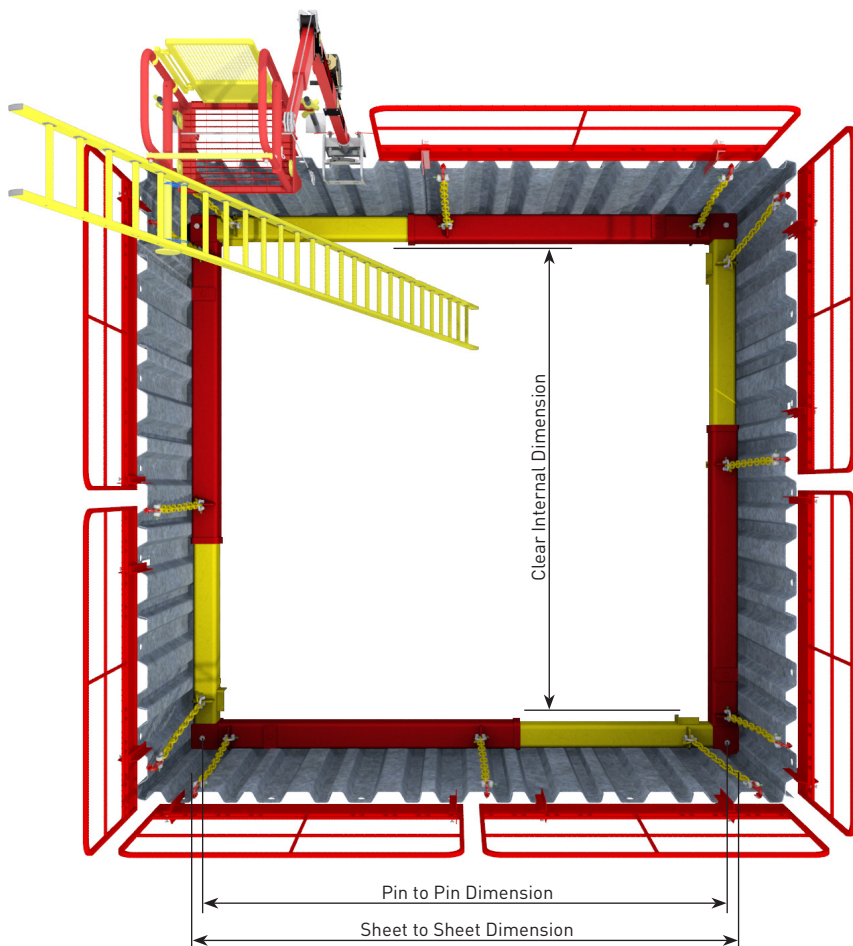


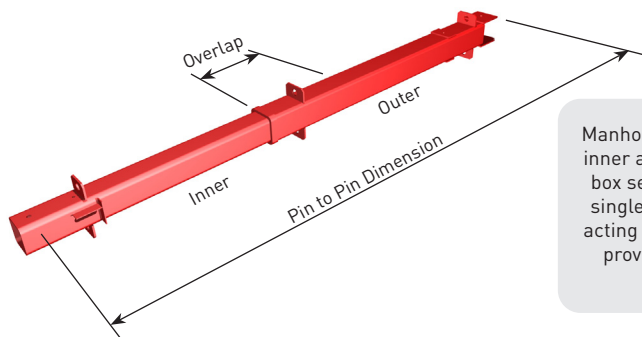
STANDARD DUTY CHAIN TO SHEET CONNECTION DETAIL

The hook fits over the sheet.

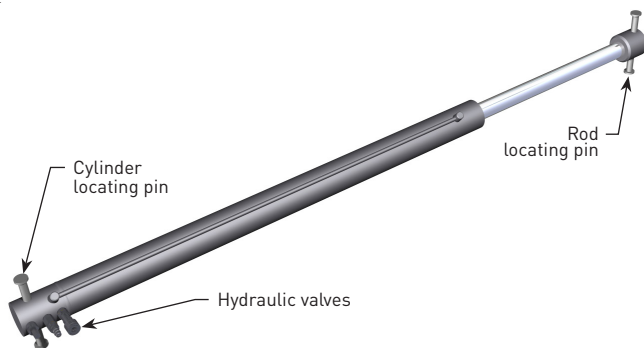


With the use of manhole brace adaptors in the corners, different manhole brace legs can be connected to each other. Legs must be installed at 90° to each other.





Manhole brace legs comprise inner and outer sleeved steel box sections housing either single acting (SA) or double acting (DA) hydraulic rams to provide up to 1500mm of leg adjustment.

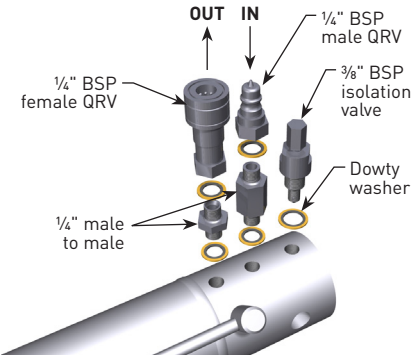


Product ID		Product Description	Sheet to Sheet Dimension		Series Compatible With*	Hydraulic Ram SWL	Leg Weight
			Min.	Max.			
			(m)	(m)			(kg)
7.201		120 Series Manhole Brace 1700-2500 (A)	1.73	2.617	200	SA 80kN	120
7.202		120 Series Manhole Brace 2200-3600 (B)	2.192	3.703	200	SA 70kN	172
7.200		150 Series Manhole Brace 1400-1900 (AB-)	1.375	2.005	200	DA 120kN	146
7.207		150 Series Manhole Brace 1900-3100 (AB)	1.943	3.143	200	DA 120kN	200
DA 7.204		200 Series Manhole Brace 3000-4100 (BC)	2.973	4.173	120 / 150	DA 100kN	312
DA 7.205		200 Series Manhole Brace 3600-4700 (CD)	3.573	4.773	120 / 150	DA 100kN	341
DA 7.206		200 Series Manhole Brace 4900-6000 (D)	4.863	6.063	120 / 150	DA 100kN	500

* Refer to page 4.1.14 for adaptor details.

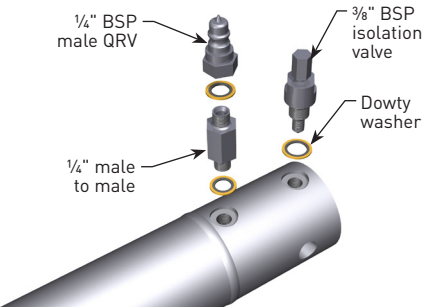
DOUBLE ACTING HYDRAULIC CYLINDER CONNECTIONS

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.

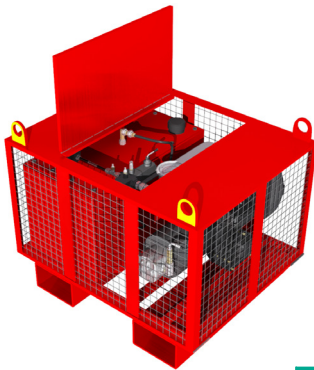


SINGLE ACTING HYDRAULIC CYLINDER CONNECTIONS

Shoring fluid is pumped into the full bore side of the piston through the male QRV. Single acting cylinders cannot be retracted using a pump unit and have to be physically closed whilst releasing the male QRV. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



PUMP UNITS

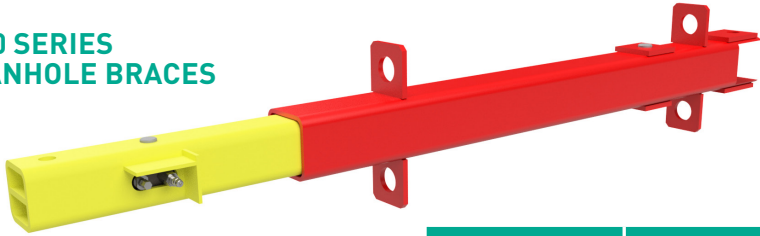


The pumps are used to extend and retract the manhole brace single acting and double acting hydraulic rams (SA and DA). The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 1500 psi (100 Bar). There are 3 types of pumps available, manually operated single acting and double acting bucket pump and a motorised petrol pump (suitable for use with double acting hydraulic rams only).



		Bucket Pump	Petrol Motorised Pump
Component	Product ID	1.602 (SA), 1.603 (DA)	8.4007 (DA)
	Fluid Capacity (L)	20	70
	Weight (kg)	25	270
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25
	Working Pressure (psi)	0-1500	0-1500

120 SERIES MANHOLE BRACES



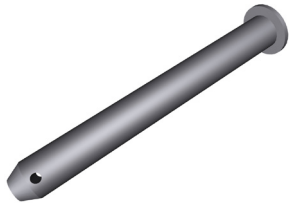
**SINGLE ACTING
1700 TO
3600MM LEGS**
Compatible
with 200 Series
Manhole Brace.

Leg Assembly		Inner Section	Outer Section
	Specification	100x100x10 SHS	120x120x8 SHS
	Material Grade	S355	S355
	Unit Mass	27.4kg/m	27.6kg/m
	Axial SWL	80kN	80kN
	Moment SWL	24kNm	30kNm

Hydraulic Cylinder		Single Acting
	Material	Aluminium
	Bore	50.8mm
	Max. Working Pressure	400 Bar (5800 psi) ^[1] / 350 Bar (5000 psi) ^[2]
	Test Pressure	400 Bar (5800 psi) ^[1] / 350 Bar (5000 psi) ^[2]
	Approx. Working Stroke	800mm ^[1] / 1400mm ^[2]
	Axial SWL	80kN ^[1] / 70kN ^[2]
	Min. FOS (by test)	2
	Working Temp Range	-20°C* to +50°C
	Approx. Pre-Load	20kN
Hydraulic Cylinder	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Ø18 and Ø20mm

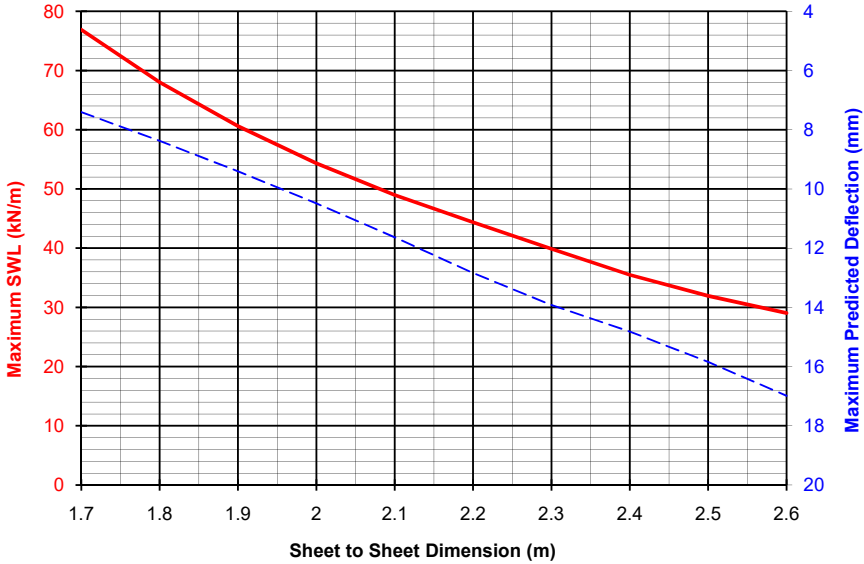
* Winter mix required for shoring fluid at low temps.
 [1] 120 Series Manhole Brace 1700-2500. [2] 120 Series Manhole Brace 2200-3600.

120 / 150 SERIES MANHOLE BRACE PIN

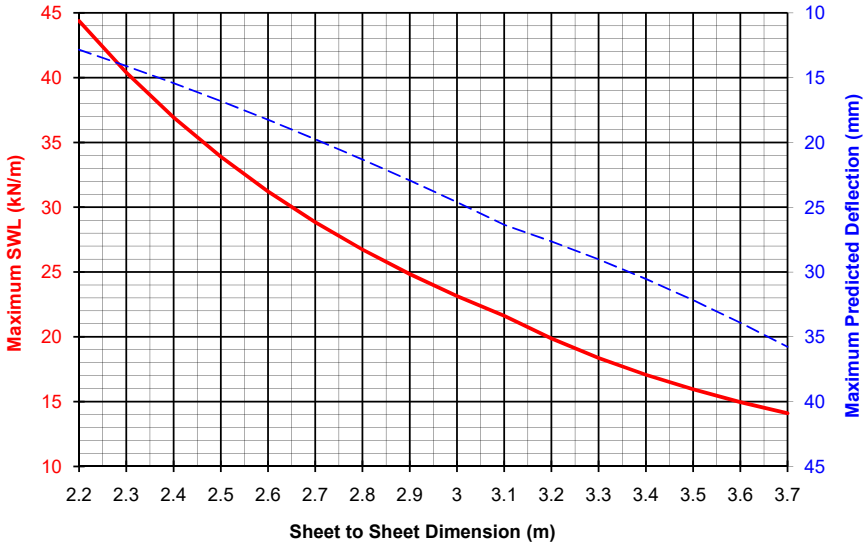


Component	Pin	Ø25mm bar, 200mm long
	Material Grade	080M40 (EN8)
	Shear SWL	120kN
	Weight	1kg

SAFE WORKING LOAD FOR MGF 120 SERIES
MANHOLE BRACE 1700-2500 (A)

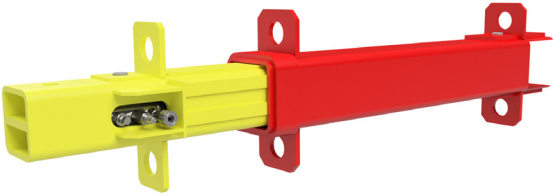


SAFE WORKING LOAD FOR MGF 120 SERIES
MANHOLE BRACE 2200-3600 (B)



The load chart deflections are based on calculated values and not test data.

150 SERIES MANHOLE BRACES



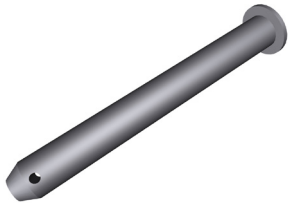
DOUBLE ACTING
1400 TO 3100MM LEGS
Compatible with 200 Series
Manhole Brace.

Leg Assembly	Specification	Inner Section	Outer Section
		120x120x10 SHS (+ 2 No. 80x6mm thk. stiffening plates)	150x150x8 SHS
	Material Grade	S355	S355
	Unit Mass	44kg/m	35.1kg/m
	Axial SWL	120kN	120kN
	Moment SWL	50kNm	50kNm

Hydraulic Cylinder	Double Acting	
	Material	Steel
	Bore	63mm
	Max. Working Pressure	400 Bar (5800 psi)
	Test Pressure	400 Bar (5800 psi)
	Approx. Working Stroke	630mm ^[1] / 1200mm ^[2]
	Axial SWL	120kN
	Min. FOS (by test)	2
	Working Temp Range	-20°C* to +50°C
	Approx. Pre-Load	30kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Ø18 and Ø20mm

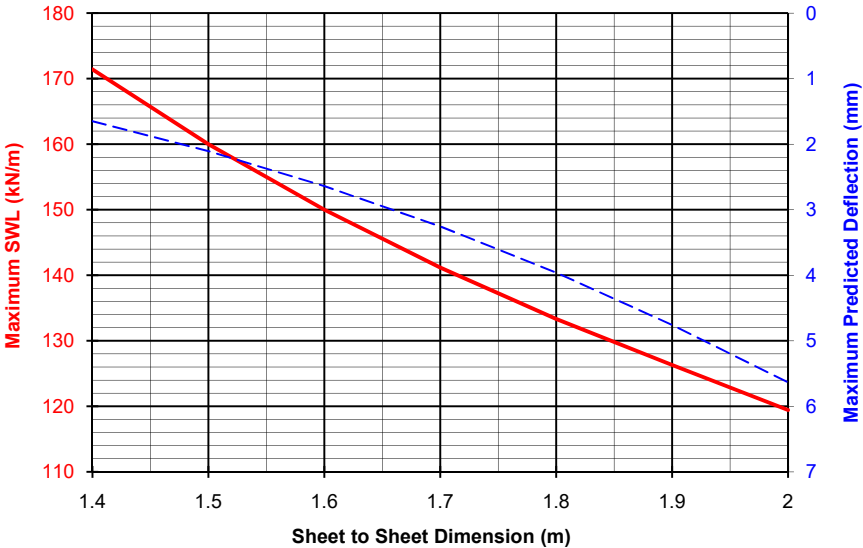
* Winter mix required for shoring fluid at low temps.
[1] 150 Series Manhole Brace 1400-1900. [2] 150 Series Manhole Brace 1900-3100.

120 / 150 SERIES MANHOLE BRACE PIN

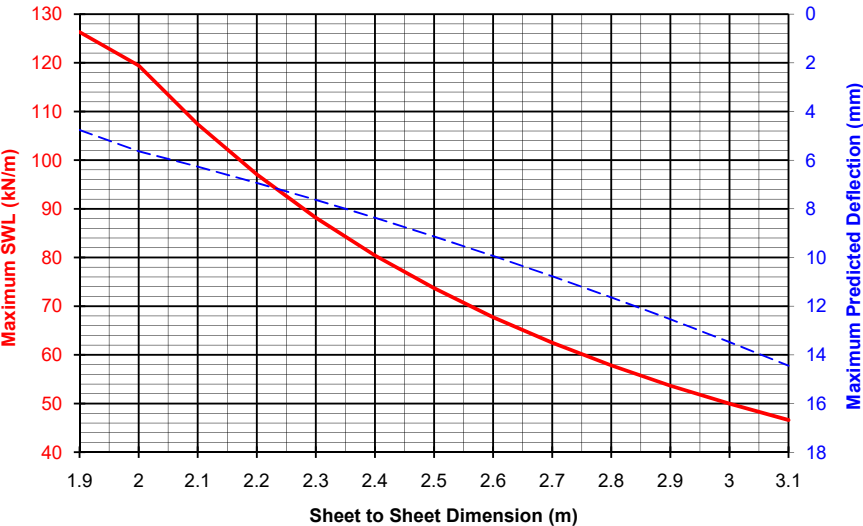


Component	Pin	Ø25mm bar, 200mm long
	Material Grade	080M40 (EN8)
	Shear SWL	120kN
	Weight	1kg

SAFE WORKING LOAD FOR MGF 150 SERIES
MANHOLE BRACE 1400-1900 (AB-)

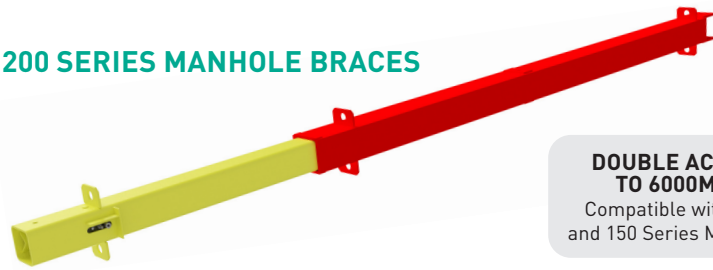


SAFE WORKING LOAD FOR MGF 150 SERIES
MANHOLE BRACE 1900-3100 (AB)



The load chart deflections are based on calculated values and not test data.

200 SERIES MANHOLE BRACES



DOUBLE ACTING 3000 TO 6000MM LEGS

Compatible with 120 Series and 150 Series Manhole Brace.

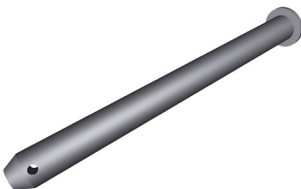
		Inner Section	Outer Section
Leg Assembly	Specification	180x180x10 SHS	200x200x8 SHS (+ 2 No. 200x12 thk. stiffening plates) ^[1]
	Material Grade	S355	S355
	Unit Mass	50.7kg/m	47.7kg/m / 66kg/m ^[1]
	Axial SWL	100kN DA	100kN DA
	Moment SWL	90kNm	90kNm / 180 kNm ^[1]

[1] Corresponds to 200 Series Manhole Brace 4900-6000 only.

		Double Acting
Hydraulic Cylinder	Material	Steel
	Bore	63mm
	Max. Working Pressure	350 Bar (5000 psi)
	Test Pressure	350 Bar (5000 psi)
	Working Stroke	1200mm
	Axial SWL	100kN
	Min. FOS (by test)	2
	Working Temp Range	-20°C* to +50°C
	Approx. Pre-Load	30kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Φ18 and Φ20mm

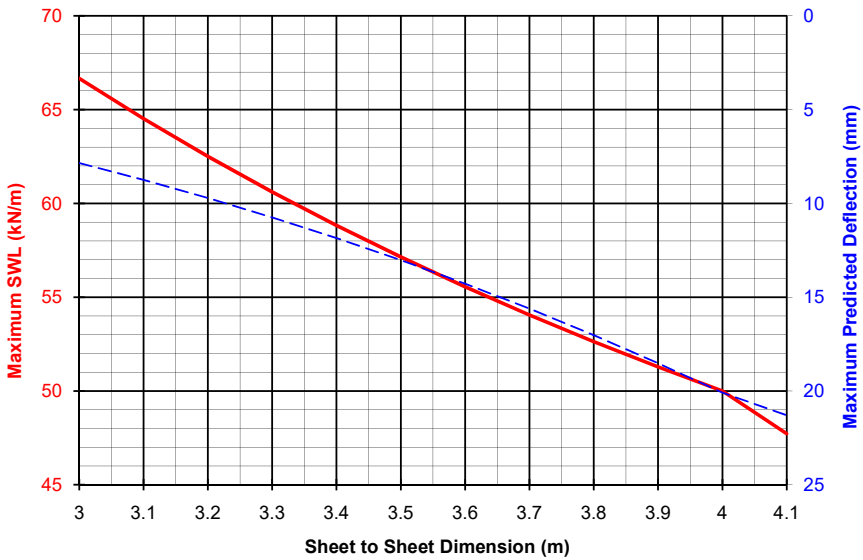
* Winter mix required for shoring fluid at low temps.

200 SERIES MANHOLE BRACE PIN

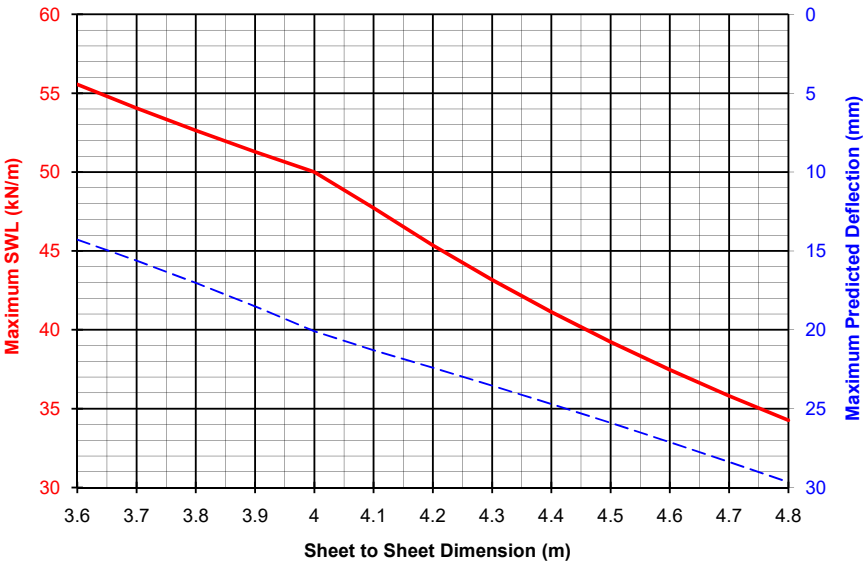


Component	Pin	Φ25mm bar, 265mm long
	Material Grade	080M40 (EN8)
	Shear SWL	120kN
	Weight	1kg

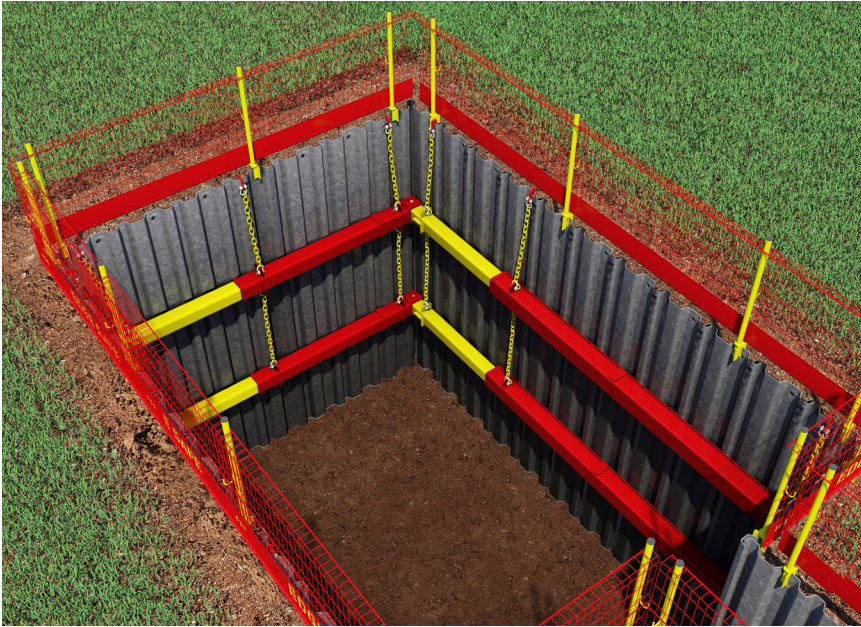
SAFE WORKING LOAD FOR MGF 200 SERIES
MANHOLE BRACE 3000-4100 DA (BC)



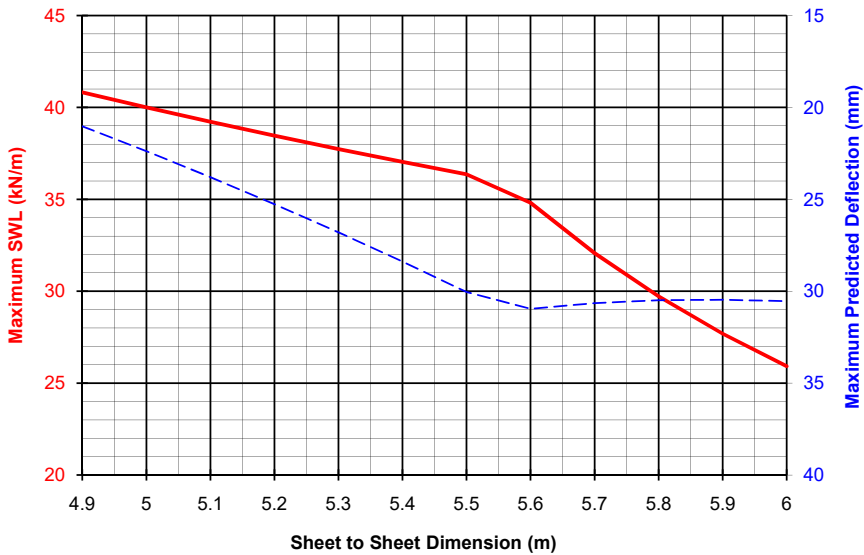
SAFE WORKING LOAD FOR MGF 200 SERIES
MANHOLE BRACE 3600-4700 DA (CD)



The load chart deflections are based on calculated values and not test data.



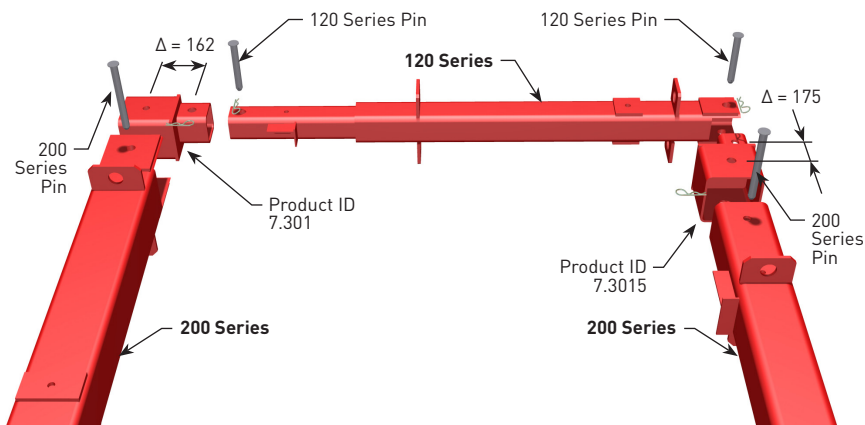
SAFE WORKING LOAD FOR MGF 200 SERIES MANHOLE BRACE 4900-6000 DA (D)



The load chart deflections are based on calculated values and not test data.

MANHOLE BRACE ADAPTORS

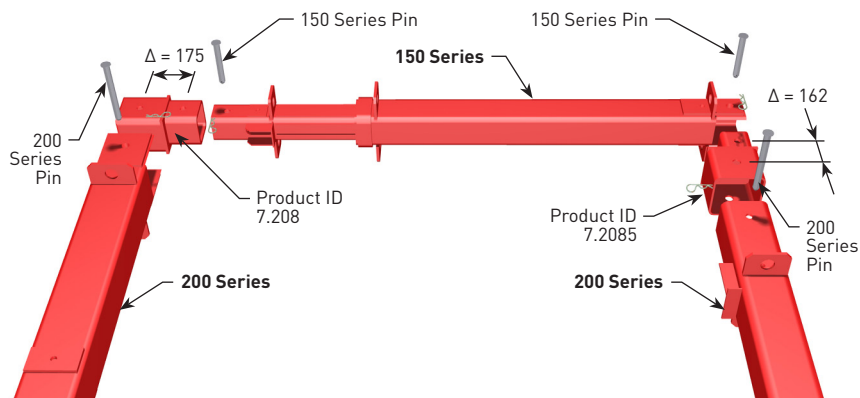
120-200 SERIES MANHOLE BRACE ADAPTORS



The 120-200 Series Manhole Brace adaptors allow 2 legs of 120 Series to be connected with 2 legs of 200 Series.

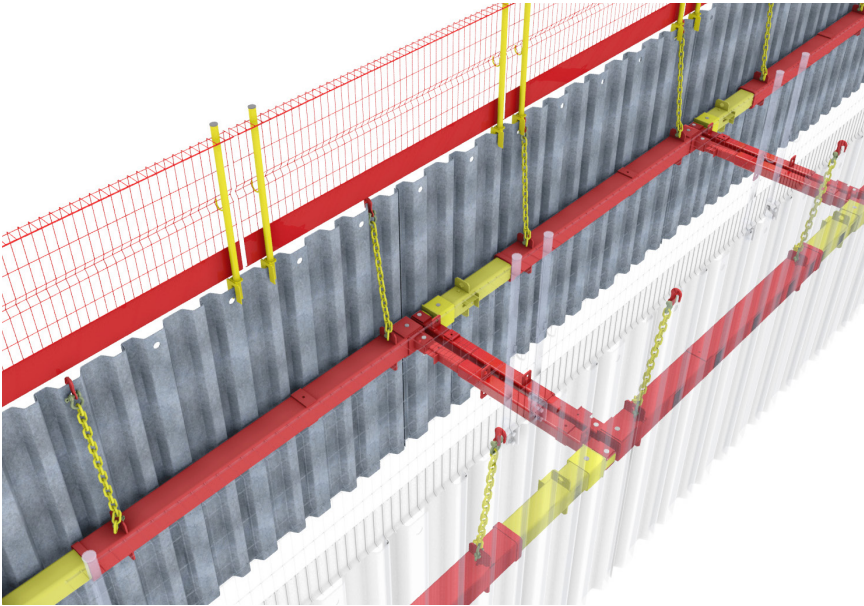
The length of the 120 Series leg will increase by 208mm and the 200 Series will increase by 109mm.

150-200 SERIES MANHOLE BRACE ADAPTORS

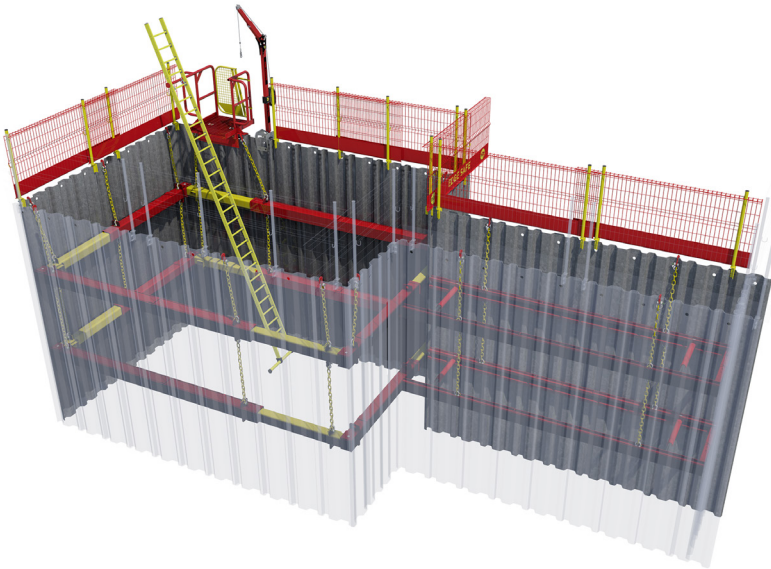


The 150-200 Series Manhole Brace adaptors allow 2 legs of 150 Series to be connected with 2 legs of 200 Series.

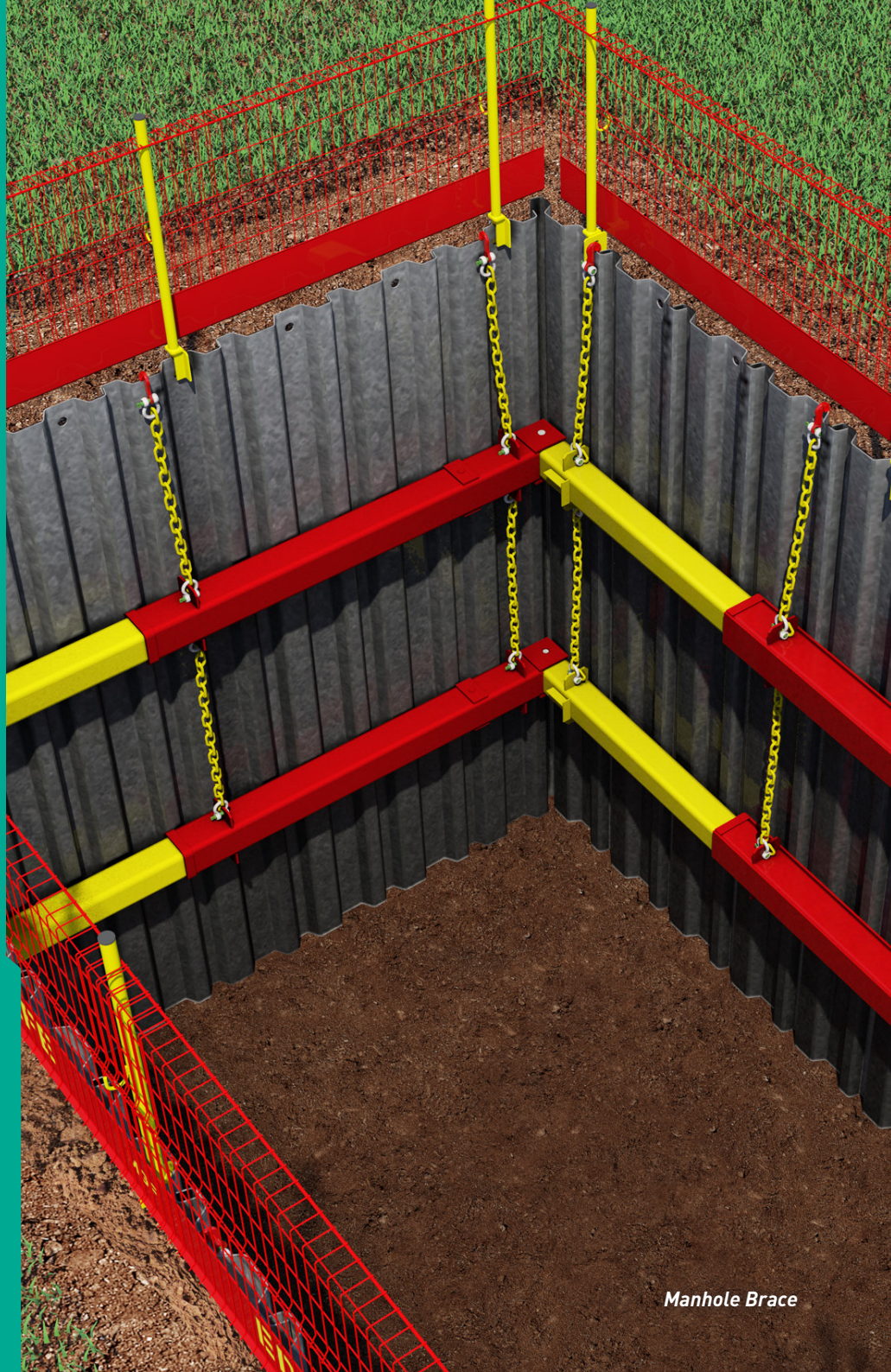
The length of the 150 Series leg will increase by 185mm and the 200 Series will increase by 149mm.



Manhole brace installed back to back to form a trench.



Manhole brace used in conjunction with walers.



Manhole Brace

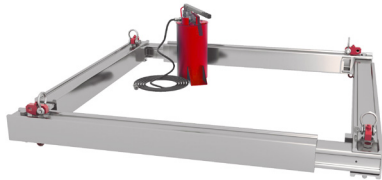
SIMPLE TO ASSEMBLE, FOUR SIDED, ALUMINIUM HYDRAULIC BRACING FRAME SYSTEM, DESIGNED TO BE USED WITH STEEL TRENCH SHEETS TO BRACE SMALL, SHALLOW COFFERDAMS FOR THE SAFE INSTALLATION OF MANHOLES AND UTILITIES. THE LEGS RANGE IN LENGTH FROM 1.5M TO 2.4M AND CAN BE INSTALLED BY HAND OR USING SMALL EXCAVATORS.

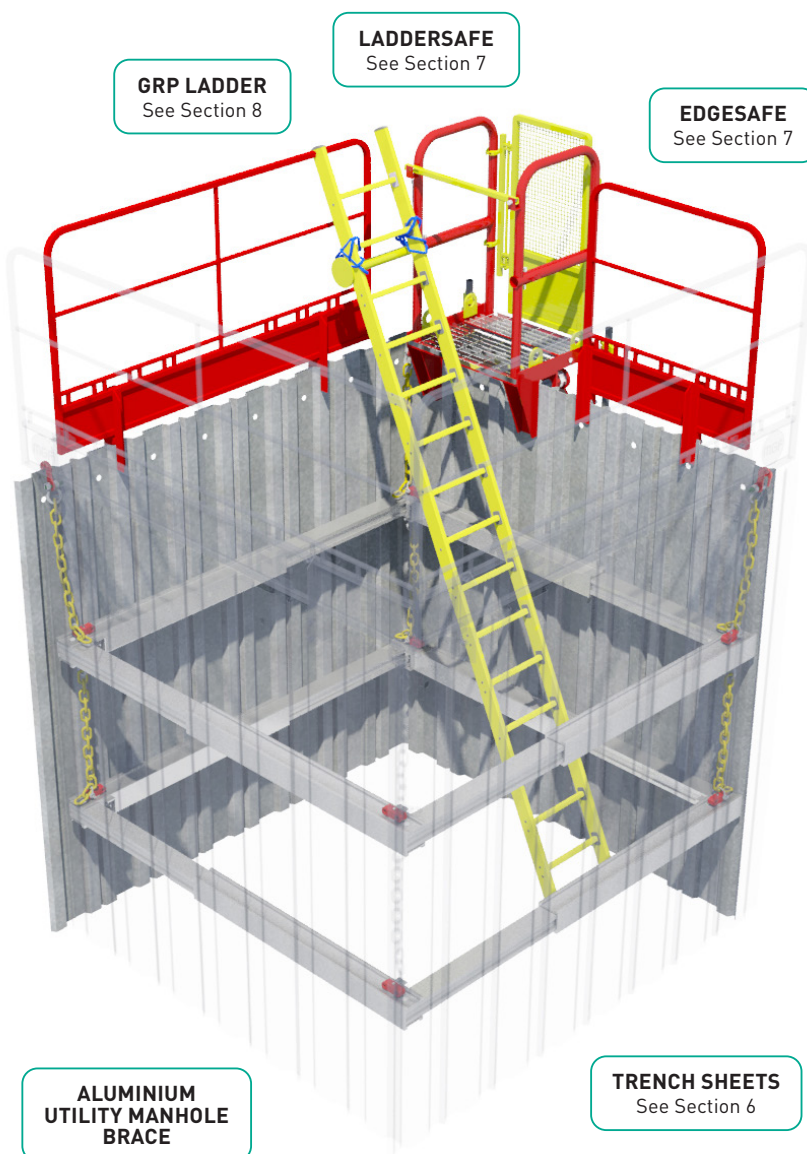
Fabricated from extruded aluminium sections (6082TF material) the legs are assembled to form a frame using simple corner pin and retaining clip assemblies. Each leg contains a single acting hydraulic ram with 915mm of stroke. Connecting the rams (via hydraulic hoses) to an MGF hand operated hydraulic pump unit containing hydraulic shoring fluid allows the leg lengths to be quickly and easily adjusted to suit the excavation dimensions. Once the frames are fully assembled and located at the correct line and level, the rams are pre-loaded against the trench sheets using a hydraulic pump. Pre-loading of the legs ensures the frame cannot slip and minimises the extent of potential ground movements. Self sealing quick release valves and mechanical isolation valves ensure that the hydraulic ram pressure cannot be accidentally released once installed. Handling and restraining points are provided on each leg to assist assembly / removal and to allow the brace to be supported by MGF restraining chains attached to the trench sheets by hooks.

MGF can supply the systems with a full range of suitable handling and restraining chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden ladders, Davitsafe retrieval / fall arrest systems, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Manhole brace should only be installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines.
2. Installation can be carried out by hand, assembling the frame, leg by leg, within the excavation or by lowering the assembled frame to the correct installation level, and once the frame is fully assembled, pre-loading each leg in turn to ensure that the frame is pressed firmly against the trench sheets and cannot slip. Max. pre-load pressure of 100Bar (1500psi) must not be exceeded.
3. Restraining chains are hung off the trench sheets and attached to the legs to assist assembly / removal of the frame and ensure vertical support is provided at all times. All the supplied restraining chains should be installed (min. 2 per leg) and adjusted to ensure an even vertical load distribution. Restraining chains should never be used for lifting nor solely relied upon to suspend loads above personnel.
4. Ensure all hydraulic ram isolation valves are closed and all corner pins in place and secured using the retaining clips provided prior to commencing works.
5. Individual brace legs should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
6. Legs should always be installed square and plumb to the excavation walls ensuring contact with all the inward facing trench sheet pans. If this is not possible any gaps must be securely packed by using hardwood wedges prior to final pre-loading of the hydraulic rams.
7. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
8. Prior to removal of systems all hydraulic rams must be released and manually retracted to avoid the need for excessive extraction forces and to avoid damaging corner joints.
9. To manually retract the manhole brace leg ensure that there is sufficient packing beneath the frame, that the hanging chains are in position, and that there is no slack in the chains. Connect the hydraulic hose to the cylinder and open the lock-off valve (2 turns anticlockwise). Ensure the bucket pump is set to 'open' and manually retract the leg by hand until the corner pin can be released, fluid will return into the bucket pump. Repeat this procedure for each leg.
10. No matter how much care is taken during the installation and removal of hydraulic bracing systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.





FOR SAFE SYSTEM OF WORKS GUIDANCE FOR
MGF ALUMINIUM UTILITY MANHOLE BRACE

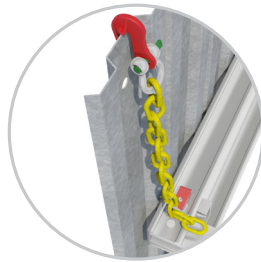
mgf.co.uk/products/aluminium-utility-manhole-brace





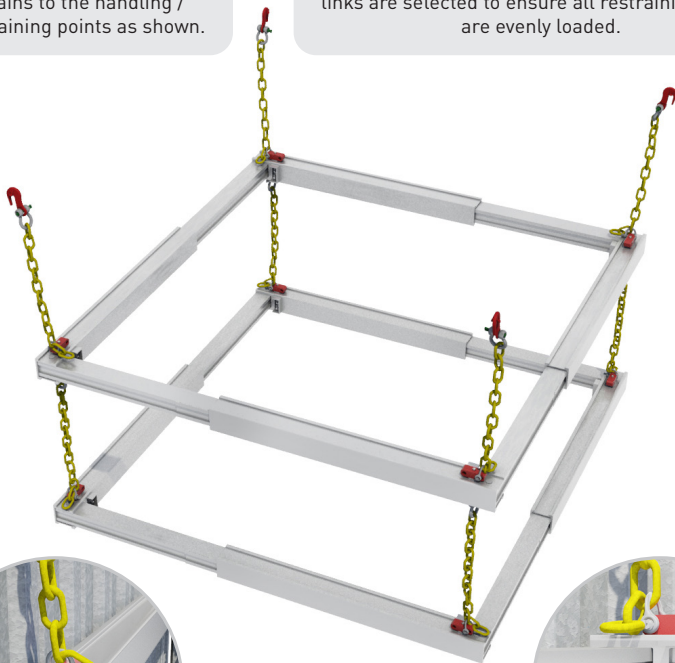
HANDLING POINT WLL = 0.4T

Manhole brace legs and frames are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



STANDARD DUTY RESTRAINING CHAIN CONNECTION DETAIL

There are 2 types of chains used, the top frame will use shackle to hook type, while lower frames will use shackle to shackle type. Individual chain links are selected to ensure all restraining chains are evenly loaded.



LEG CONNECTION DETAIL

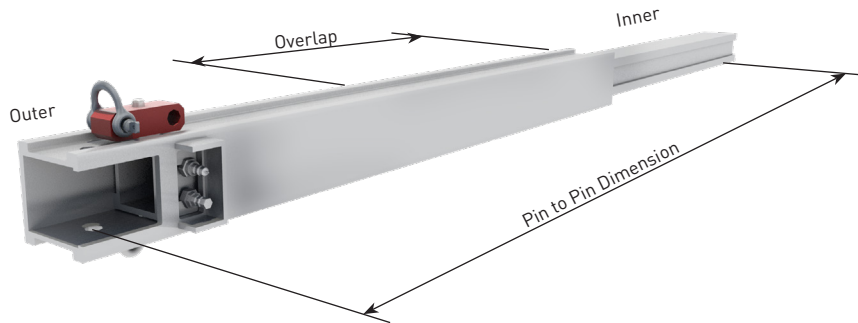
Manhole brace legs are connected to each other using a pin and r-clip detail.



HYDRAULIC CONNECTION DETAIL

Legs are pumped out by attaching a hydraulic hose to the male QRV, and pressure is locked in and released via the lock-off valve.

ALUMINIUM UTILITY MANHOLE BRACE



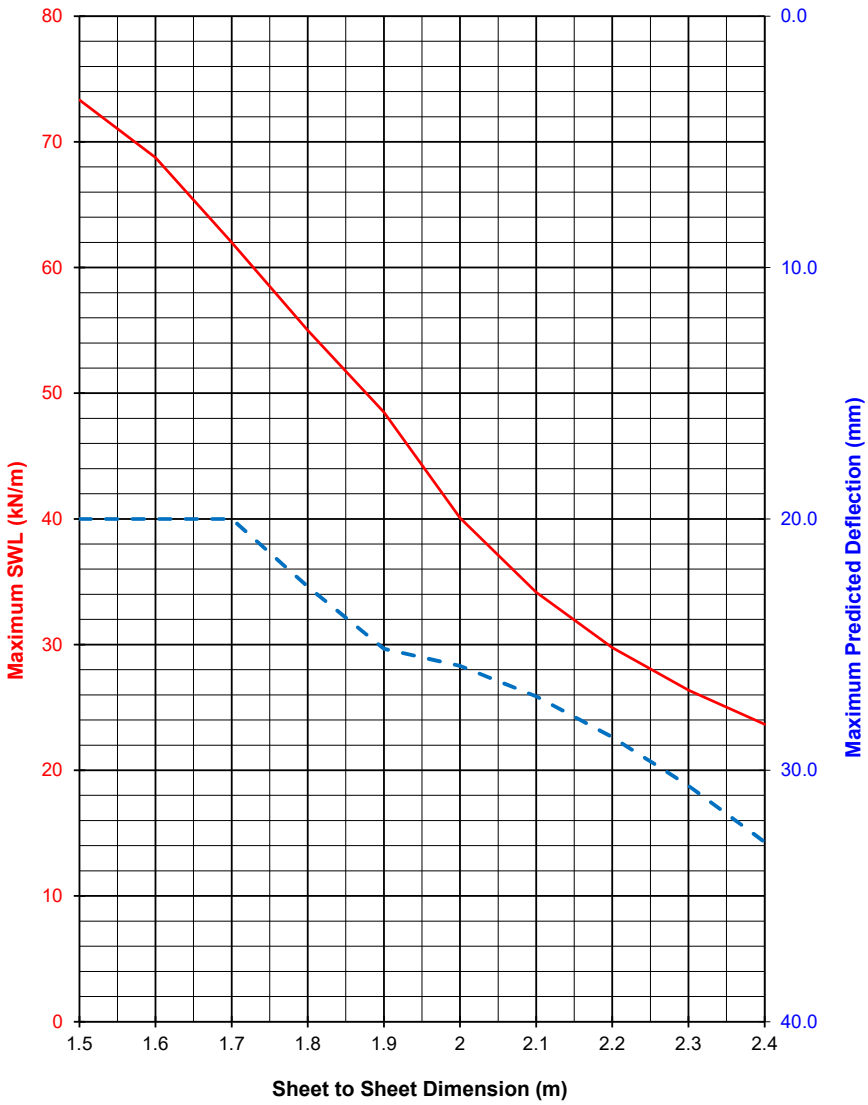
Manhole Brace legs comprise inner and outer sleeved bespoke aluminium box sections housing a single acting (SA) hydraulic ram to provide 915mm of leg adjustment.

Product Description	Product ID	Sheet to Sheet Dimension		Hydraulic Ram SWL	Leg Weight
		Min.	Max.		
		[m]	[m]		[kg]
MGF Aluminium Utility Manhole Brace	7.209	1.5	2.4	SA 55kN	35

Hydraulic Cylinder	Material	Single Acting
	Bore	Aluminium
	Max. Working Pressure	50.8mm
	Test Pressure	270 Bar (4000 psi)
	Approx. Working Stroke	270 Bar (4000 psi)
	Axial SWL	915mm
	Min. FOS (by test)	55kN
	Working Temp Range	2
	Approx. Pre-Load	-20°C* to +50°C
	Approx. Pre-Load Pressure	15kN
		75 Bar (1100 psi)

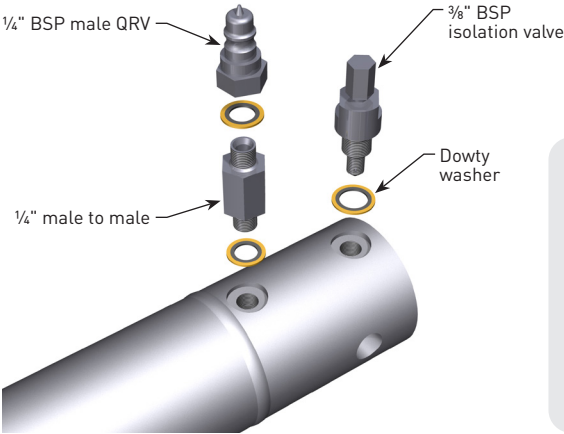
* Winter mix required for shoring fluid at low temps.

**SAFE WORKING LOAD FOR MGF
ALUMINIUM UTILITY MANHOLE BRACE**

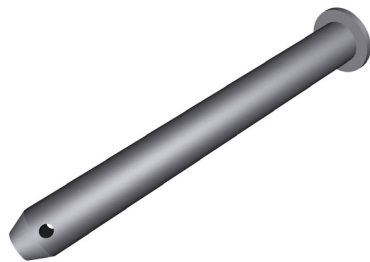


Note: The load chart deflections are based on calculated values and not test data.

SINGLE ACTING HYDRAULIC CYLINDER CONNECTIONS



Shoring fluid is pumped into the full bore side of the piston through the male QRV. Single acting cylinders cannot be retracted using a pump unit and have to be physically closed whilst releasing the male QRV. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



ALUMINIUM UTILITY
MANHOLE BRACE PIN

Component	Pin	Ø20mm bar, 145mm long
	Material Grade	080M40 (EN8)
	Shear SWL	55kN
	Weight	0.5kg

MANUALLY OPERATED HYDRAULIC PUMPS



The pump is used to extend the Aluminium Utility Manhole Brace single acting hydraulic rams. The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 1500 psi (100 Bar).

Component	Product ID	1.602 (SA)
	Capacity	20 litres
	Weight	25kg
	Shoring Fluid	Houghto Safe SF25
	Installation Pressure	0-1500 psi (0-100 Bar)

SIMPLE TO ASSEMBLE, HIGHLY VERSATILE, MODULAR HYDRAULIC BRACING SYSTEM COMPRISING INTERCHANGEABLE HYDRAULIC RAM ASSEMBLIES AND VARIOUS LENGTH WALER EXTENSION BARS. DESIGNED TO BE USED WITH STEEL TRENCH SHEETS OR SHEET PILES TO BRACE SMALL TO MEDIUM SIZED COFFERDAMS (IN A WIDE VARIETY OF SHAPES) AND LARGER TRENCHES FOR THE SAFE INSTALLATION OF UNDERGROUND STRUCTURES, DRIVE / THRUST PITS OR SERVICES.

Extension bars can additionally be used without the ram assemblies as waler rails for trenches or cantilevered walls. The 203 UC system is ideally suited for cofferdams in sizes ranging from 2.1m to 9.1m and is normally assembled and installed within the excavation using either excavators or cranes. Larger excavations can be braced using this system in conjunction with intermediate bracing struts and it is fully compatible with the MGF 200 and 300 Series Bracing Strut systems.

Fabricated from grade S460 UC steel sections the extensions are quickly assembled into brace legs using simple pin and retaining clip / bolt and nut assemblies. Each leg contains a double acting hydraulic ram assembly providing 1000mm of stroke and the legs are joined together at corners to form frames via a simple pin and retaining clip assembly. Connecting the rams (via hydraulic hoses) to an MGF hydraulic pump unit containing hydraulic shoring fluid allows the leg lengths to be quickly and easily adjusted to suit the excavation dimensions. Once the frames are fully assembled and located at the correct line and level, the rams are pre-loaded against the trench sheets using the hydraulic pump. Pre-loading of the legs ensures the frame cannot slip and minimises the extent of potential ground movements. Self sealing quick release valves and mechanical isolation valves ensure that the ram pressure cannot be accidentally released once installed. Handling and restraining points are provided on each leg to assist assembly / removal and to allow the brace / waler to be supported off MGF restraining chains attached to the trench sheets by hooks.

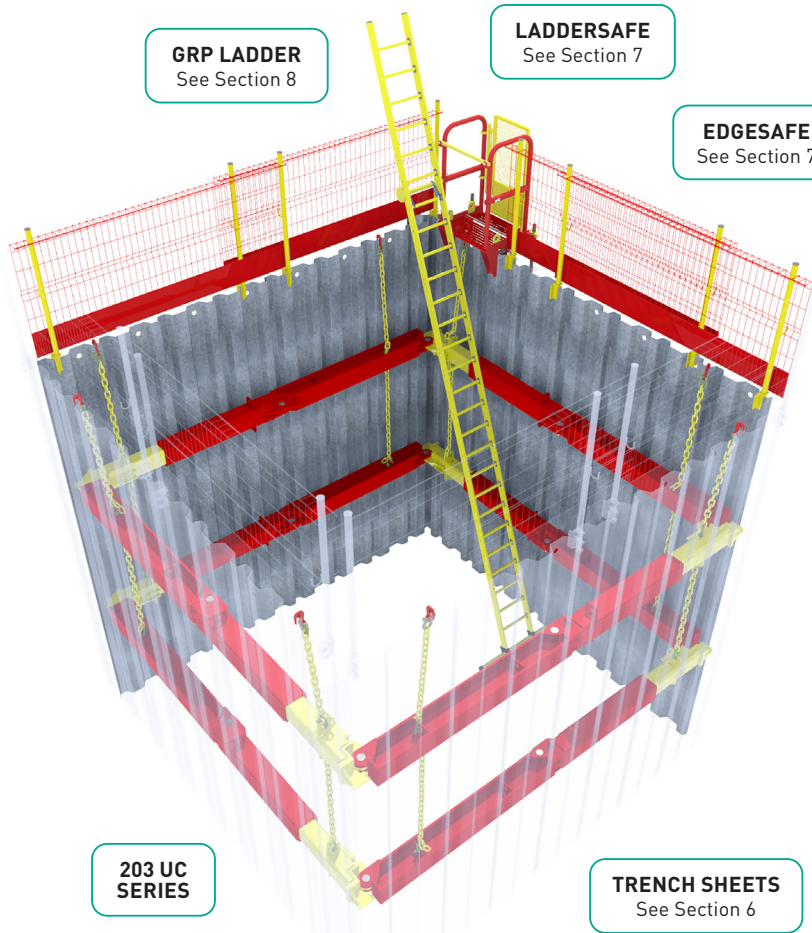
MGF can supply the systems with a full range of suitable handling and restraining chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Hydraulic brace is very heavy and should only be assembled, installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines. When assembling on site ensure that all pins and retaining clips are in place and secured and all bolts are installed and fully tightened with a minimum two threads visible beyond the nut.
2. Installation is normally carried out by lowering either the assembled frame or individual legs (dependant upon lifting capacity of excavator / crane) to the correct installation level and once the frame is fully assembled, pre-loading each leg in turn to ensure that the frame is pressed firmly against the trench sheets and cannot slip. Max. pre-load pressure of 100Bar (1500psi) must not be exceeded.
3. Restraining chains are hung off the trench sheets and attached to the legs to assist assembly / removal of the frame and ensure vertical support is provided at all times. All the supplied restraining chains should be installed (min. 2 per leg) and adjusted to ensure an even vertical load distribution. Restraining chains should never be used for lifting nor solely relied upon to suspend loads above personnel.
4. Ensure all hydraulic ram isolation valves are closed and all corner pins in place and secured using the retaining clips provided prior to commencing works.
5. Individual brace legs should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
6. Legs should always be installed square and plumb to the excavation walls ensuring contact with all the inward facing trench sheet pans. If this is not possible any gaps must be securely packed by using hardwood wedges prior to final pre-loading of the hydraulic rams.
7. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.



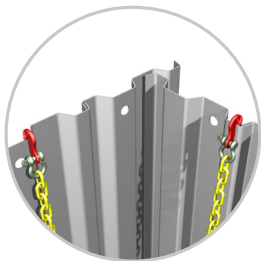
8. Prior to removal of systems all hydraulic rams must be released and retracted to avoid the need for excessive extraction forces and to avoid damaging corner joints.
9. No matter how much care is taken during the installation and removal of hydraulic bracing systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF 203 UC BRACE**

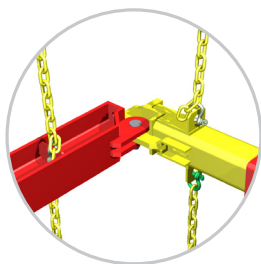
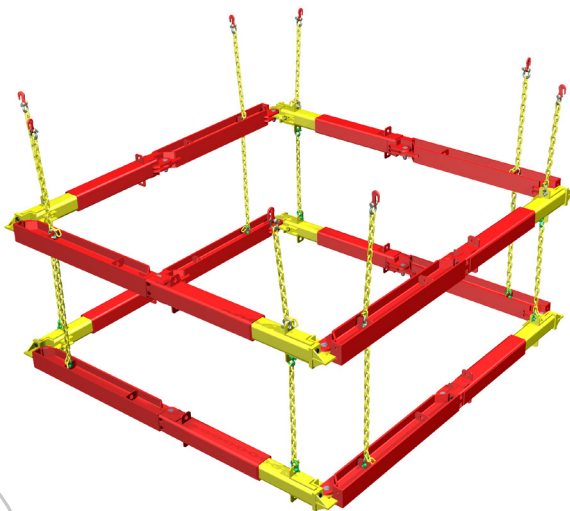
mgf.co.uk/products/203-uc-brace





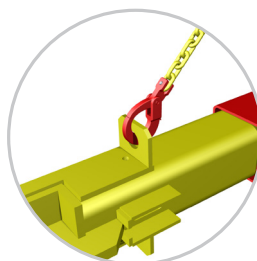
STANDARD DUTY CHAIN TO SHEET CONNECTION DETAIL

The hook fits over the sheet.



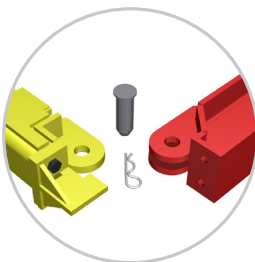
STANDARD DUTY RESTRAINING CHAIN CONNECTION DETAIL

There are 2 types of chains used, the top frame will use shackle to hook type, while lower frames will use shackle to shackle type. Individual chain links selected to ensure all restraining chains are evenly loaded.



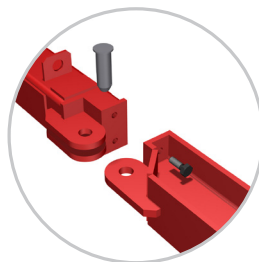
HANDLING POINT WLL = 3.15T

Brace legs and frames are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



CORNER CONNECTION DETAIL

Leg corners are connected to each other using the 203 UC connection pin and r-clip detail. To fill corner void a corner bracket is attached to ram assembly using 2No. M24x50 (min.) grade 8.8 set screws c/w washers.

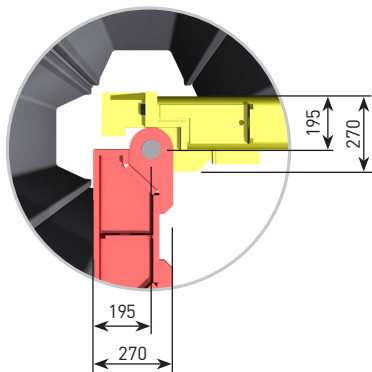


LEG CONNECTION DETAIL

Brace legs are connected to each other using a 203 UC connection pin and r-clip detail and 2 No. M24x70 (min.) grade 8.8 bolts and nuts c/w washers.

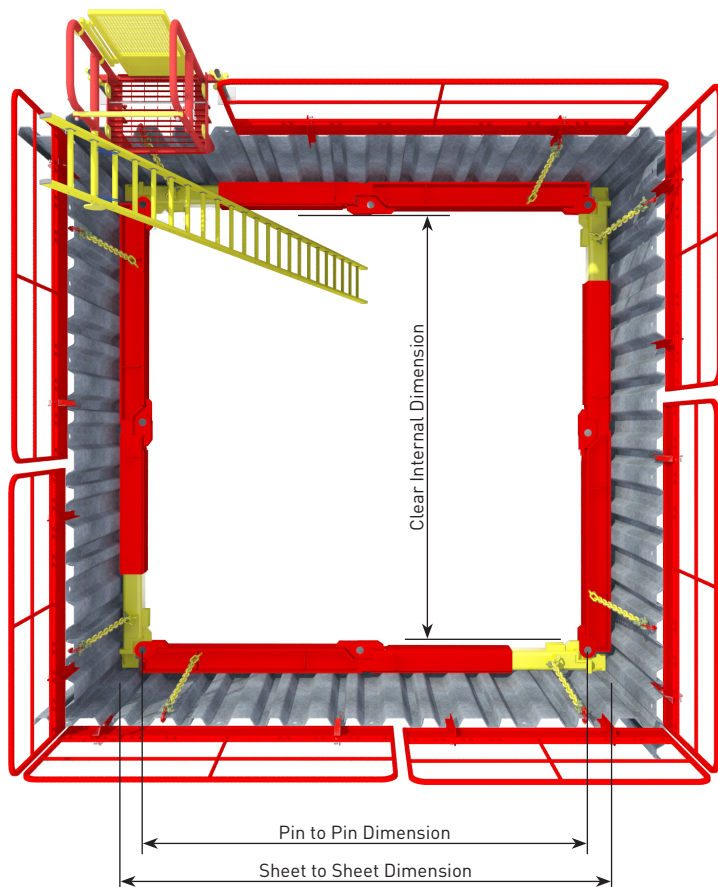


203 UC CONNECTION DETAILS

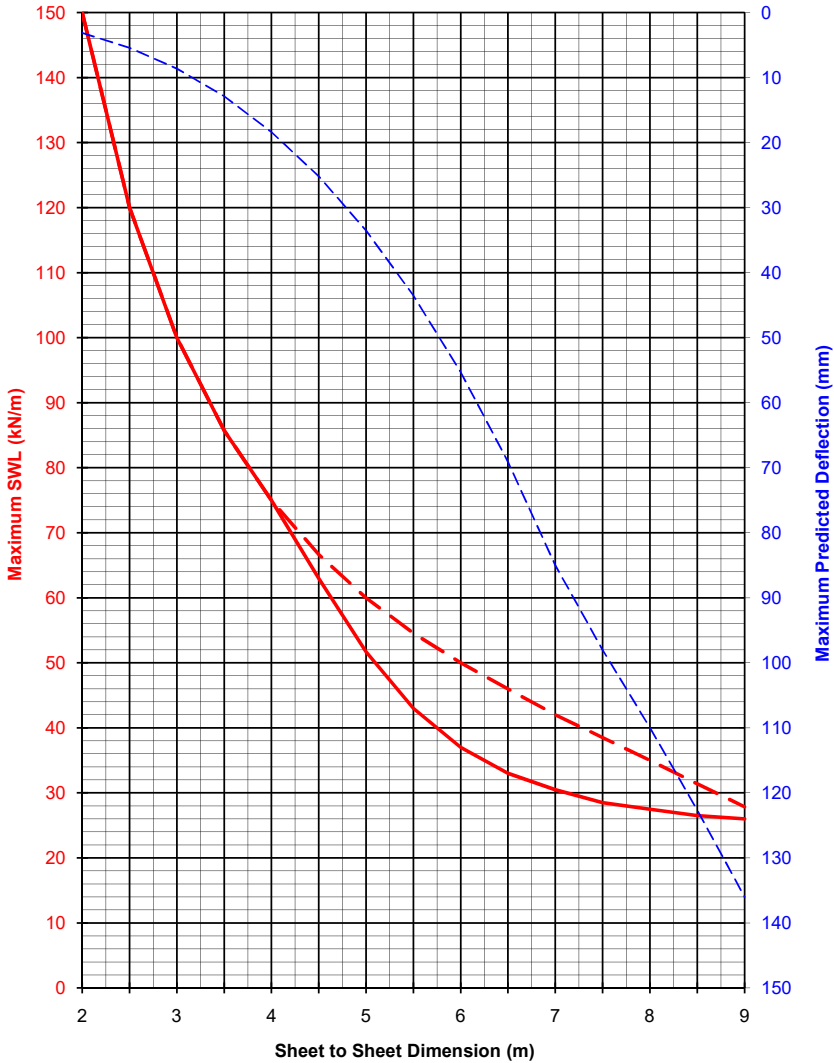


Legs are normally installed at 90° to each other. However, subject to confirmation by a competent design Engineer, angles of between 75° and 135° can be achieved (>90° corner bracket requires removing).

Corners should always be packed out using hardwood wedges against the sheets prior to final pre-load to ensure even load distribution and avoid introducing excessive bending in the brace legs (especially ram assembly).

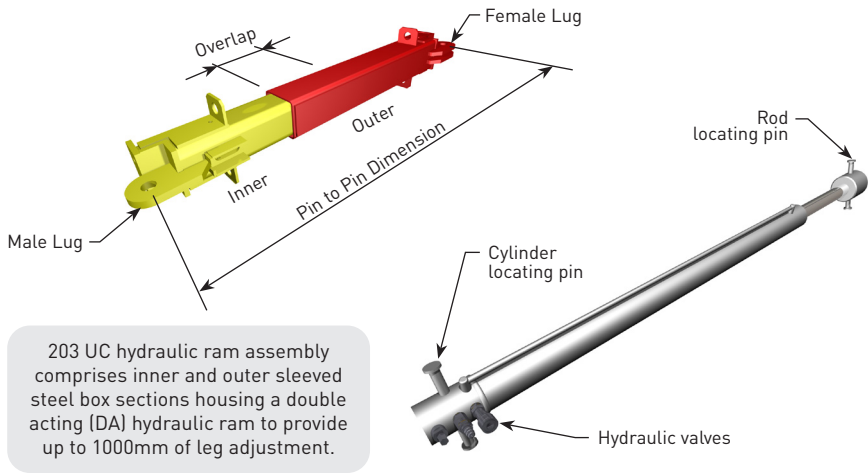


SAFE WORKING LOAD FOR MGF 203 UC (kN/m)

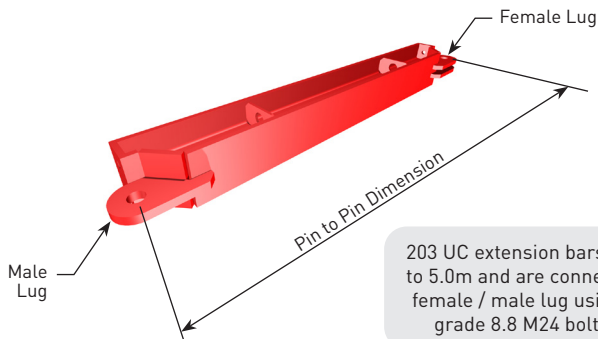


- Recommended SWL
- Max. SWL available subject to MGF Design Services checks

The above load chart is applicable when bracing leg is built up in accordance with the recommended brace extension combinations on page 4.3.10.
The load chart deflections are based on calculated values and not test data.



Ram Assembly	Product ID	Pin to Pin Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
150kN 203 UC Ram	8.100	1747	2747	352



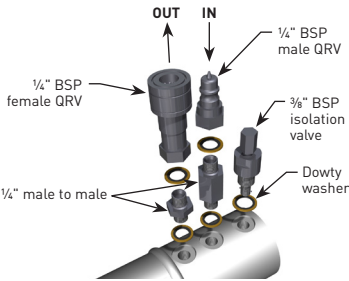
203 UC extension bars range in length from 0.6m to 5.0m and are connected to each other via a 2:1 female / male lug using a $\Phi 50$ mm pin and 2 No. grade 8.8 M24 bolts c/w nuts and washers.

Product Description		Weight
		(kg)
Product ID	8.105	203 UC 0.6m Extension 79
	8.110	203 UC 1.0m Extension 122
	8.120	203 UC 2.0m Extension 208
	8.130	203 UC 3.0m Extension 294
	8.140	203 UC 4.0m Extension 380
	8.150	203 UC 5.0m Extension 466

150kN DOUBLE ACTING HYDRAULIC RAM ASSEMBLY



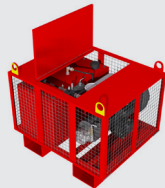
Hydraulic Cylinder		Double Acting
	Material	Steel
	Bore	63mm
	Max. Working Pressure	480 Bar (7000 psi)
	Test Pressure	480 Bar (7000 psi)
	Approx. Working Stroke	1000mm
	Axial SWL	150kN
	Min. FOS (by test)	2
	Working Temp Range	-20°C* to +50°C
	Approx. Pre-Load	30kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Ø16 and Ø18mm



* Winter mix required for shoring fluid at low temps.

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.

PUMP UNITS

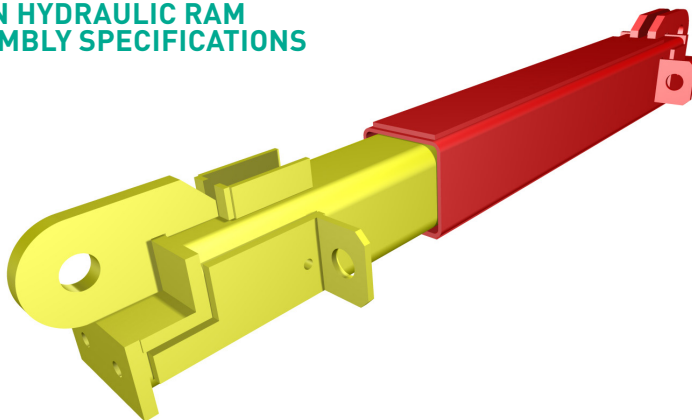


The pumps are used to extend and retract the 203 UC double acting hydraulic rams. The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 1500 psi (100 Bar). There are 2 types of pumps available, a manually operated bucket pump and a motorised petrol pump.



Component		Bucket Pump	Petrol Motorised Pump
	Product ID	1.603 (DA)	8.4007 (DA)
	Fluid Capacity (L)	20	70
	Weight (kg)	25	270
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25
	Working Pressure (psi)	0-1500	0-1500

150kN HYDRAULIC RAM ASSEMBLY SPECIFICATIONS



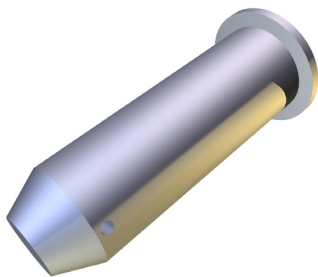
Hydraulic Ram		Inner Section	Outer Section
	Specification	180x180x12.5 SHS	200x200x8 SHS (+ 2 No. 180x10 thk. stiffening plates)
	Material Grade	S355	S355
	Unit Mass	64.4kg/m	76.0kg/m
	Axial SWL	150kN	150kN
	Moment SWL	121kNm	188kNm

203 UC EXTENSION BAR SPECIFICATIONS



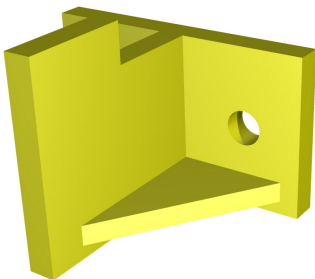
Extension Bar	Specification	203x203x86UC
	Material Grade	S460
	Unit Mass	86kg/m
	Axial SWL	150kN
	UC Moment SWL	258kNm
	Joint Moment SWL	157kNm
	Bolting Details	2 No. M24x70 (min.) grade 8.8 bolts and nuts c/w washers

203 UC ANCILLARIES



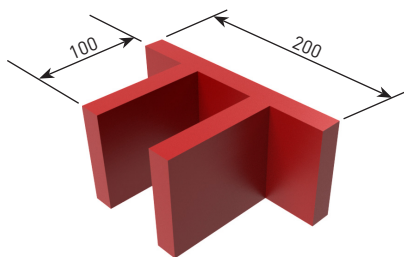
203 UC WALER CONNECTION PIN

Component	Pin	Ø50mm bar, 150mm long
	Material Grade	708M40 (EN19A)
	Shear SWL	600kN
	Weight	3kg



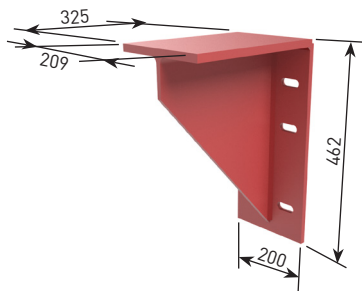
203 UC CORNER BRACKET

Component	Weight	11kg
	Material	S275
	Bolting Details	2 No. M24x50 (min.) grade 8.8 set screws c/w washers



203 UC SHEAR STOP

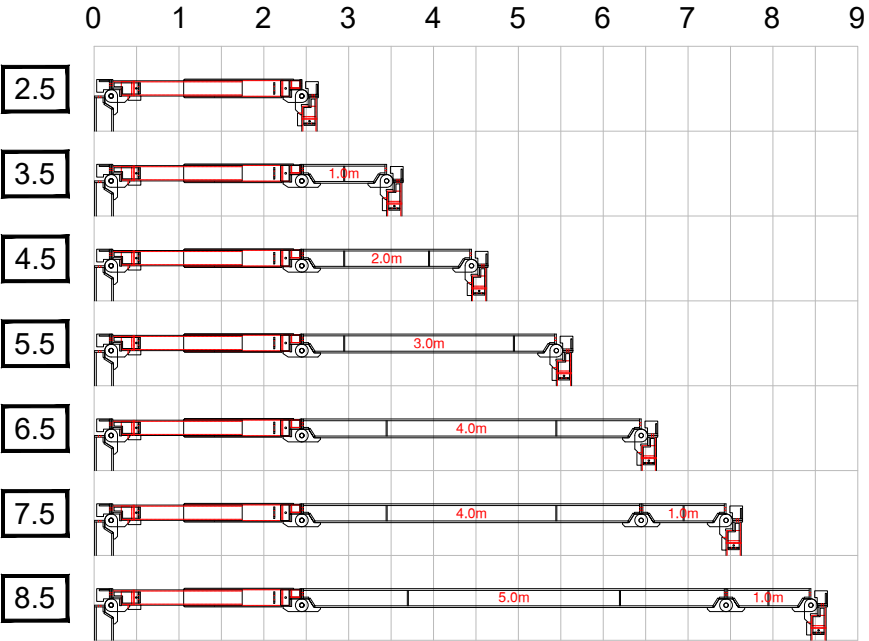
Component	Weight	7kg
	Material	90x20 flat, S275
	Weld Details	9mm single run fillet weld. No weld on bearing face
	Shear SWL	600kN



203 UC STEEL SUPPORT BRACKET

Component	Product ID	8.3003
	Weight	23kg
	Material	533x210x92 UB, S355
	Weld Details	8mm single run fillet weld. No weld on bearing face
	SWL	30kN
	Hole Details	6 No. Ø18 holes min. 100mm c/c

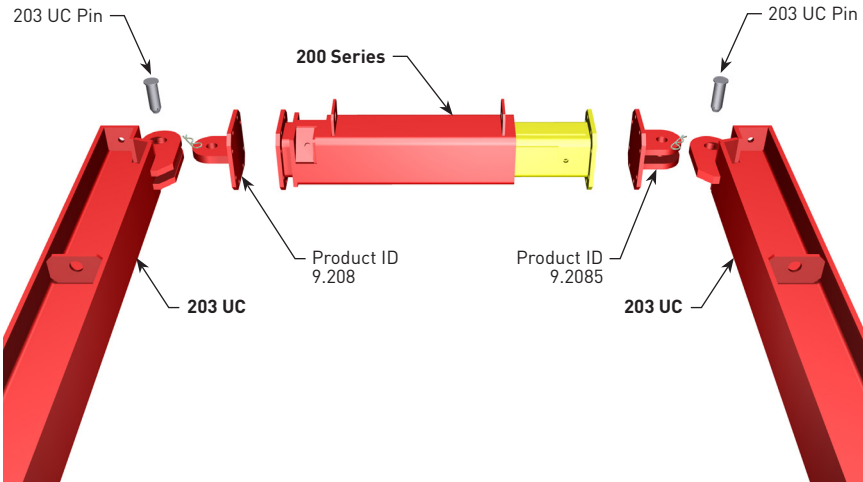
203 UC RECOMMENDED BRACE EXTENSION COMBINATIONS



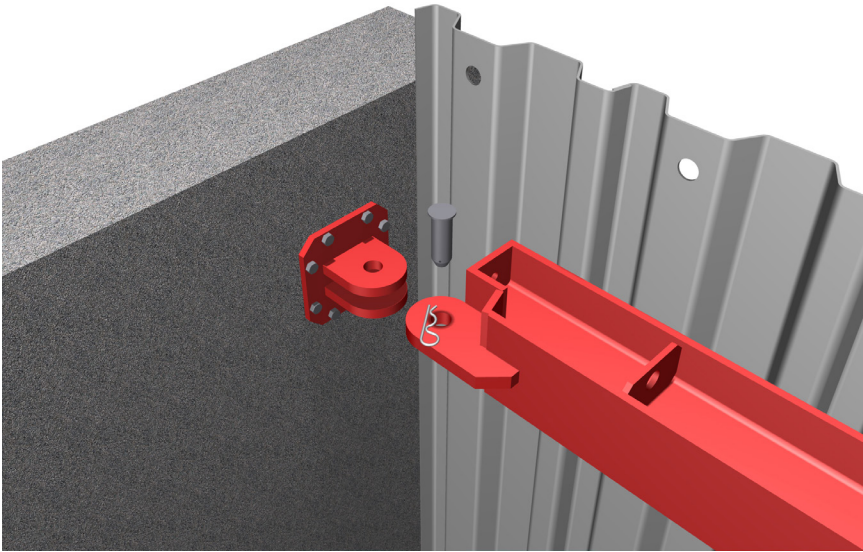
N.B. Single 0.6m extensions should be added to these combinations for intermediate dimensions. The ram assemblies are shown at mid-stroke, so each length can vary by 500mm in either direction.

Sheet to Sheet Dimension	Min. Length	Max. Length	Leg Weight
(m)	(mm)	(mm)	(kg)
2.5	2147	3147	352
3.5	3147	4147	474
4.5	4147	5147	560
5.5	5147	6147	646
6.5	6147	7147	732
7.5	7147	8147	854
8.5	8147	9147	940

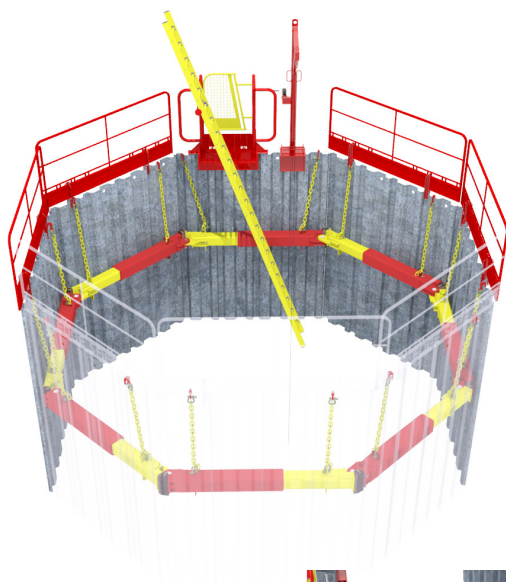
203 UC 200 SERIES STRUT ADAPTORS



203 UC extension can be utilised with 200 series struts to support trenches between 1250mm and 5000mm wide. Adaptor uses 8 No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers.

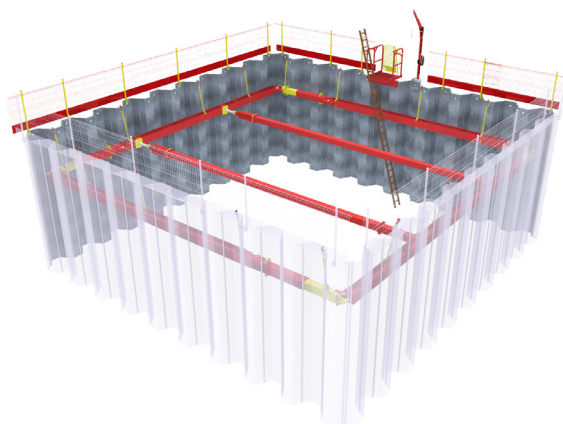
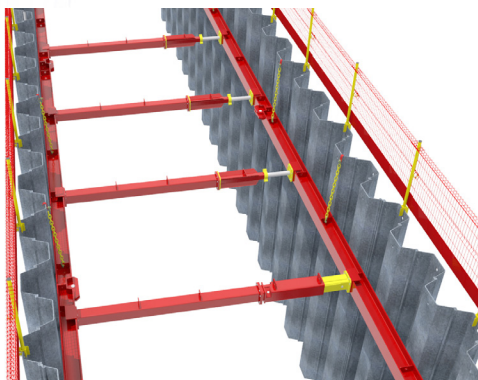


Adaptors can be utilised as RC wall fixing plates (subject to bolt anchorage design).



Octagonal frame designs available for circular excavations.

Typical trench application utilising 200 / 300 Series Struts.



Larger cofferdam designs available utilising intermediate bracing struts.

SIMPLE TO ASSEMBLE, HIGHLY VERSATILE, MODULAR HYDRAULIC BRACING SYSTEM COMPRISING INTERCHANGEABLE HYDRAULIC RAM ASSEMBLIES AND VARIOUS LENGTH WALER EXTENSION BARS. DESIGNED TO BE USED WITH STEEL TRENCH SHEETS OR SHEET PILES TO BRACE MEDIUM TO LARGE SIZED COFFERDAMS (IN A WIDE VARIETY OF SHAPES) AND LARGER TRENCHES FOR THE SAFE INSTALLATION OF LARGE UNDERGROUND STRUCTURES, DEEPER DRIVE / THRUST PITS OR BASEMENTS.

Extension bars can additionally be used without the ram assemblies as waler rails for trenches or cantilevered walls. The 203 UC+ system is ideally suited for cofferdam sizes ranging from 3.0m to 11.0m and is normally assembled and installed within the excavation using either excavators or cranes. Any size of excavation can be braced using this system in conjunction with intermediate bracing struts. The 203 UC+ extension bars have built in shear stops and web stiffeners and is fully compatible with the MGF 200 and 300 Series Bracing Strut systems. Legs of 203 UC+ can also be used in conjunction with 203 UC legs, ensuring the most efficient frame design can be provided.

Fabricated from grade S460 UC steel sections and min. S600 plate, the extensions are quickly assembled into brace legs using simple pin and retaining clip / bolt and nut assemblies. Each leg contains a double acting hydraulic ram assembly providing 700mm of stroke and the legs are joined together at corners to form frames via a simple pin and retaining clip assembly. Connecting the rams (via hydraulic hoses) to an MGF hydraulic pump unit containing hydraulic shoring fluid allows the leg lengths to be quickly and easily adjusted to suit the excavation dimensions. Once the frames are fully assembled and located at the correct line and level, the rams are pre-loaded against the trench sheets using the hydraulic pump. Pre-loading of the legs ensures the frame cannot slip and minimises the extent of potential ground movements. Self-sealing quick release valves and mechanical isolation valves ensure that the ram pressure cannot be accidentally released once installed. Handling and restraining points are provided on each leg to assist assembly / removal and to allow the brace / waler to be supported off MGF restraining chains attached to the trench sheets by hooks.

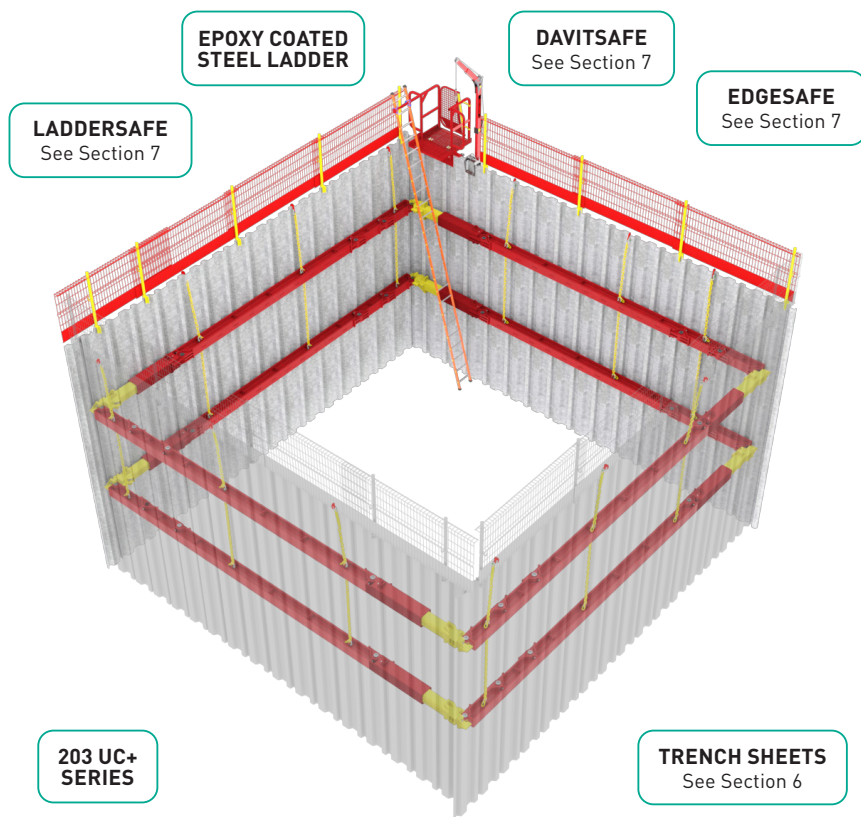
MGF can supply the systems with a full range of suitable handling and restraining chains, Edgesafe edge protection panels, Laddersafe access platforms and epoxy coated steel, GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.



PRODUCT NOTES

1. Hydraulic brace is very heavy and should only be assembled, installed and removed by competent persons in accordance with a site-specific detailed design & installation sequence and MGF installation guidelines. When assembling on site ensure that all pins and retaining clips are in place and secured and all bolts are installed and fully tightened with a minimum two threads visible beyond the nut.
2. Installation is normally carried out by lowering either the assembled frame or individual legs (dependent upon lifting capacity of excavator / crane) to the correct installation level and once the frame is fully assembled pre-loading each leg in turn to ensure that the frame is pressed firmly against the trench sheets and cannot slip. Max. pre-load pressure of 100Bar (1500psi) must not be exceeded.
3. Restraining chains are hung off the trench sheets and attached to the legs to assist assembly / removal of the frame and ensure vertical support is provided at all times. All the supplied restraining chains should be installed (min. 2 per leg) and adjusted to ensure an even vertical load distribution. Restraining chains should never be used for lifting nor solely relied upon to suspend loads above personnel.
4. Ensure all hydraulic ram isolation valves are closed and all corner pins in place and secured using the retaining clips provided prior to commencing works.
5. Individual brace legs should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
6. Legs should always be installed square and plumb to the excavation walls ensuring contact with all the inward facing trench sheet pans. If this is not possible any gaps must be securely packed by using hardwood wedges prior to final pre-loading of the hydraulic rams.

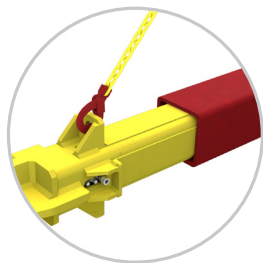
7. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
8. Prior to removal of systems all hydraulic rams must be released and retracted to avoid the need for excessive extraction forces and to avoid damaging corner joints.
9. No matter how much care is taken during the installation and removal of hydraulic bracing systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.
10. 203 UC+ extension bars and the hydraulic ram assembly feature integrated shear stops to accept bracing struts, in conjunction with the relevant clamping details.
11. 203 UC+ leg build up combinations can be found on page 4.4.10, please adhere to this configuration for clear spanning brace legs. It is essential the longest extension bars connect to the power pack and the smallest extensions be placed at the opposing end.
12. 203 UC+ bracing legs can also accept 203 UC extension bars, should the design allow, these 203 UC extensions must be placed at the opposing end of the leg to the hydraulic power pack.



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF 203 UC+ BRACE**

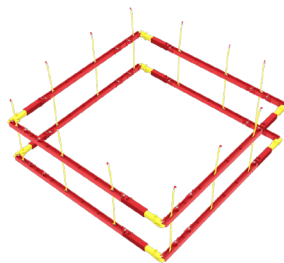
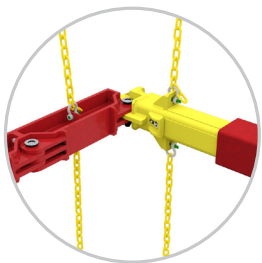
mgf.co.uk/products/203-UC-plus





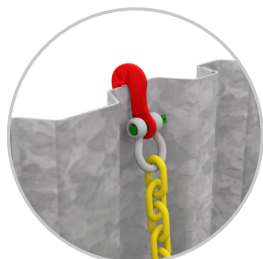
HANDLING POINT WLL = 3.15T

Brace legs and frames are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



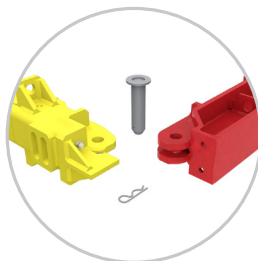
STANDARD DUTY RESTRAINING CHAIN CONNECTION DETAIL

There are 2 types of chains used, the top frame will use shackle to hook type, while lower frames will use shackle to shackle type. Individual chain links selected to ensure all restraining chains are evenly loaded.



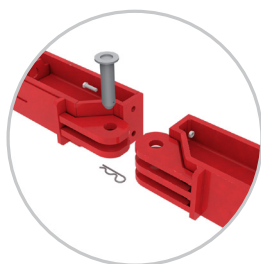
STANDARD DUTY CHAIN TO SHEET CONNECTION DETAIL

The hook fits over the sheet.



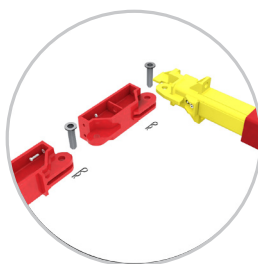
CORNER CONNECTION DETAIL

Leg corners are connected to each other using the 203 UC+ connection pin and r-clip detail. To fill corner void a corner bracket is attached to ram assembly using M20 x 70 (min.) grade 8.8 bolts and Nyloc nuts c/w washers.



LEG CONNECTION DETAIL

Brace legs are connected to each other using a 203 UC+ connection pin and r-clip detail and 2 No. M24 x 70 (min.) grade 8.8 bolts and nuts c/w washers.

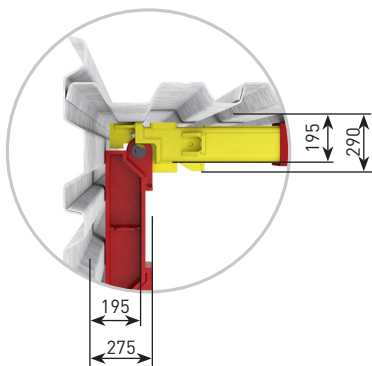


203 UC EXTENSION CONNECTION DETAIL

203 UC extension bars can connect to the end of 203 UC+ bracing legs using a 203 UC+ connection pin and r-clip detail and 2No. M24 x 70 (min.) grade 8.8 bolts and nuts c/w washers.

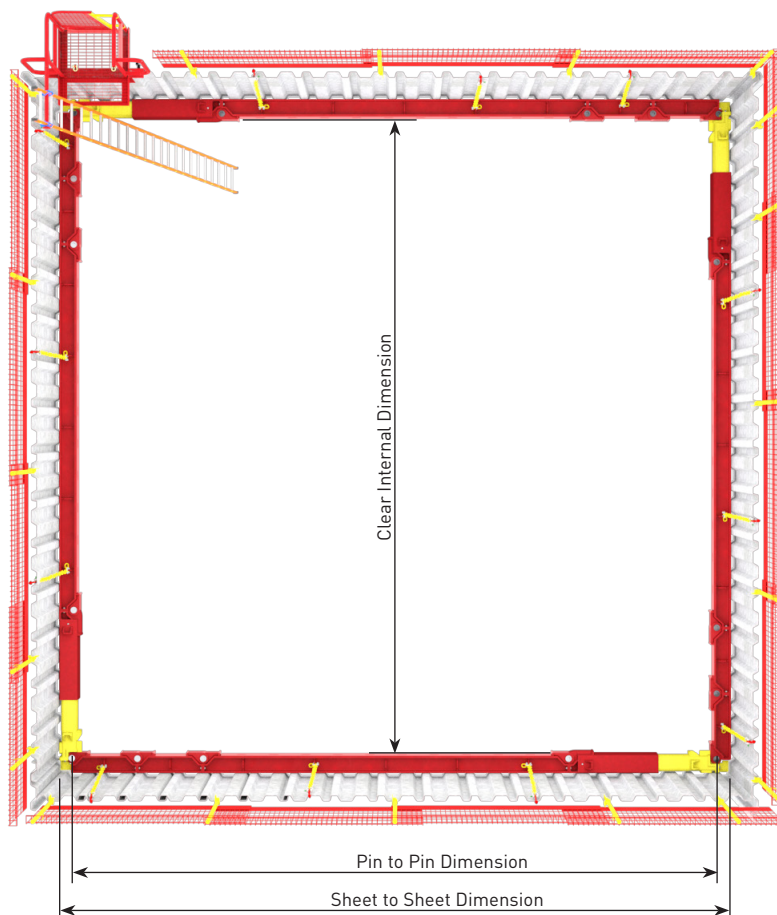


203 UC+ CONNECTION DETAILS

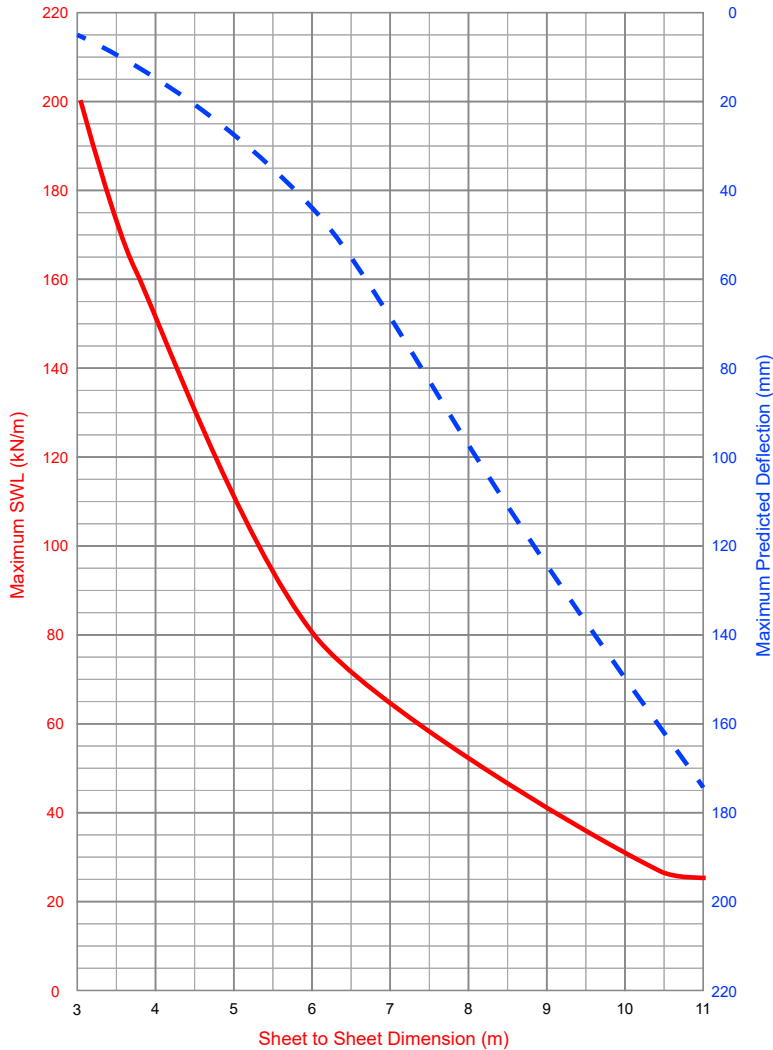


Legs are normally installed at 90° to each other. However, subject to confirmation by a competent design Engineer, angles of between 75° and 135° can be achieved (>90° corner bracket requires removing).

Corners should always be packed out using hardwood wedges against the sheets prior to final pre-load to ensure even load distribution and avoid introducing excessive bending in the brace legs (especially ram assembly).



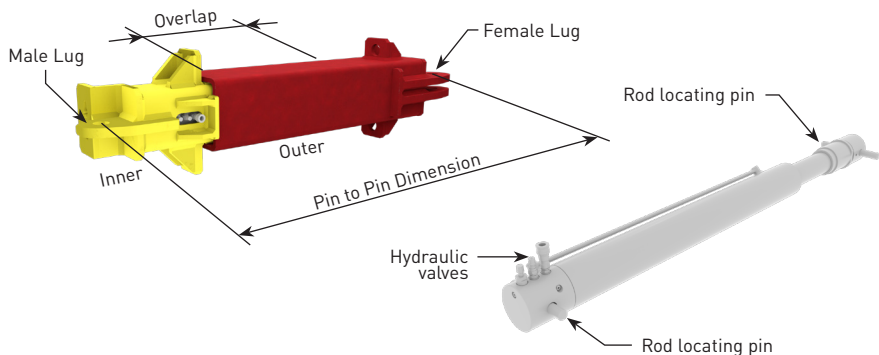
SAFE WORKING LOAD FOR MGF 203 UC+ (kN/m)



- Recommended SWL
- - - Max. SWL available subject to MGF Design Services checks

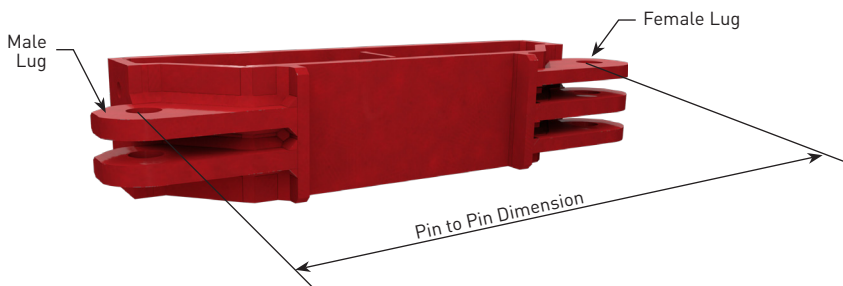
The above load chart is applicable when bracing leg is built up in accordance with the recommended brace extension combinations on page 4.4.10.

The load chart deflections are based on calculated values and not test data.



203 UC+ hydraulic ram assembly comprises inner and outer sleeved box section housing a double acting (DA) hydraulic ram to provide up to 700mm of leg adjustment.

Ram Assembly	Product ID	Pin to Pin Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
300kN 203 UC+ Ram	8.160	1600	2300	425



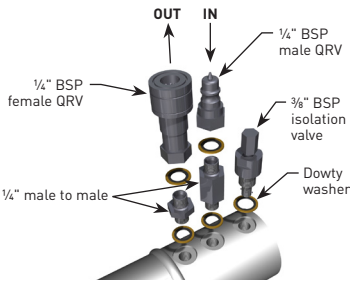
203 UC+ extension bars are available in 4 lengths, ranging from 0.25m up to 5.0m and each are connected to each other via a 3:2 female / male lug using a $\Phi 50$ mm pin and 2 No. grade 8.8 M24x70 (min.) bolts c/w nuts and washers.

		Product Description	Weight
			(kg)
Product ID	8.168	203 UC+ 0.25m Extension	60
	8.170	203 UC+ 0.9m Extension	130
	8.180	203 UC+ 3.3m Extension	412
	8.190	203 UC+ 5.0m Extension	610

300kN DOUBLE ACTING HYDRAULIC CYLINDER



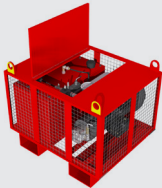
Hydraulic Cylinder	Double Acting	
	Material	Steel
	Bore	100mm
	Max. Working Pressure	380 Bar (5500 psi)
	Test Pressure	400 Bar (5800 psi)
	Approx. Working Stroke	700mm
	Axial SWL	300kN
	Min. FOS (by calc)	1.78
	Working Temp Range	-20°C* to +50°C
	Approx. Pre-Load	75kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Ø25mm



* Winter mix required for shoring fluid at low temps.

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time, fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.

PUMP UNITS

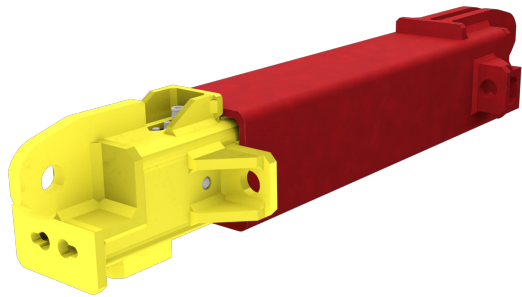


The pumps are used to extend and retract the 203 UC double acting hydraulic rams. The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 1500 psi (100 Bar). There are 2 types of pumps available, a manually operated bucket pump and a motorised petrol pump.



Component	Bucket Pump		Petrol Motorised Pump	
	Product ID	1.603 (DA)	8.4007 (DA)	
	Fluid Capacity (L)	20	70	
	Weight (kg)	25	270	
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25	
	Working Pressure (psi)	0-1500	0-1500	

300kN HYDRAULIC RAM ASSEMBLY SPECIFICATIONS



		Inner Section	Outer Section
Hydraulic Ram	Specification	200x200x12.5 SHS (+ 6thk. stiffening plates)	250x250x16 SHS
	Material Grade	S355	S355
	Unit Mass	72.31kg/m	115kg/m
	Axial SWL	300kN	300kN
	Moment SWL	203kNm	302kNm

203 UC+ EXTENSION BAR SPECIFICATIONS



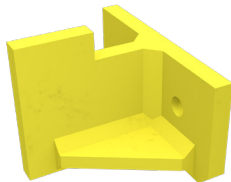
Extension Bar	Specification	203x203x100 UC
	Material Grade	S460M
	Unit Mass	99.6kg/m
	Axial SWL	300kN
	Moment SWL	334kNm (0.25m & 0.9m extensions) 386kNm (3.3m & 5.0m extensions)
	Joint Moment SWL	293kNm
	Bolting Details	2 No. M24x70 (min.) grade 8.8 bolts and nuts c/w washers

203 UC+ ANCILLARIES



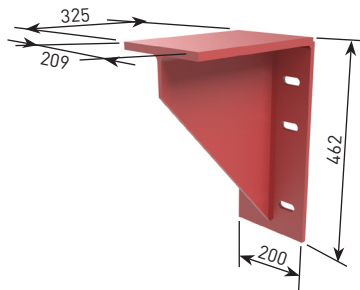
203 UC+ WALER CONNECTION PIN

Component	Pin	Ø50mm bar, 200mm long
	Material Grade	708M40 (EN19A)
	Shear SWL	600kN
	Weight	3kg



203 UC+ WALER CORNER BRACKET

Component	Weight	10kg
	Material	S355
	Bolting Details	2No. M20x70 (min.) grade 8.8 bolts and Nyloc nuts c/w washers



203 UC+ STEEL SUPPORT BRACKET

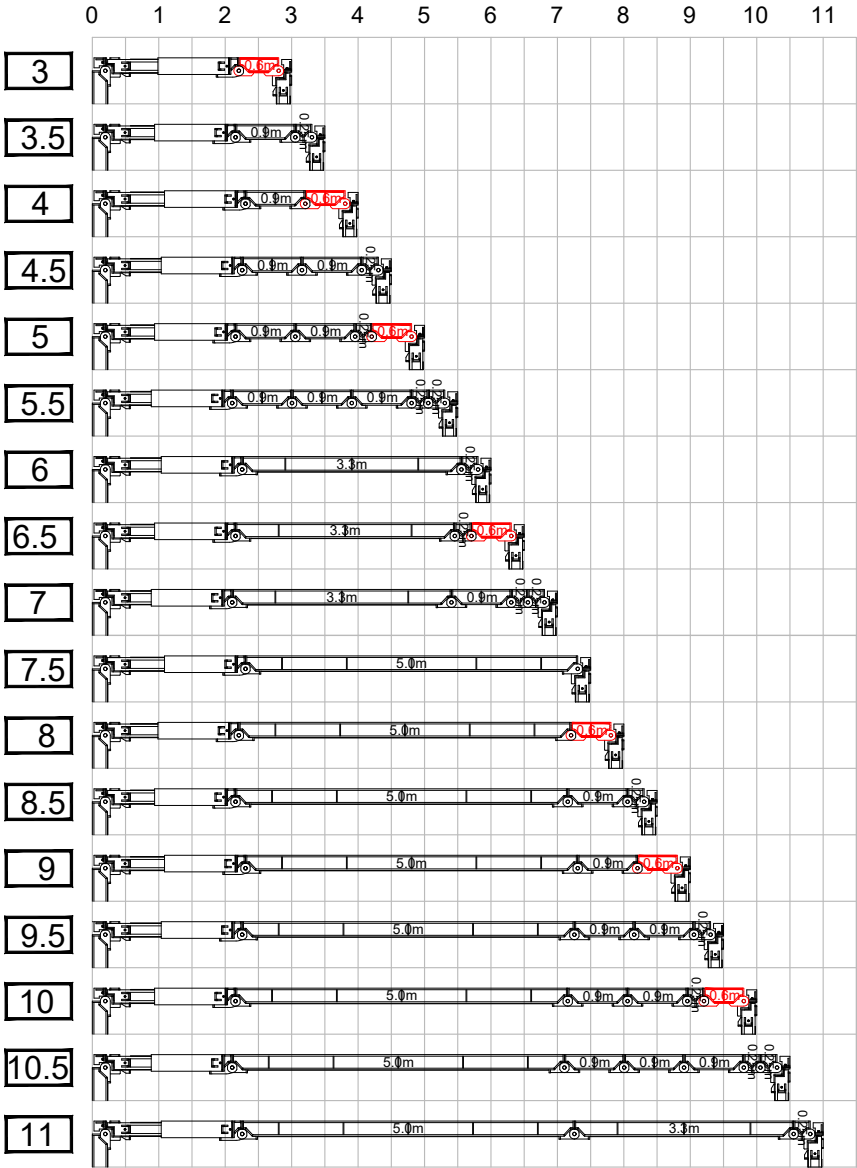
Component	Product ID	8.3003
	Weight	23kg
	Material	533x210x92 UB, S355
	Weld Details	8mm single run fillet weld. No weld on bearing face
	SWL	30kN
	Hole Details	6 No. Ø18 holes min. 100mm c/c

203 UC+ SHEAR LUG DETAIL

The 0.9m, 3.3m and 5.0m 203UC+ extension bars feature a shear stop detail built in. This detail, along with the relevant clamps are compatible with 200/300 Series knee brace swivels.



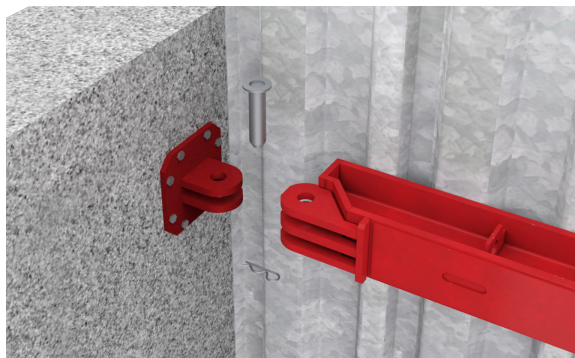
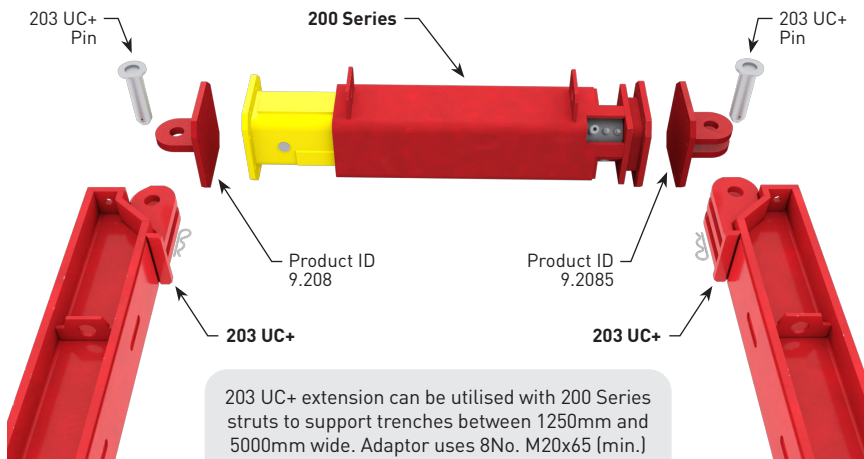
203 UC+ RECOMMENDED BRACE EXTENSION COMBINATIONS



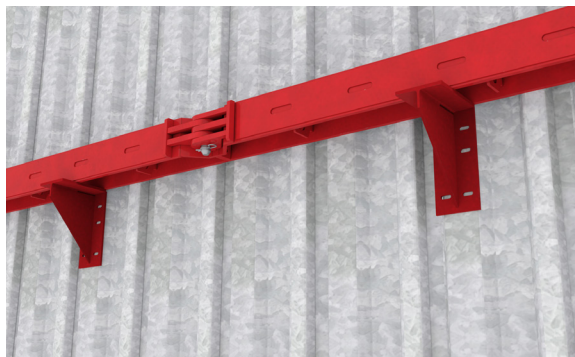
N.B. The ram assemblies are shown at roughly mid-stroke, for intermediate dimensions single 0.25m 203 UC+ extensions or 0.6m 203 UC extensions can be added / substituted to these combinations.

Sheet to Sheet Dimension	Min. Length	Max. Length	Leg Weight
[m]	[mm]	[mm]	[kg]
3	2590	3290	523
3.5	3140	3840	625
4	3490	4190	656
4.5	4040	4740	770
5	4640	5340	852
5.5	5190	5890	966
6	5540	6240	919
6.5	6140	6840	1001
7	6690	7390	1115
7.5	6990	7690	1054
8	7590	8290	1136
8.5	8140	8840	1250
9	8490	9190	1269
9.5	9040	9740	1383
10	9640	10340	1465
10.5	10190	10890	1579
11	10540	11240	1532

203 UC+ 200 SERIES STRUT ADAPTORS

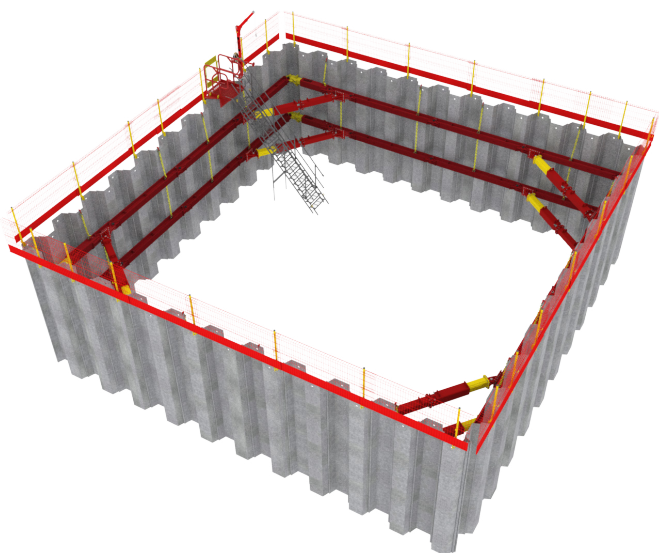


Adaptors can be utilised as RC wall fixing plates (subject to bolt anchorage design).

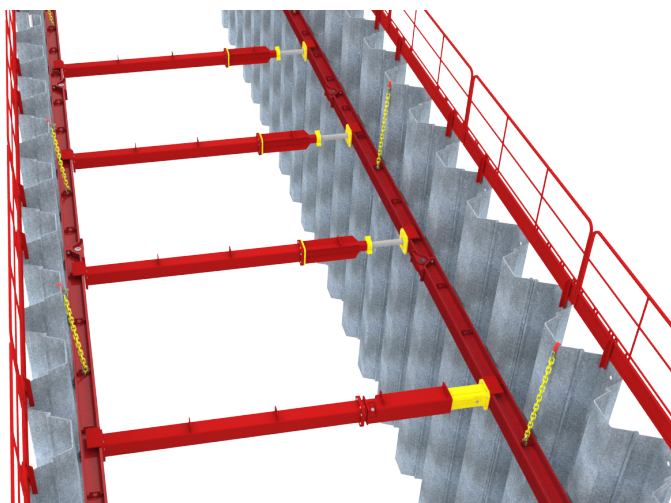


203 UC Water support brackets can be used to provide vertical support when restraining chains are not used. Minimum 8mm single run fillet weld recommended when welding to pans of steel sheets.

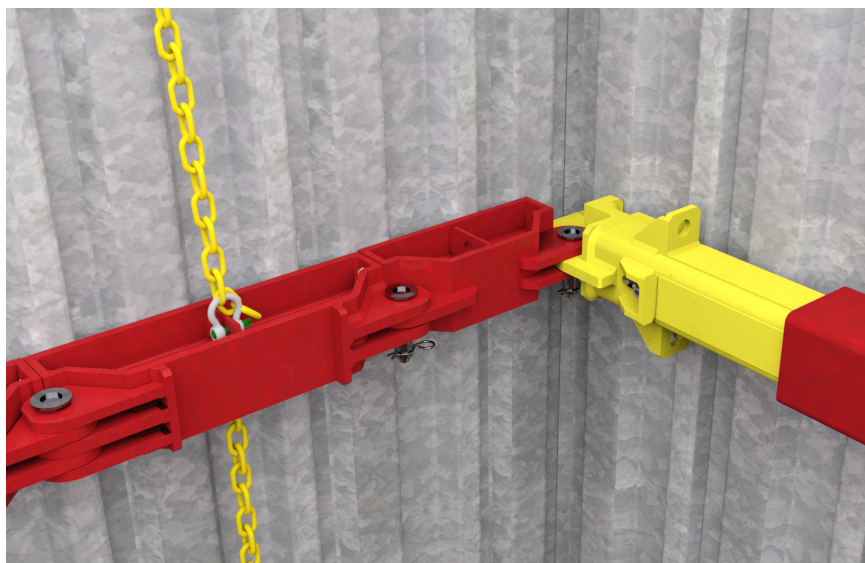




Larger cofferdam sizes available utilising intermediate bracing struts.
203 UC+ extension bars feature integrated shear stops up against the connecting lugs, designed to accept 200 and 300 Series knee braces.

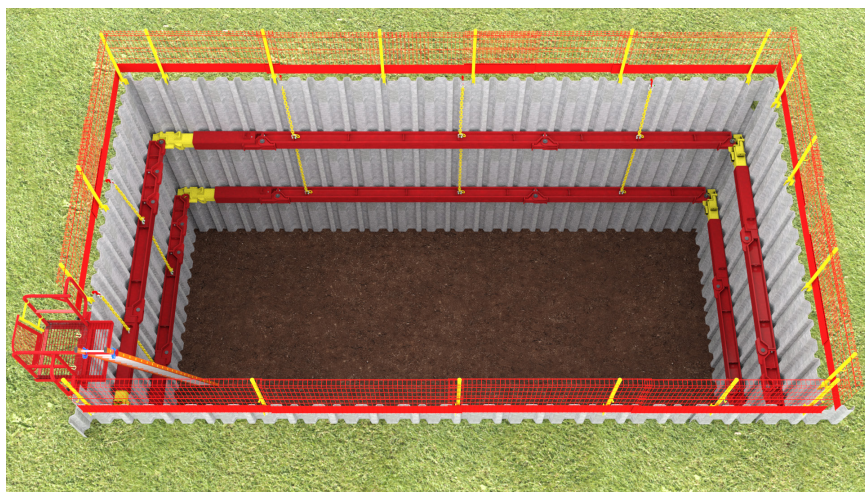


Typical trench application utilising 200/300 Series bracing struts as cross struts.



203 UC components can be used at the ends of 203 UC+ bracing legs, corresponding to the recommended brace extension combinations on page 4.4.10, or subject to design.

In addition, whole legs of 203 UC can directly connect with 203 UC+ legs to create rectangular frames.



SIMPLE TO ASSEMBLE, HIGHLY VERSATILE, MODULAR HYDRAULIC BRACING SYSTEM COMPRISING INTERCHANGEABLE HYDRAULIC RAM ASSEMBLIES AND VARIOUS LENGTH WALER EXTENSION BARS. 305 UC IS DESIGNED TO BE USED WITH HEAVY DUTY STEEL TRENCH SHEETS OR SHEET PILES TO BRACE LARGE / DEEP COFFERDAMS (IN A WIDE VARIETY OF SHAPES) FOR THE SAFE INSTALLATION OF UNDERGROUND STRUCTURES, DEEP DRIVE / THRUST PITS OR BASEMENTS. USED EXTENSIVELY ON MAJOR BASEMENTS AND SUBSTRUCTURES TO PROVIDE TEMPORARY SUPPORT TO RC PERMANENT WORKS. THE 305 UC HYDRAULIC RAM AND EXTENSION BARS CAN BE CONNECTED TO LEGS OF 406 UC MAKING IT HIGHLY VERSATILE AND ECONOMIC. IN ADDITION, FOR HEAVY LOAD CONDITIONS, CENTRAL 406 UC EXTENSION BARS CAN BE INSERTED TO INCREASE SWLS.

Extension bars can additionally be used without the ram assemblies as waler rails for large trenches or cantilevered walls. The 305 UC extension bars have built in shear stops and web stiffeners to allow the use of knee braces and cross struts. The 305 UC system is ideally suited for projects requiring cofferdam sizes ranging from 1.9m to 15.5m and is normally assembled and installed within the excavation using either excavators or cranes. Any size of excavation can be braced using this system in conjunction with intermediate bracing struts and it is fully compatible with the MGF 200, 300, 400 and 600 Series Bracing Strut systems.

Fabricated from grade S460 UC steel sections the extensions are quickly assembled into brace legs using simple pin and retaining clip / bolt and nut assemblies. Each leg contains a double acting hydraulic ram assembly providing 600mm of stroke and the legs are joined together at corners to form frames via a simple pin and retaining clip assembly. Connecting the rams (via hydraulic hoses) to an MGF hydraulic pump unit containing hydraulic shoring fluid allows the leg lengths to be quickly and easily adjusted to suit the excavation dimensions. Once the frames are fully assembled and located at the correct line and level, the rams are pre-loaded against the trench sheets using the hydraulic pump. Pre-loading of the legs ensures the frame cannot slip and minimises the extent of potential ground movements. Self sealing quick release valves and mechanical isolation valves ensure that the ram pressure cannot be accidentally released once installed. Handling and restraining points are provided on each leg to assist assembly / removal and to allow the brace / waler to be supported off MGF heavy duty restraining chains attached to the trench sheets by hooks. Alternatively 305 UC steel support brackets can be supplied which can be welded or bolted to steel or RC walls. MGF can supply the systems with a full range of suitable handling and restraining chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Stairsafe, Davitsafe retrieval / fall arrest systems, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment. Manufactured and designed fully in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.



PRODUCT NOTES

1. Hydraulic brace is very heavy and should only be assembled, installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines. When assembling on site ensure that all pins and retaining clips are in place and secured and all bolts are installed and fully tightened with a minimum two threads visible beyond the nut.
2. Installation is normally carried out by lowering either the assembled frame or individual legs (dependant upon lifting capacity of excavator / crane) to the correct installation level and once the frame is fully assembled pre-loading each leg in turn to ensure that the frame is pressed firmly against the trench sheets and cannot slip. Max. pre-load pressure of 100Bar (1500psi) must not be exceeded.
3. Restraining chains are hung off the trench sheets and attached to the legs to assist assembly / removal of the frame and ensure vertical support is provided at all times. All the supplied restraining chains should be installed (min. 2 per leg) and adjusted to ensure an even vertical load distribution. Restraining chains should never be used for lifting nor solely relied upon to suspend loads above personnel.



4. Ensure all hydraulic ram lock off valves are closed and all corner pins in place and secured using the retaining clips provided prior to commencing works.
5. Individual brace legs should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
6. Legs should always be installed square and plumb to the excavation walls ensuring contact with all the inward facing trench sheet pans. If this is not possible any gaps must be securely packed by using hardwood wedges prior to final pre-loading of the hydraulic rams.
7. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
8. Prior to removal of systems all hydraulic rams must be released and retracted to avoid the need for excessive extraction forces and to avoid damaging corner joints.
9. No matter how much care is taken during the installation and removal of hydraulic bracing systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.

STAIRSAFE

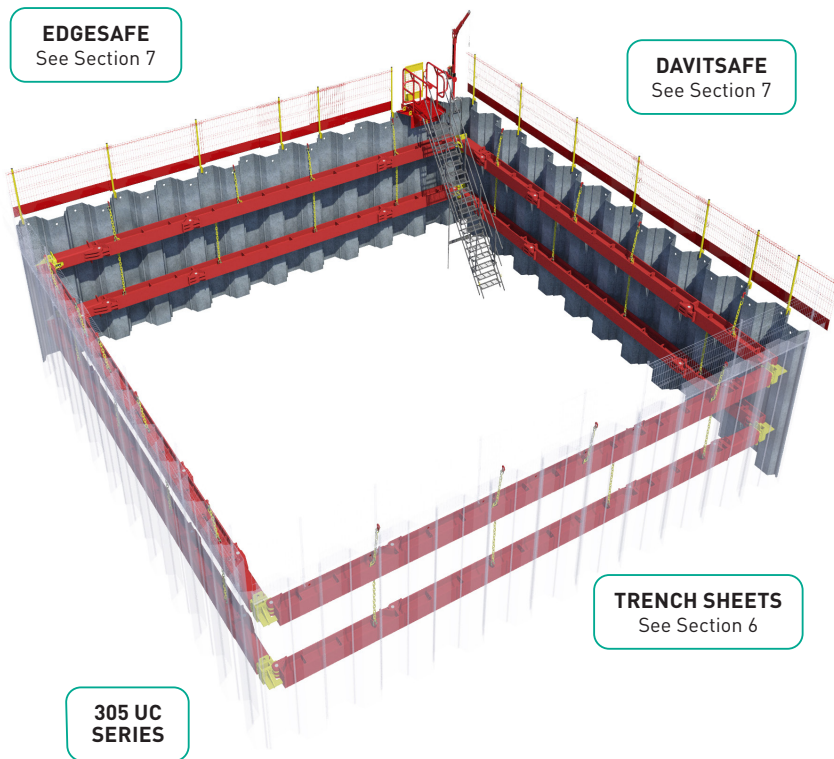
See Section 7

EDGESAFE

See Section 7

DAVITSAFE

See Section 7

**TRENCH SHEETS**

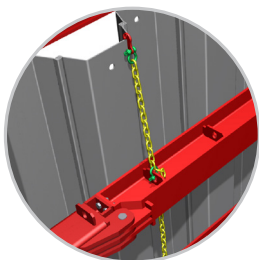
See Section 6

**305 UC
SERIES**

**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF 305 UC BRACE**

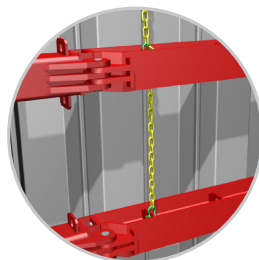
mgf.co.uk/products/305-uc-brace





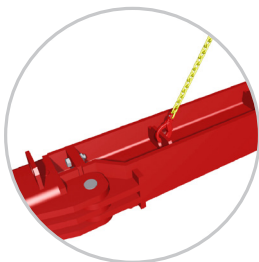
HEAVY DUTY CHAIN TO SHEET CONNECTION DETAIL*

The hook fits over the sheet.



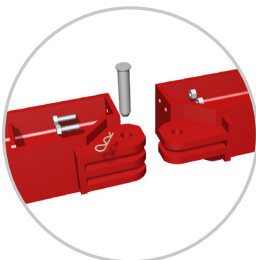
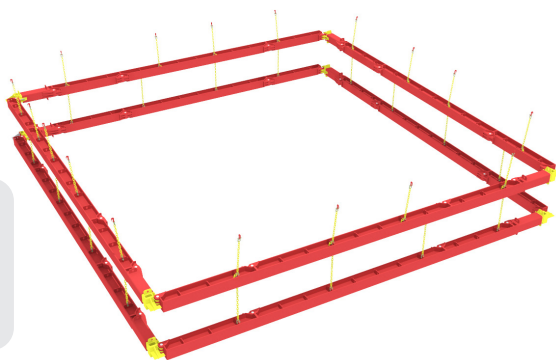
HEAVY DUTY RESTRAINING CHAIN CONNECTION DETAIL*

There are 2 types of chains used, the top frame will use shackle to hook type, while lower frames will use shackle to shackle type. Individual chain links selected to ensure all restraining chains are evenly loaded.



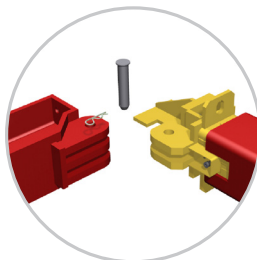
HANDLING POINT WLL = 7.0T

Brace legs and frames are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



LEG CONNECTION DETAIL

Brace legs are connected to each other using a 305 UC connection pin and r-clip detail and 4 No. M30x90 (min.) grade 8.8 bolts and nuts c/w washers.



CORNER CONNECTION DETAIL

Leg corners are connected to each other using the 305 UC connection pin and r-clip detail. To fill corner void a corner bracket is attached to ram assembly using 4No. M30x90 (min.) grade 8.8 bolts and nuts c/w washers.

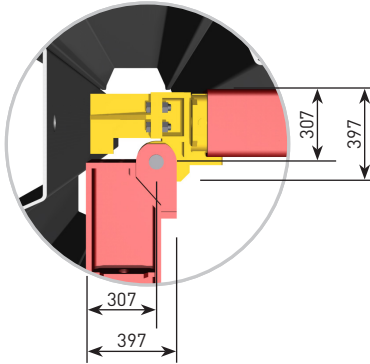
**Standard Duty Chains can be used provided the 305 UC frames are not being used with bracing struts, and any lower frames are not heavier than 305 UC.*



CONTACT US design@mgf.co.uk

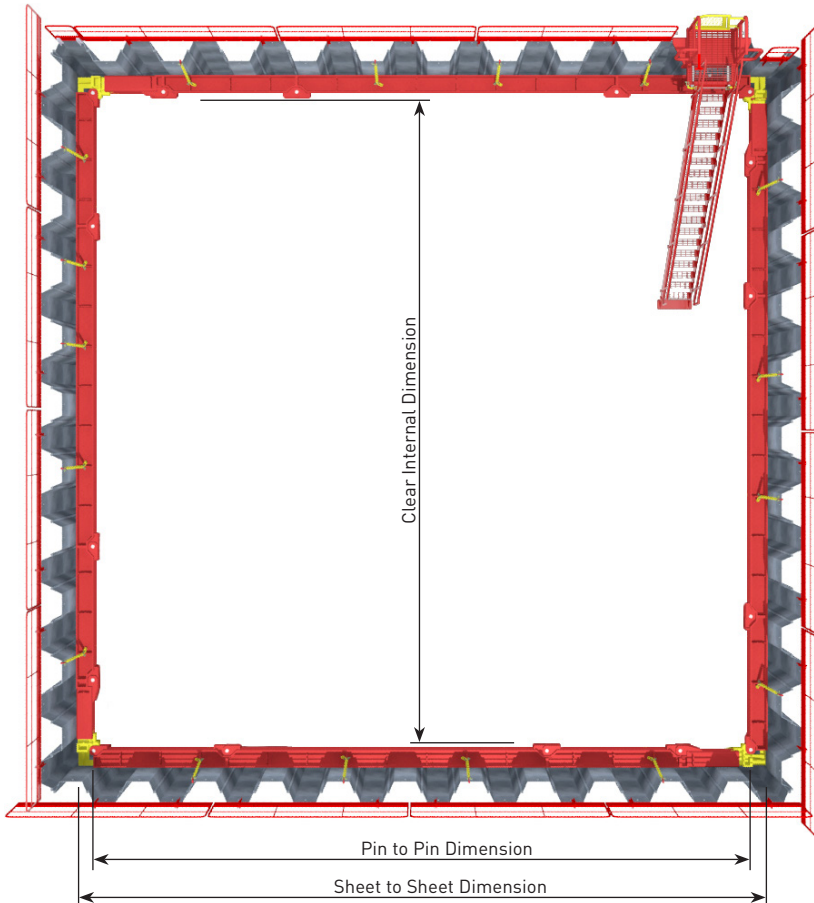
MGF can supply battery impact wrenches to facilitate assembly and removal of bolted connections. Please contact MGF for details.

305 UC CONNECTION DETAILS

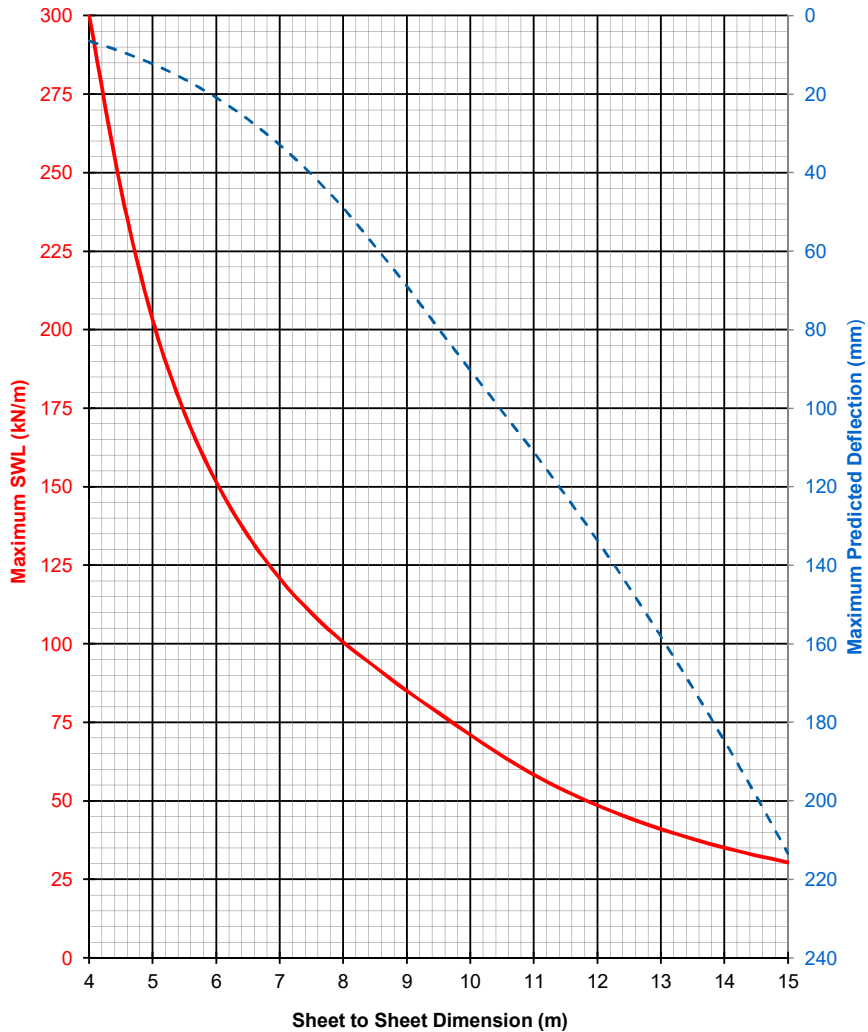


Legs are normally installed at 90° to each other. However, subject to confirmation by a competent design Engineer, angles of between 75° and 135° can be achieved (>90° corner bracket requires removing).

Corners should always be packed out using hardwood wedges against the sheets prior to final pre-load to ensure even load distribution and avoid introducing excessive bending in the brace legs (especially ram assembly).

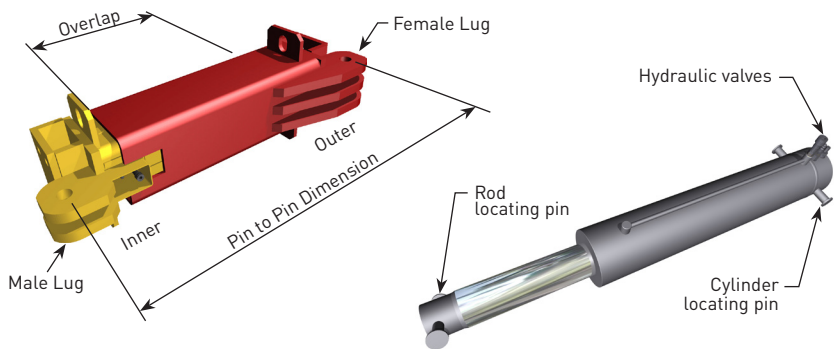


SAFE WORKING LOAD FOR MGF 305 UC (kN/m)



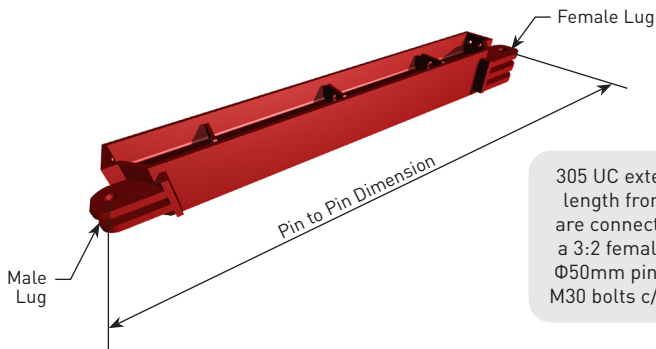
Recommended SWL

The above load chart is applicable when bracing leg is built up in accordance with the recommended brace extension combinations on page 4.5.10.
The load chart deflections are based on calculated values and not test data.



305 UC hydraulic ram assembly comprises inner and outer sleeved steel box sections, housing a double acting (DA) hydraulic ram to provide up to 600mm of leg adjustment.

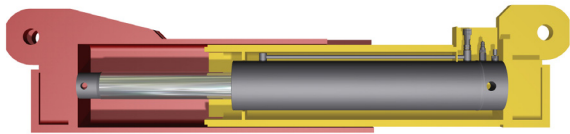
Ram Assembly	Product ID	Pin to Pin Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
305 UC Ram	8.302	1270	1868	613



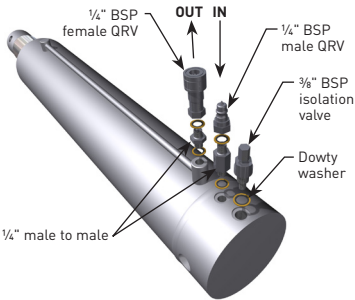
305 UC extension bars range in length from 0.5m to 6.0m and are connected to each other via a 3:2 female / male lug using a $\Phi 50$ mm pin and 4 No. grade 8.8 M30 bolts c/w nuts and washers.

		Product Description	Weight
			(kg)
Product ID	8.305	305 UC 0.5m Extension	170
	8.307	305 UC 0.75m Extension	220
	8.310	305 UC 1.0m Extension	260
	8.315	305 UC 1.5m Extension	350
	8.325	305 UC 2.5m Extension	510
	8.360	305 UC 6.0m Extension	1100

600kN DOUBLE
ACTING HYDRAULIC
CYLINDER



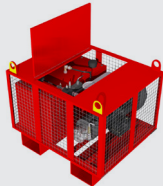
Hydraulic Cylinder	Double Acting	
	Material	Steel
	Bore	140mm
	Max. Working Pressure	390 Bar (5700 psi)
	Test Pressure	390 Bar (5700 psi)
	Approx. Working Stroke	600mm
	Axial SWL	600kN
	Min. FOS (by test)	2
	Working Temp Range	-20°C* to +50°C
	Approx. Pre-Load	150kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Ø20 and Ø25mm



* Winter mix required for shoring fluid at low temps.

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time, fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.

PUMP UNITS

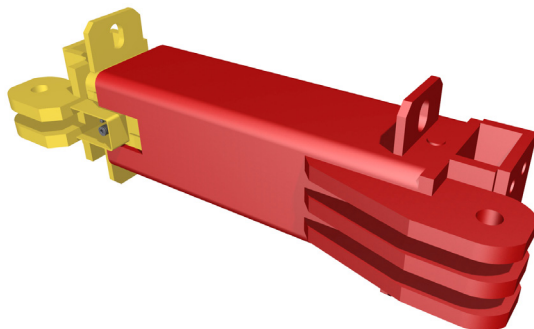


The pumps are used to extend and retract the 305 UC double acting hydraulic rams. The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 1500 psi (100 Bar). There are 2 types of pumps available, a manually operated bucket pump and a motorised petrol pump.



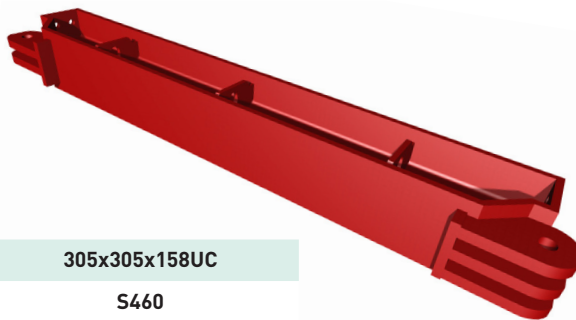
Component	Bucket Pump		Petrol Motorised Pump	
	Product ID	1.603 (DA)	8.4007 (DA)	
	Fluid Capacity (L)	20	70	
	Weight (kg)	25	270	
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25	
Working Pressure (psi)		0-1500	0-1500	

600kN HYDRAULIC RAM ASSEMBLY SPECIFICATIONS



		Inner Section	Outer Section
Hydraulic Ram	Specification	250x250x16 SHS (+ 8 No. 75x6 thk stiffener plates)	300x300x16 SHS
	Material Grade	S355	S355
	Unit Mass	115kg/m	141kg/m
	Axial SWL	600kN	600kN
	Moment SWL	432kNm	432kNm

305 UC EXTENSION BAR SPECIFICATIONS



Extension Bar	Specification	305x305x158UC
	Material Grade	S460
	Unit Mass	158kg/m
	Axial SWL	600kN
	Moment SWL	786kNm
	Joint Moment SWL	786kNm
Bolting Details		4 No. M30x90 (min.) grade 8.8 bolts and nuts c/w washers

If using 305 UC Brace with bracing struts, the section must be checked fully to structural codes.

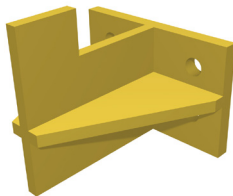


305 UC ANCILLARIES



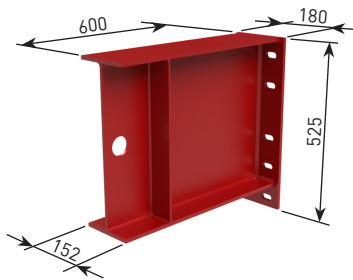
305 UC WATER CONNECTION PIN

Component	Pin	Ø50mm bar, 245mm long
	Material Grade	708M40 (EN19A)
	Shear SWL	1250kN
	Weight	4kg



305 UC WATER CORNER BRACKET

Component	Weight	30kg
	Material	S275
	Bolting Details	2 No. M30x90 (min.) grade 8.8 bolts and nuts c/w washers

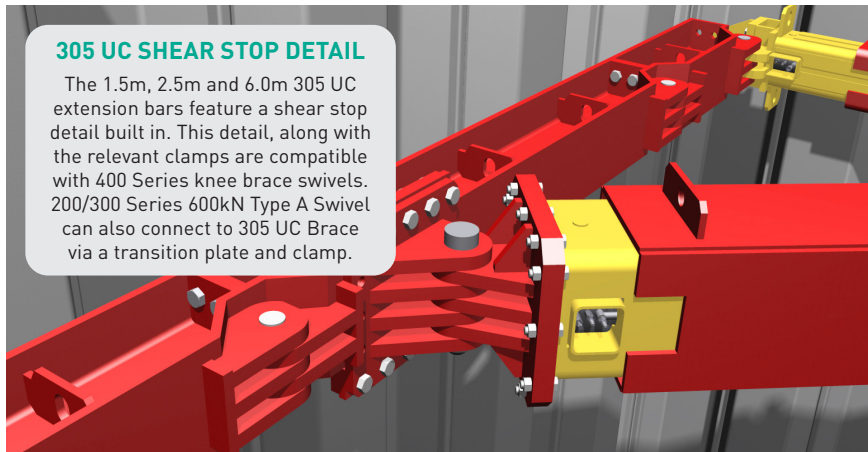


305 UC STEEL SUPPORT BRACKET

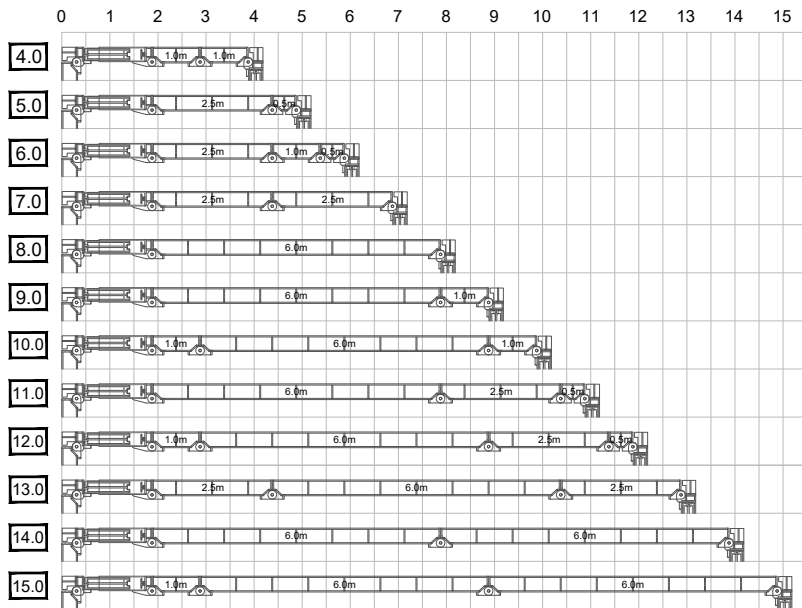
Component	Product ID	8.4002
	Weight	42kg
	Material	457x152x52 UB, S355
	Weld Details	8mm single run fillet weld. No weld on bearing face
	SWL	30kN
	Hole Details	6 No. Ø18 holes min. 90mm c/c

305 UC SHEAR STOP DETAIL

The 1.5m, 2.5m and 6.0m 305 UC extension bars feature a shear stop detail built in. This detail, along with the relevant clamps are compatible with 400 Series knee brace swivels. 200/300 Series 600kN Type A Swivel can also connect to 305 UC Brace via a transition plate and clamp.



305 UC RECOMMENDED BRACE EXTENSION COMBINATIONS

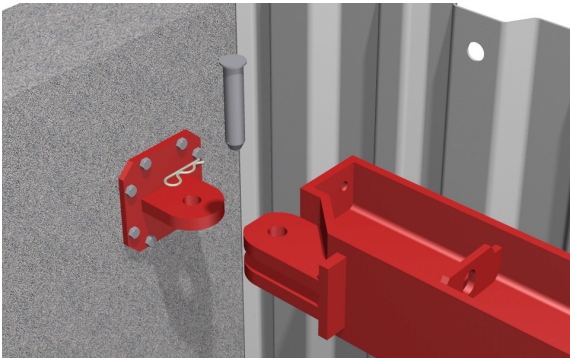
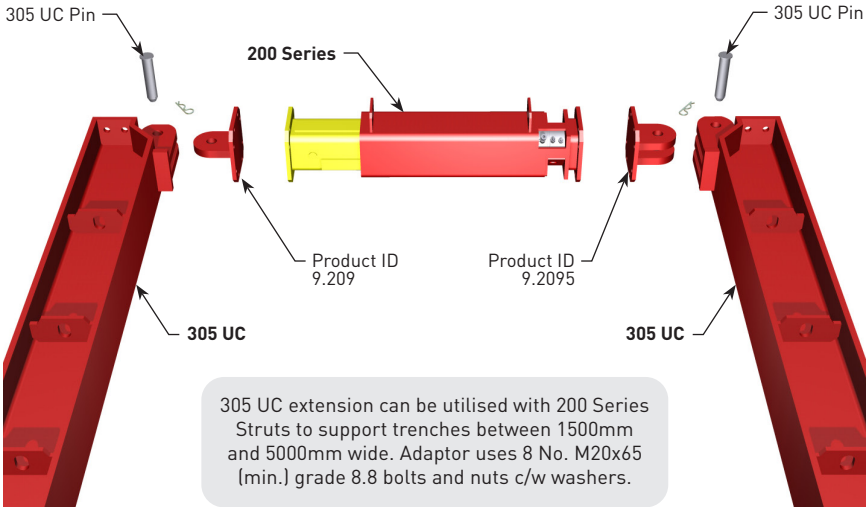


N.B. Single 0.5m or 0.75m extensions can be added / substituted to these combinations to provide intermediate dimensions. The ram assemblies are shown at mid-stroke, so each length can vary by 300mm in either direction.

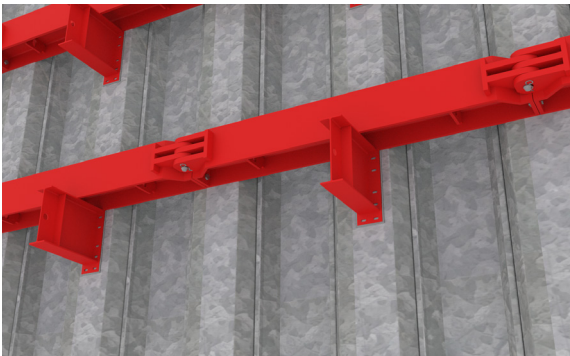
Sheet to Sheet Dimension	Min. Length	Max. Length	Leg Weight
(m)	(mm)	(mm)	(kg)
4	3884	4482	1133
5	4884	5482	1326
6	5884	6482	1586
7	6884	7482	1633
8	7884	8482	1713
9	8884	9482	1973
10	9884	10482	2233
11	10884	11482	2393
12	11884	12482	2653
13	12884	13482	2733
14	13884	14482	2813
15	14884	15482	3073



305 UC 200 SERIES STRUT ADAPTORS

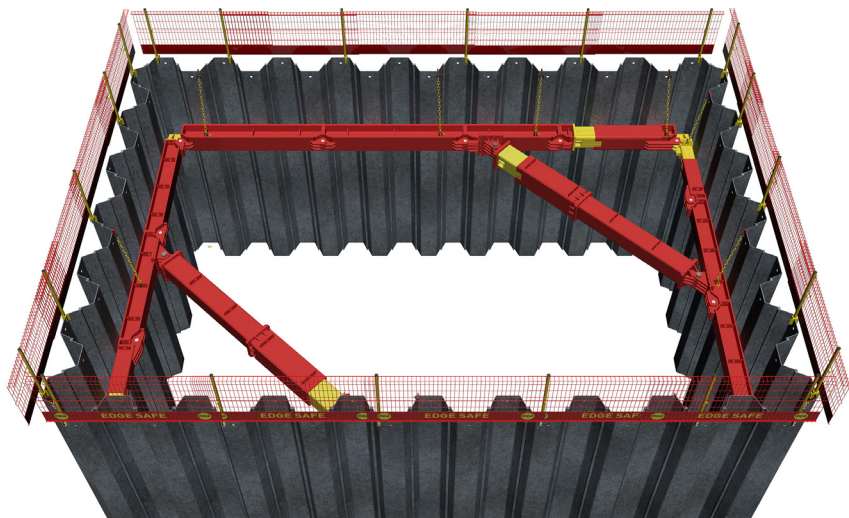


Adaptors can be utilised as RC wall fixing plates (subject to bolt anchorage design).

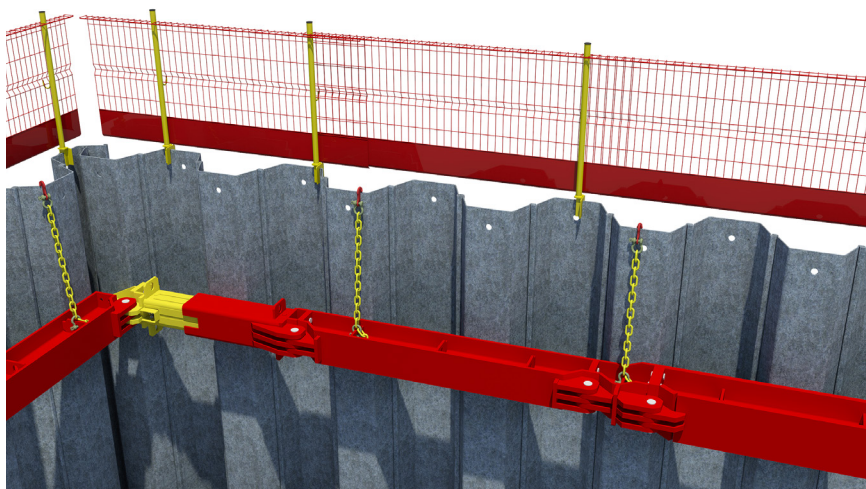


305 UC Water support brackets can be used to provide vertical support when restraining chains are not used. Minimum 8mm single run fillet weld recommended when welding to pans of steel sheets.

305 UC CONFIGURATIONS



Frames can be built up combining 305 UC legs with 406 UC legs. The system is also fully compatible with 400 Series struts and 200/300 Series struts (600kN knee brace swivel requires transition plate to attach to 305UC).



With the use of 305 UC to 406 UC transition adaptors, rigid sections of 406 UC can be used within legs of 305 UC for longer spans, or for where loadings in the middle of the leg are too great for 305 UC.



SIMPLE TO ASSEMBLE, HIGHLY VERSATILE, MODULAR HYDRAULIC BRACING SYSTEM COMPRISING INTERCHANGEABLE HYDRAULIC RAM ASSEMBLIES AND VARIOUS LENGTH WALER EXTENSION BARS. 406 UC IS DESIGNED TO BE USED WITH HEAVY DUTY STEEL TRENCH SHEETS OR SHEET PILES TO BRACE LARGE / DEEP COFFERDAMS (IN A WIDE VARIETY OF SHAPES) FOR THE SAFE INSTALLATION OF UNDERGROUND STRUCTURES, DEEP DRIVE / THRUST PITS OR BASEMENTS. USED EXTENSIVELY ON MAJOR BASEMENTS AND SUBSTRUCTURES TO PROVIDE TEMPORARY SUPPORT TO RC PERMANENT WORKS.

Extension bars can additionally be used without the ram assemblies as waler rails for large trenches or cantilevered walls. The 406 UC system is ideally suited for major projects requiring cofferdam sizes ranging from 2.9m to 20.7m and is normally assembled and installed within the excavation using either excavators or cranes. Any size of excavation can be braced using this system in conjunction with intermediate bracing struts and it is fully compatible with the MGF 200, 300, 400, 600 and 1000 Series Bracing Strut systems. 406 UC is also compatible with MGF 305 UC Brace, see section 4.5 for further details.

Fabricated from grade S460 UC steel sections the extensions are quickly assembled into brace legs using simple pin and retaining clip / bolt and nut assemblies. Each leg contains a double acting hydraulic ram assembly providing 800mm of stroke and the legs are joined together at corners to form frames via a simple pin and retaining clip assembly. Connecting the rams (via hydraulic hoses) to an MGF motorised hydraulic pump unit containing hydraulic shoring fluid allows the leg lengths to be quickly and easily adjusted to suit the excavation dimensions. Once the frames are fully assembled and located at the correct line and level, the rams are pre-loaded against the trench sheets using the hydraulic pump. Pre-loading of the legs ensures the frame cannot slip and minimises the extent of potential ground movements. Self sealing quick release valves and mechanical isolation valves ensure that the ram pressure cannot be accidentally released once installed. Handling and restraining points are provided on each leg to assist assembly / removal and to allow the brace / waler to be supported off MGF heavy duty restraining chains attached to the trench sheets by hooks. Alternatively 406 UC steel support brackets can be supplied which can be welded or bolted to steel or RC walls.

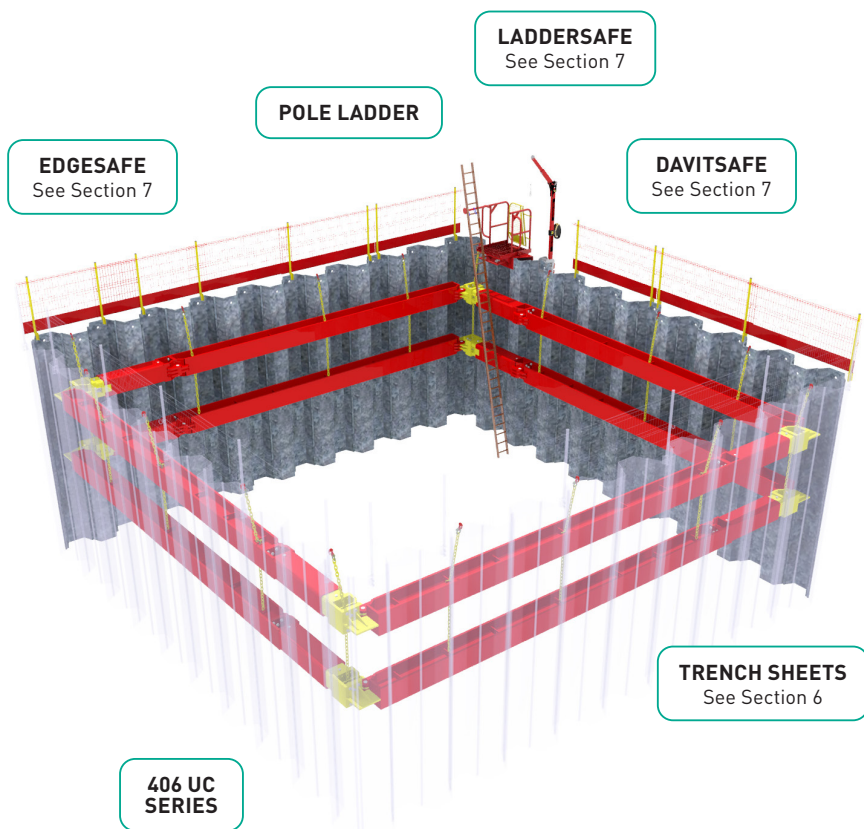
MGF can supply the systems with a full range of suitable handling and restraining chains, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, motorised hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.



PRODUCT NOTES

1. Hydraulic brace is extremely heavy and should only be assembled, installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines. When assembling on site ensure that all pins and retaining clips are in place and secured and all bolts are installed and fully tightened with a minimum two threads visible beyond the nut.
2. Installation is normally carried out by lowering either the assembled frame or individual legs (dependant upon lifting capacity of excavator / crane) to the correct installation level and once the frame is fully assembled pre-loading each leg in turn to ensure that the frame is pressed firmly against the trench sheets and cannot slip. Max. pre-load pressure of 100Bar (1500psi) must not be exceeded.
3. Restraining chains are hung off the trench sheets and attached to the legs to assist assembly / removal of the frame and ensure vertical support is provided at all times. All the supplied restraining chains should be installed (min. 2 per leg) and adjusted to ensure an even vertical load distribution. Restraining chains should never be used for lifting nor solely relied upon to suspend loads above personnel.
4. Ensure all hydraulic ram lock off valves are closed and all corner pins in place and secured using the retaining clips provided prior to commencing works.

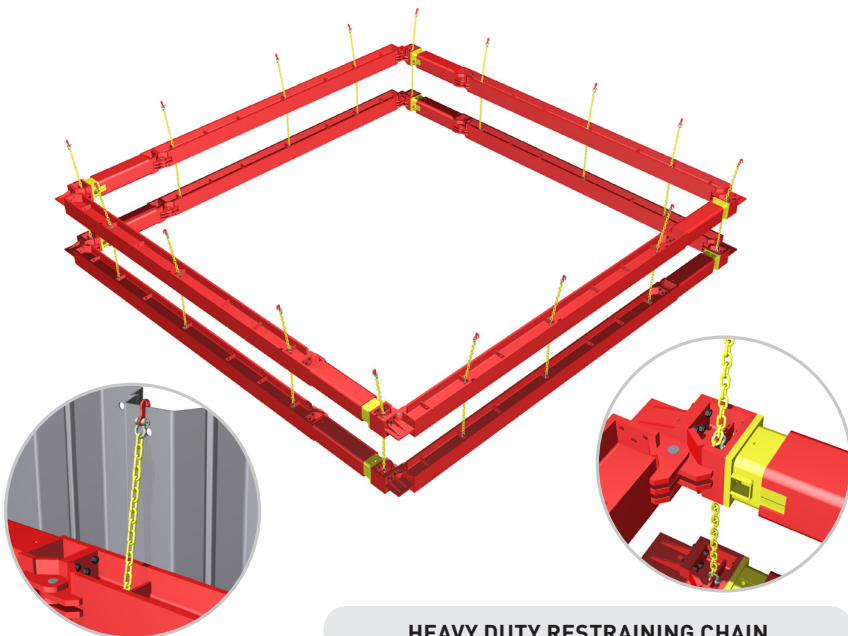
5. Individual brace legs should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
6. Legs should always be installed square and plumb to the excavation walls ensuring contact with all the inward facing trench sheet pans. If this is not possible any gaps must be securely packed by using hardwood wedges prior to final pre-loading of the hydraulic rams.
7. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
8. Prior to removal of systems all hydraulic rams must be released and retracted to avoid the need for excessive extraction forces and to avoid damaging corner joints.
9. No matter how much care is taken during the installation and removal of hydraulic bracing systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF 406 UC BRACE**

mgf.co.uk/products/406-uc-brace



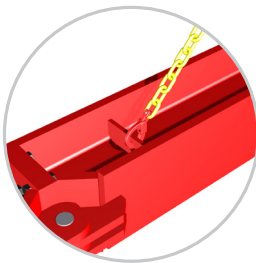


HEAVY DUTY CHAIN TO SHEET CONNECTION DETAIL

The hook fits over the sheet.

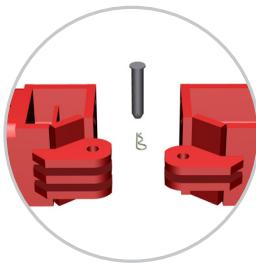
HEAVY DUTY RESTRAINING CHAIN CONNECTION DETAIL

There are 2 types of chains used, the top frame will use shackle to hook type, while lower frames will use shackle to shackle type. Individual chain links selected to ensure all restraining chains are evenly loaded.



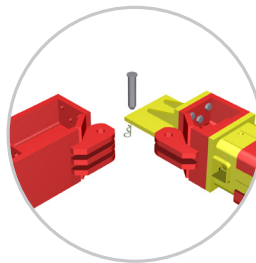
HANDLING POINT WLL = 7.0T

Brace legs and frames are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



LEG CONNECTION DETAIL

Brace legs are connected to each other using a 406 UC connection pin and r-clip detail and 6 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers.



CORNER CONNECTION DETAIL

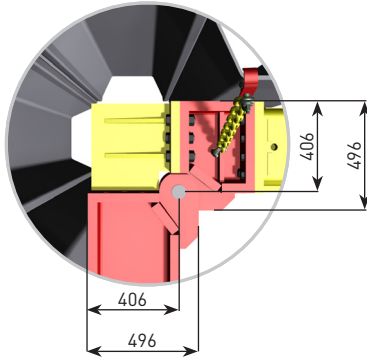
Leg corners are connected to each other using the 406 UC connection pin and r-clip detail. To fill corner void a corner bracket is attached to ram assembly using 6 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers.

MGF can supply battery impact wrenches to facilitate assembly and removal of bolted connections. Please contact MGF for details.



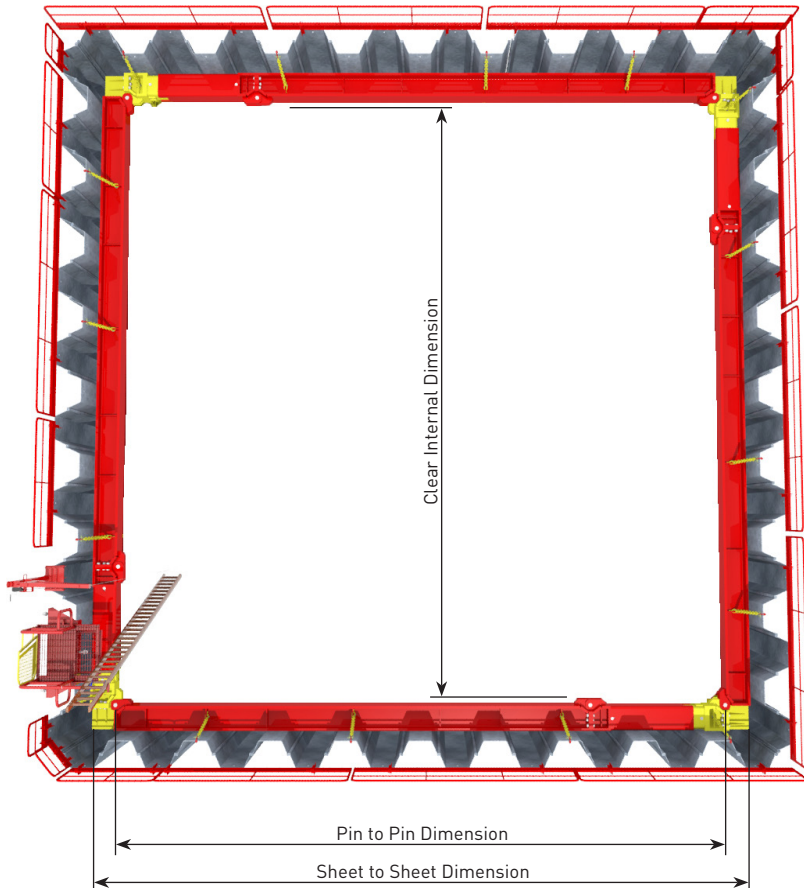
CONTACT US design@mgf.co.uk

406 UC CONNECTION DETAILS

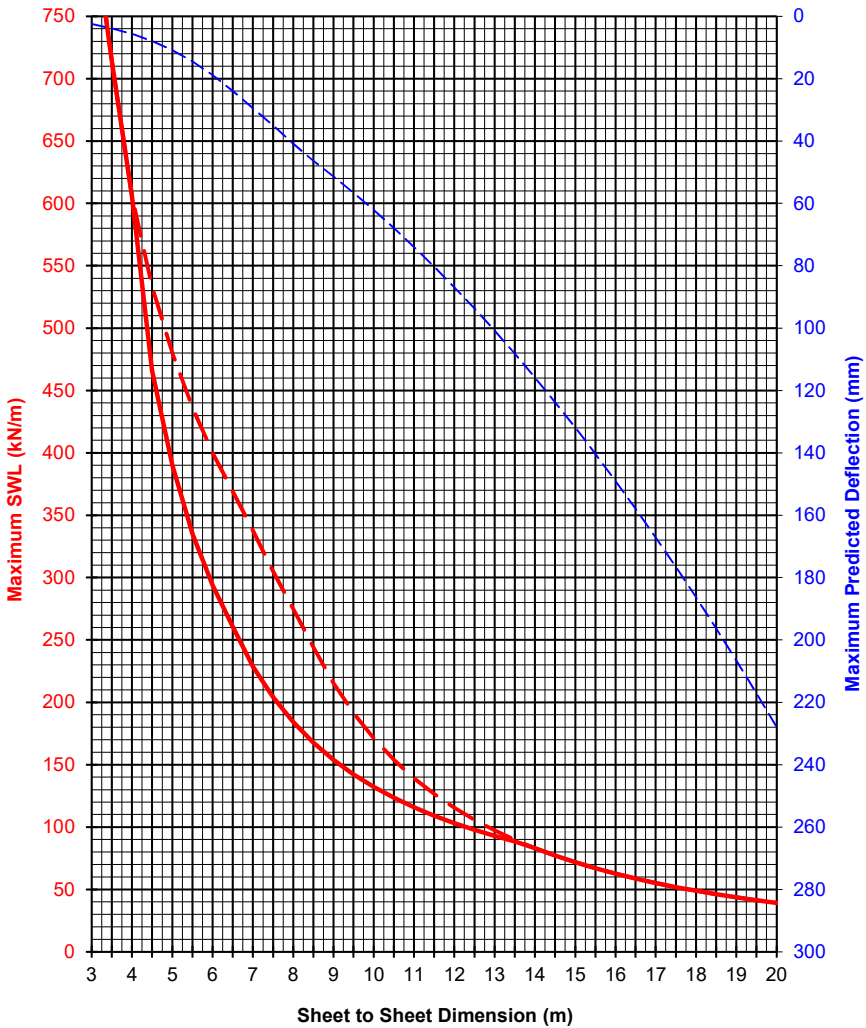


Legs are normally installed at 90° to each other. However, subject to confirmation by a competent design Engineer, angles of between 75° and 135° can be achieved (>90° corner bracket requires removing).

Corners should always be packed out using hardwood wedges against the sheets prior to final pre-load to ensure even load distribution and avoid introducing excessive bending in the brace legs (especially ram assembly).



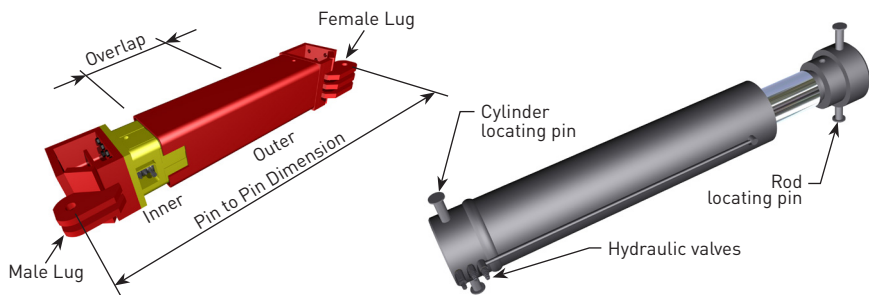
SAFE WORKING LOAD FOR MGF 406 UC (kN/m)



- Recommended SWL using 406 UC Ram
- - - Max. SWL available subject to MGF Design Services checks

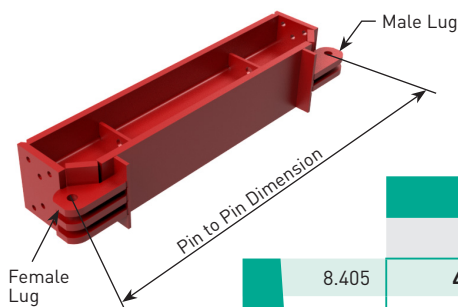
The above load chart is applicable when bracing leg is built up in accordance with the recommended brace extension combinations on page 4.6.11.

The load chart deflections are based on calculated values and not test data.



406 UC hydraulic ram assembly comprises inner and outer sleeved steel box sections housing a double acting (DA) hydraulic ram to provide up to 800mm of leg adjustment.

Ram Assembly	Product ID	Pin to Pin Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
406 UC Ram	8.399	2096	2896	1490



406 UC extension bars range in length from 0.6m to 10.0m and are connected to each other via a 3:2 female / male lug using a $\Phi 50$ mm pin and 6 No. grade 8.8 M30 bolts c/w nuts and washers.

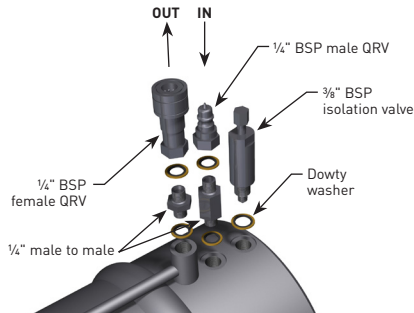
		Product Description	Weight
			(kg)
Product ID	8.405	406 UC 0.6m Extension	374
	8.410	406 UC 1.0m Extension	508
	8.420	406 UC 2.0m Extension	868
	8.430	406 UC 3.0m Extension	1228
	8.440	406 UC 4.0m Extension	1588
	8.450	406 UC 5.0m Extension	1992
	8.460	406 UC 6.0m Extension	2309
	8.470	406 UC 7.0m Extension	2659
	8.480	406 UC 8.0m Extension	3173
	8.490	406 UC 9.0m Extension	3388
	8.499	406 UC 10.0m Extension	3749
	8.411	406 UC Corner Extension Type 1	605
	8.412	406 UC Corner Extension Type 2	600



1250kN DOUBLE
ACTING HYDRAULIC
CYLINDER



Hydraulic Cylinder		Double Acting
	Material	Steel
	Bore	200mm
	Max. Working Pressure	400 Bar (5800 psi)
	Test Pressure	400 Bar (5800 psi)
	Approx. Working Stroke	800mm
	Axial SWL	1250kN
	Min. FOS (by test)	2
	Working Temp Range	-50°C to +50°C
	Approx. Pre-Load	300kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Ø30



Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time, fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



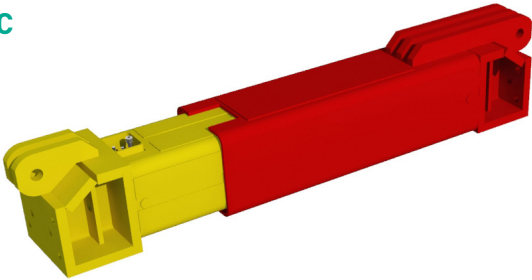
MOTORISED PUMP UNITS

The motorised pumps are used to extend and retract the 406 UC Brace double acting hydraulic rams. The pumps contain neat bio-degradable Houghto Safe SF25 shoring fluid. Maximum recommended installation pressure 1500 psi (100 Bar). MGF supply 2 different types of motorised pump for 406 UC, electric and diesel.



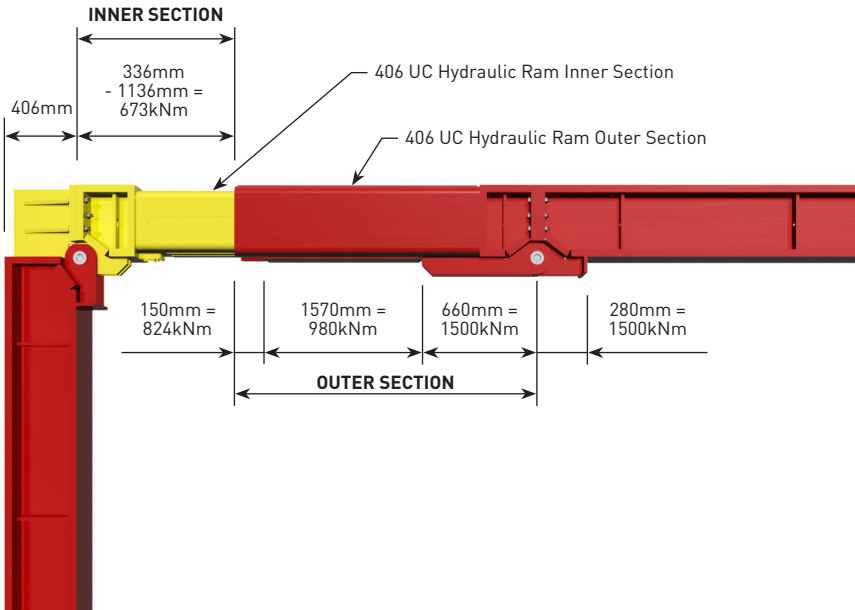
Component		Electric Pump	Diesel Pump
	Rating	110V, 6.5kVA	8kW
	Product ID	8.4001U / 8.4003U	8.4006
	Capacity	120 / 190 litres	100 litres
	Weight (kg)	460 / 622	394
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25
	Working Pressure (psi)	0-1500	0-1500

1250kN HYDRAULIC RAM ASSEMBLY SPECIFICATIONS

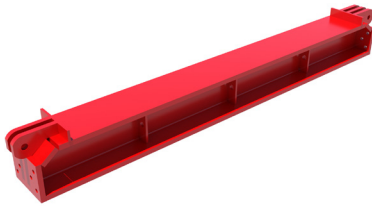


		Inner Section	Outer Section
Hydraulic Ram	Specification	350x350x16 SHS (+ 8 No. 100x4 thk. stiffening plates)	400x400x16 SHS (+ 280x8 thk. stiffening plates)
	Material Grade	S355	S355
	Unit Mass	191kg/m	226kg/m
	Axial SWL	1250kN	1250kN
	Moment SWL	673kNm	824kNm – 1500kNm

1250kN HYDRAULIC RAM OUTER SECTION – MOMENT SWL DETAILS



406 UC EXTENSION BAR SPECIFICATIONS



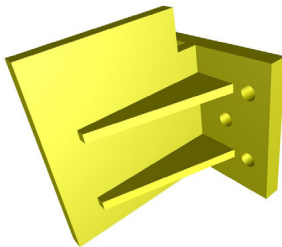
Extension Bar	Specification	356x406x340UC
	Material Grade	S460
	Unit Mass	340kg/m
	Axial SWL	1250kN
	Moment SWL	1806kNm
	Joint Moment SWL	1500kNm
	Bolting Details	6 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers

406 UC ANCILLARIES



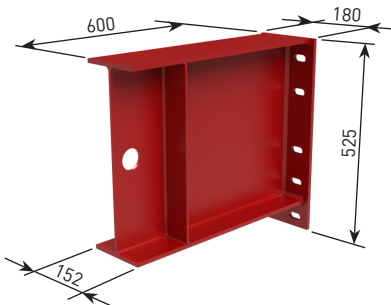
406 UC WATER CONNECTION PIN

Component	Pin	Ø50mm bar, 245mm long
	Material Grade	708M40 (EN19A)
	Shear SWL	1250kN
	Weight	4kg



406 UC WATER CORNER BRACKET

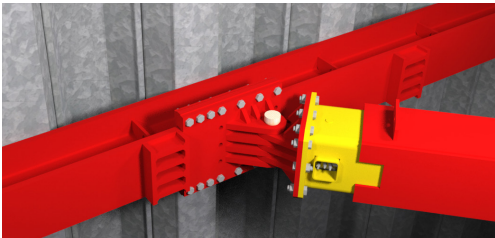
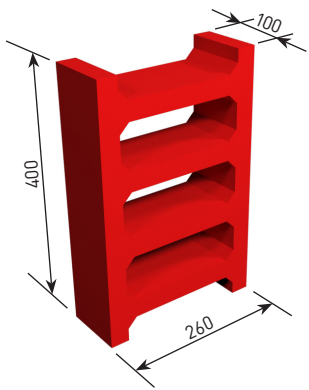
Component	Weight	100kg
	Material	S275
	Bolting Details	6 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers



406 UC STEEL SUPPORT BRACKET

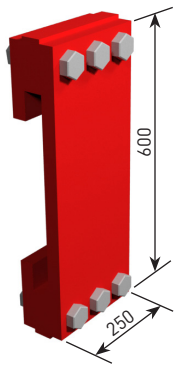
Component	Product ID	8.4002
	Weight	42kg
	Material	457x152x52 UB, S355
	Weld Details	8mm single run fillet weld. No weld on bearing face
	SWL	30kN
	Hole Details	6 No. Ø18 holes min. 90mm c/c

406 UC SHEAR STOP



Shear Stop	Component	406 UC Shear Stop
	Weight	40kg
	Material	100x30 flat, S355
	Weld Details	15mm multi run fillet weld. No weld on bearing faces
	Shear SWL	3500kN

406 UC extension bars can be provided with double sided integrated shear stops (as an alternative to using bespoke welded shear stops), which when used in conjunction with spacer plates (max. 1No.) can allow knee braces to be placed anywhere along the beam. Integrated shear stops are available on 5.0m and 8.0m extension bars. For further details contact MGF Design.

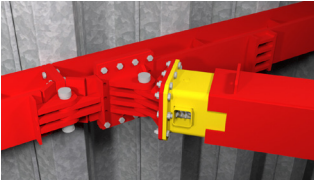


406 UC SHEAR STOP SPACER PLATE AND CLAMP

Component		406 UC Shear Stop Spacer Plate	406 UC Shear Stop Spacer Clamp
	Product ID	8.4992	8.4993
	Weight	35kg	16kg per clamp
	Material	30thk. S355	S355
	Bolting Details	6 No. M30x140 (min.) grade 8.8 bolts and nuts c/w washers	
	Shear SWL	3500kN	

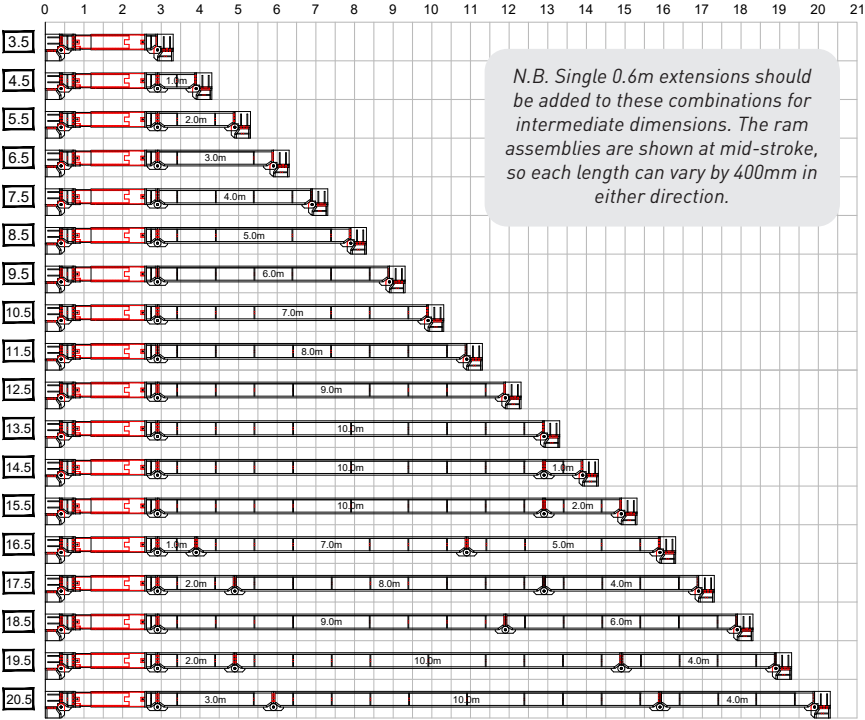
406 UC SHEAR LUGS

	1250kN Hydraulic Strut	2500kN Hydraulic Strut
Min. achievable int. angle (θ)	35°	35°



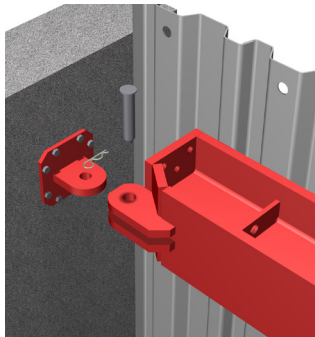
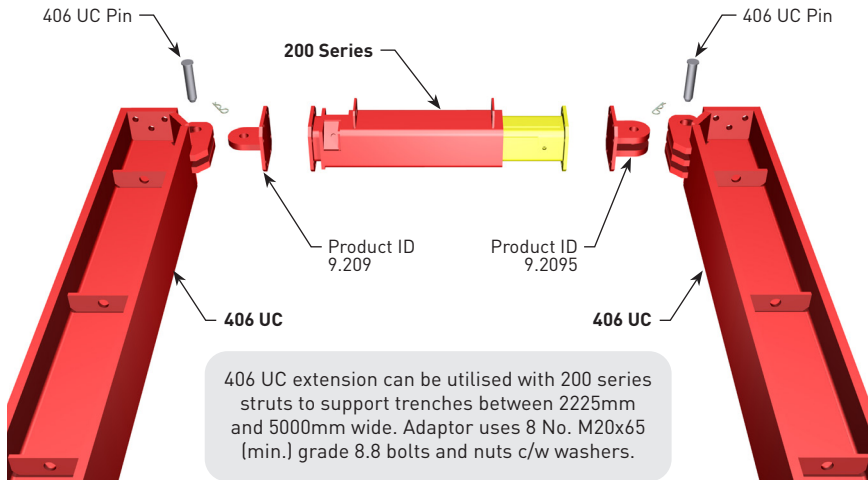
Knee braces can also be taken directly into the connecting lugs of 406 UC extensions (2.0m and above). These shear lugs are only suitable for 1250kN and 2500kN hydraulic struts, the achievable angles for those capacities are shown above. Up to 1No. spacer plates can be used to assist with positioning. For further details contact MGF Design.

406 UC RECOMMENDED BRACE EXTENSION COMBINATIONS

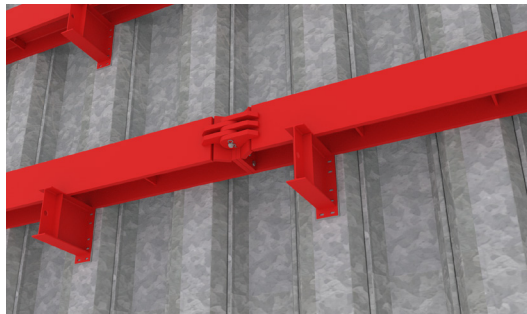


Sheet to Sheet Dimension	Min. Length	Max. Length	Leg Weight
(m)	(mm)	(mm)	(kg)
3.5	2948	3748	1598
4.5	3948	4748	2110
5.5	4948	5748	2470
6.5	5948	6748	2830
7.5	6948	7748	3190
8.5	7948	8748	3594
9.5	8948	9748	3911
10.5	9948	10748	4261
11.5	10948	11748	4775
12.5	11948	12748	4990
13.5	12948	13748	5351
14.5	13948	14748	5863
15.5	14948	15748	6223
16.5	15948	16748	6769
17.5	16948	17748	7239
18.5	17948	18748	7303
19.5	18948	19748	7815
20.5	19948	20748	8175

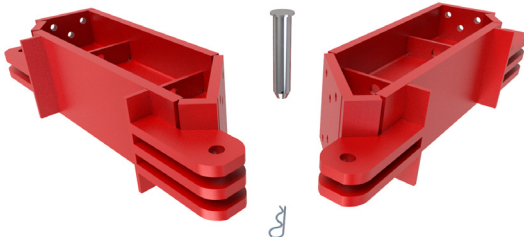
406 UC 200 SERIES STRUT ADAPTORS



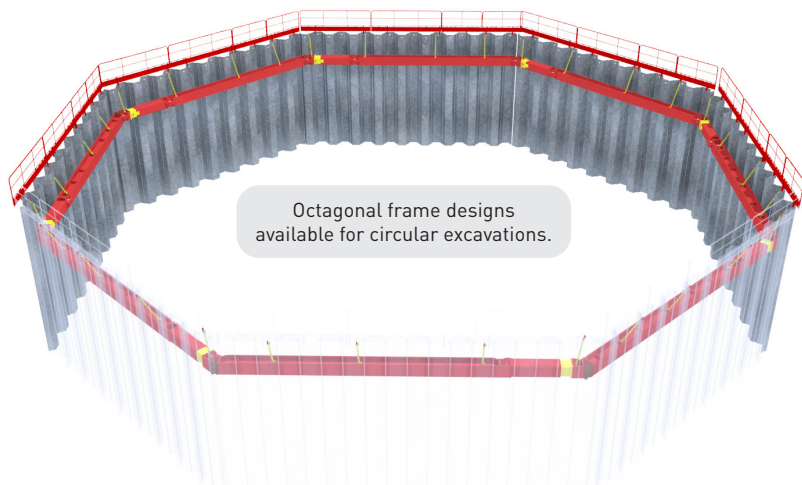
Adaptors can be utilised as RC wall fixing plates (subject to bolt anchorage design).



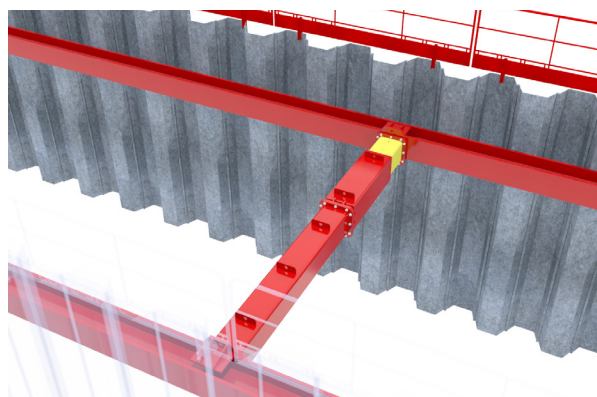
406 UC Waler support brackets can be used to provide vertical support when restraining chains are not used. Minimum 8mm single run fillet weld recommended when welding to pans of steel sheets.



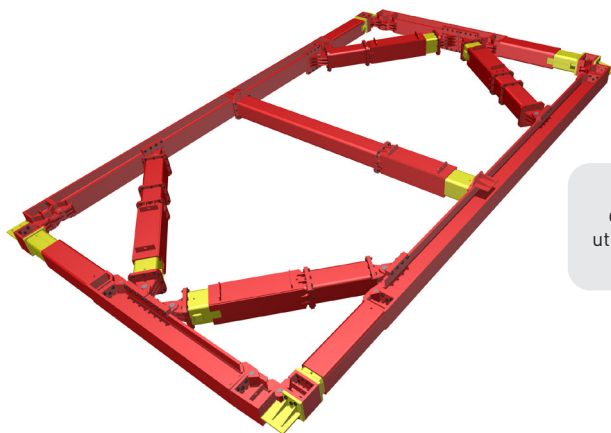
406 UC corner extensions can be used for non-standard excavation sizes. They connect together like normal 406 UC extensions and are suitable for internal corners of between 180° and 270°. Additional propping onto these corner extensions may be required.



Octagonal frame designs available for circular excavations.



Typical trench application utilising 400 Series Struts.



Larger cofferdam designs available, utilising intermediate bracing struts.



UNISHORE® MODULAR STRUCTURAL SUPPORT

MGF's UniShore® structural support system has been designed and manufactured in-house using Strenx high grade steel to ensure market leading performance across the range.

Designed with safety and simplicity in mind the system offers load capacities of 20, 70 and 150 tonnes, which are fully interconnectable to enable more efficient design. Unishore is supported by MGF's excellence in engineering and customer service.

CONTACT US FOR A FRESH APPROACH TO STRUCTURAL SUPPORT:

 enquiries@mgf.co.uk  08083 028 832



MGF'S T700 BRACE IS A HEAVY DUTY, HIGHLY VERSATILE, MODULAR HYDRAULIC BRACING SYSTEM COMPRISING RIGID EXTENSION BARS AND TRANSITION PIECES TO ALLOW THEM TO BE USED WITH 406 UC HYDRAULIC RAM ASSEMBLIES AND RIGID EXTENSION BARS. T700 BRACE IS THE STRONGEST MODULAR HYDRAULIC BRACING SYSTEM CURRENTLY AVAILABLE IN THE UK AND IS IDEAL FOR LONG SPANS AND DEEP EXCAVATIONS. THE SYSTEM IS DESIGNED TO BE USED WITH SHEET PILES TO BRACE LARGE / DEEP COFFERDAMS (IN A WIDE VARIETY OF SHAPES) FOR THE SAFE INSTALLATION OF UNDERGROUND STRUCTURES, LARGE STORAGE TANKS AND TO TEMPORARILY PROP LARGE BASEMENTS. THE T700 SYSTEM IS IDEALLY SUITED FOR CLEAR SPANS OF BETWEEN 10.9M AND 30.7M AND IS NORMALLY ASSEMBLED AND INSTALLED WITHIN THE EXCAVATION USING EITHER EXCAVATORS OR CRANES. LARGER EXCAVATIONS CAN BE BRACED USING THIS SYSTEM IN CONJUNCTION WITH INTERMEDIATE BRACING STRUTS AND IT IS FULLY COMPATIBLE WITH MGF 400, 600 AND 1000 SERIES BRACING STRUT SYSTEMS. T700 BRACE CAN BE USED WITH 406 UC BRACE, WHERE THE LONG LEGS USE T700 AND THE SHORT LEGS JUST USE 406 UC BRACE.

Fabricated from twinned grade S460 UB steel sections and grade S460 steel plates, the extension bars are quickly assembled using simple pin and retaining clip / bolt and nut assemblies and connect to 406 UC Brace components using transition pieces. In a normal configuration each leg would normally contain a double acting 406 UC hydraulic ram assembly providing up to 800mm of stroke. The legs are joined together at corners to form frames via a simple pin and retaining clip assembly. Connecting the 406 UC hydraulic rams (via hydraulic hoses) to an MGF motorised hydraulic pump unit containing neat hydraulic shoring fluid allows the leg lengths to be quickly and easily adjusted to suit the excavation dimensions. Additional lengths of 406 UC Brace extension bars can be used at the end of the legs (in areas of lower bending) to achieve any leg length. Once the frames are fully assembled and located at the correct line and level, the rams are pre-loaded against the sheet piles using the hydraulic pump. Pre-loading of the legs ensures the frame cannot slip and minimises the extent of potential ground movements. Self-sealing quick release valves and mechanical isolation valves ensure that the ram pressure cannot be accidentally released once installed. Handling and restraining points are provided on each leg to assist assembly / removal and to allow the brace / waler to be supported off MGF heavy duty restraining chains attached to the sheet piles by hooks. Alternatively, steel support brackets can be supplied which can be welded or bolted to steel or RC walls.

MGF can supply the systems with a full range of suitable handling and restraining chains, waler rail support brackets, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders, Davitsafe retrieval / fall arrest systems, motorised hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment.

Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

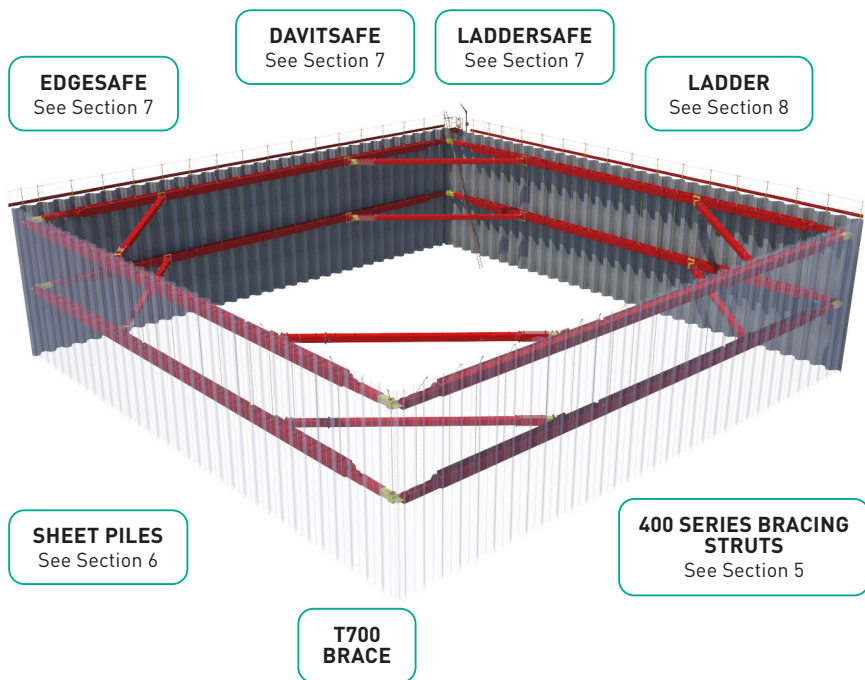
PRODUCT NOTES

1. Hydraulic brace is extremely heavy and should only be assembled, installed and removed by competent persons in accordance with a site-specific detailed design & installation sequence and MGF installation guidelines. Consideration must be given to the weight of the components when preparing lifting plans on site. Operatives should not be in the vicinity during the lifting process.
2. Prior to assembling T700 Brace legs / frames all components should be laid outside of the excavation on suitable timber supports.
3. When assembling on site ensure that all pins and retaining clips are in place and secured and all bolts are installed and fully tightened with a minimum two threads visible beyond the nut.
4. Installation of T700 Brace components is normally carried out by lowering the individual extension bars into the excavation at the correct installation level and building up the complete legs (which would normally include a 406 UC hydraulic ram and T700 transition pieces) within the excavation. Do not try to install / remove entire legs or frames.
5. Legs would then be connected to each other at the corners using a pin and retaining clip assembly. Once all legs are connected together and the frame is fully assembled each hydraulic ram / leg can be preloaded to ensure that the frame is pressed firmly against the trench sheets / sheet piles and cannot slip. Ensure the lock-off valves are open prior to pumping. Max. pre-load pressure of 100Bar (1500psi) must not be exceeded.
6. It is advised to confirm the ram pressure is being held before continuing works.
7. Heavy duty restraining chains are hung off the sheet piles and attached to the legs to assist assembly / removal of the frame and ensure vertical support is provided at all times. All the supplied restraining chains should be installed (min. 3 per T700 Brace extension bar) and adjusted to ensure an even vertical load distribution. Restraining chains should never be used for lifting nor



solely relied upon to suspend loads above personnel. Alternatively, both the 406 UC Brace and T700 Brace are available with waler support brackets, which can be welded to sheet piles or affixed to concrete walls / piles using bolts or anchors. These waler support brackets must be installed prior to beginning to install the waler frames. It is essential that the 406 UC and T700 waler support brackets be installed at the correct levels and there are sufficient brackets installed to satisfy the installation procedure.

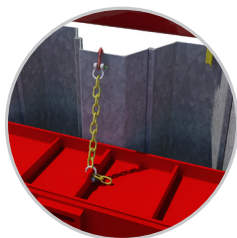
8. Ensure all hydraulic ram lock off valves are closed and all corner pins in place and secured using the retaining clips provided prior to commencing works. Release the pump pressure to ease removal of the hydraulic hoses. Never release ram pressure by depressing the nipple of the male quick release valve.
9. Individual brace legs should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
10. Legs should always be installed square and plumb to the excavation walls ensuring contact with all the inward facing sheet pans. If this is not possible any gaps must be securely packed by using hardwood wedges prior to final pre-loading of the hydraulic rams.
11. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
12. Prior to removal of systems all hydraulic rams must be released and retracted to avoid the need for excessive extraction forces and to avoid damaging corner joints.
13. No matter how much care is taken during the installation and removal of hydraulic bracing systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF T700 BRACE**

mgf.co.uk/products/t700-hydraulic-brace





HEAVY DUTY CHAIN TO SHEET CONNECTION DETAIL

The hook fits over the sheet.



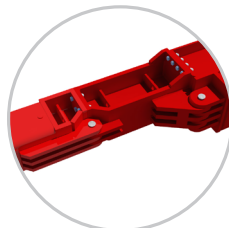
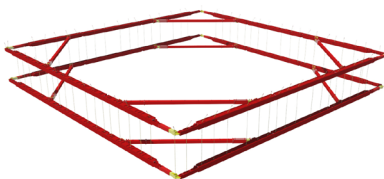
HEAVY DUTY RESTRAINING CHAIN CONNECTION DETAIL

There are 2 types of chains used, the top frame will use shackle to hook type, while lower frames will use shackle to shackle type. Individual chain links selected to ensure all restraining chains are evenly loaded.



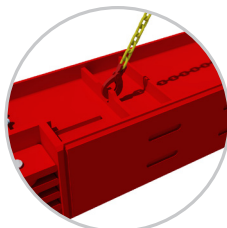
WALER SUPPORT BRACKET CONNECTION DETAIL

There are 2 waler support brackets, 406 UC support brackets and T700 Brace support brackets. These can be used in lieu of restraining chains and can be either welded to steel sheets or anchored to concrete walls / piles.



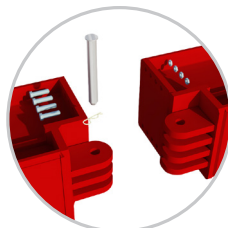
406 UC TO T700 TRANSITION CONNECTION DETAIL

406 UC components are connected to the T700 transitions using a 50mm 406 UC connection pin and r-clip detail and 6 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers. T700 transition connects to T700 legs as below.



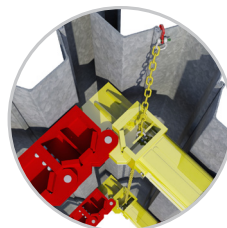
HANDLING POINT WLL = 14T

T700 extension bars are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



LEG CONNECTION DETAIL

T700 extension bars are connected to each other using a 60mm T700 connection pin and r-clip detail and 8 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers.

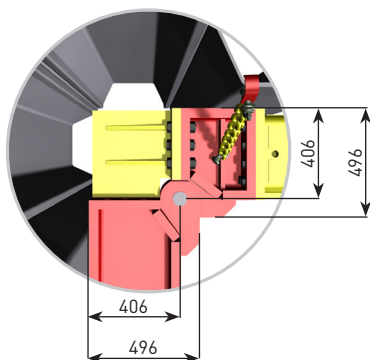


CORNER CONNECTION DETAIL

Leg corners are connected to each other using the 50mm diameter 406 UC connection pin and r-clip detail. To fill corner void a corner bracket is attached to the 406 UC hydraulic ram assembly using 6 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers.

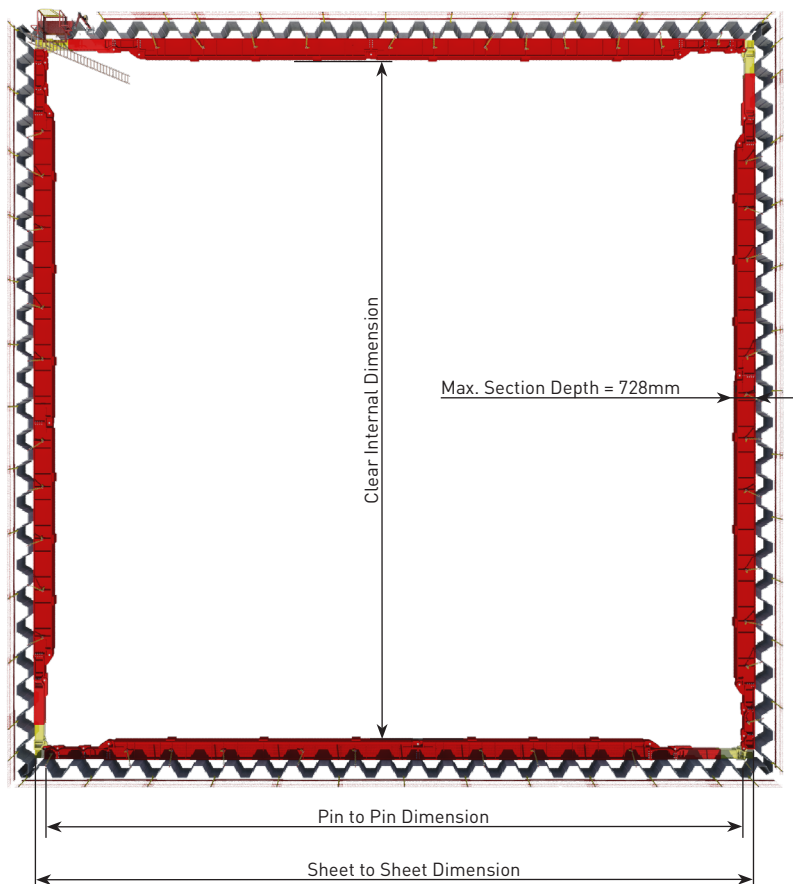


T700 BRACE CORNER DETAIL

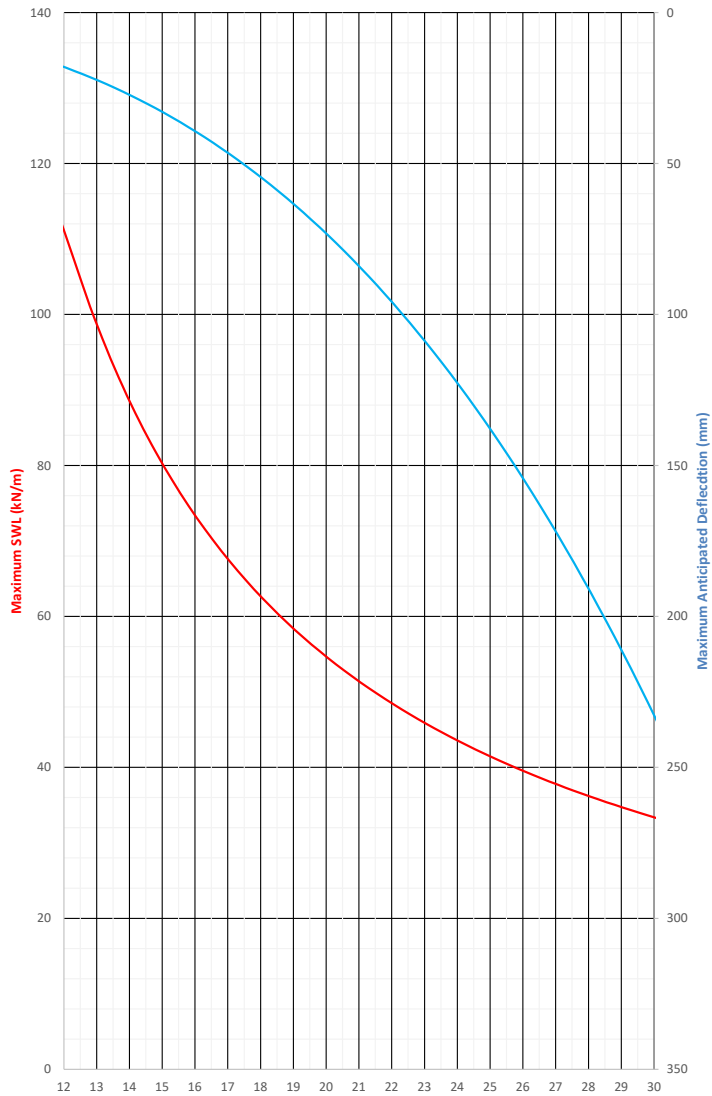


Legs are normally installed at 90° to each other. However, subject to confirmation by a competent design Engineer, angles of between 75° and 135° can be achieved (>90° corner bracket requires removing).

Corners should always be packed out using hardwood wedges against the sheets prior to final pre-load to ensure even load distribution and avoid introducing excessive bending in the brace legs (especially ram assembly).



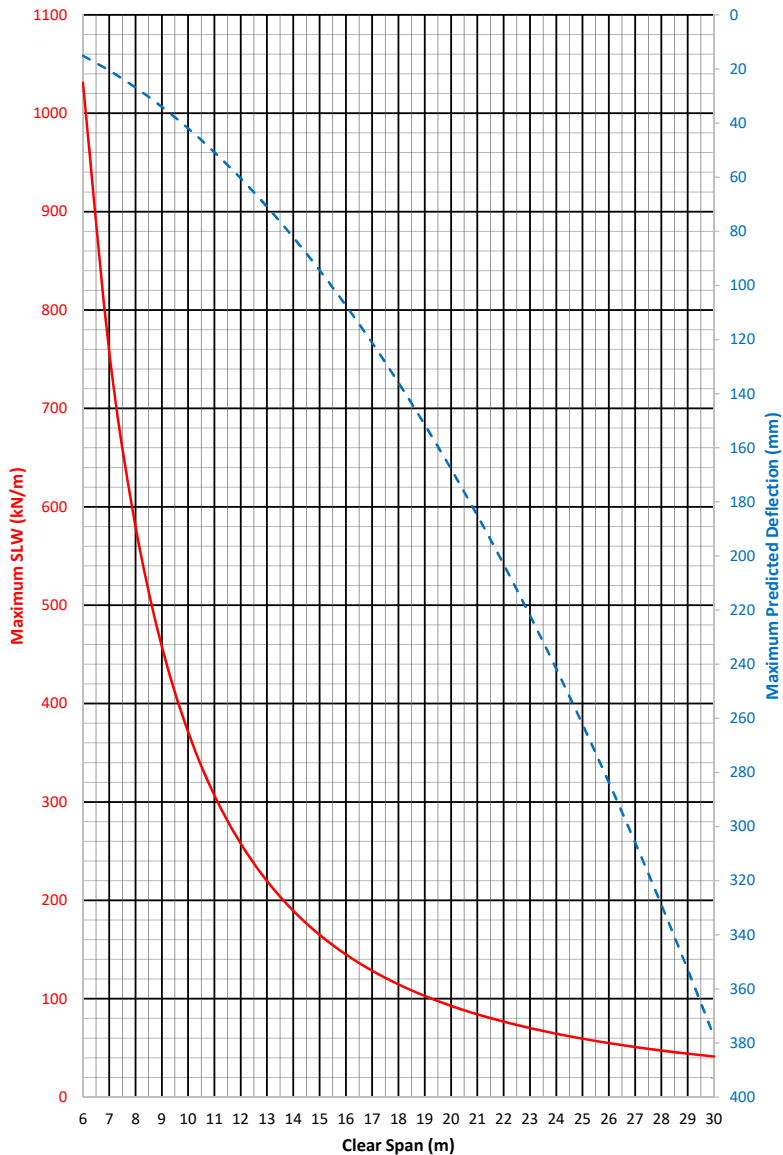
SAFE WORKING LOAD FOR MGF T700 BRACE (kN/m)



Recommended SWL using 406 UC Hydraulic Ram

The above load chart is applicable when bracing leg is built up in accordance with the recommended brace extension combinations on page 4.7.14.
The load chart deflections are based on calculated values and not test data.

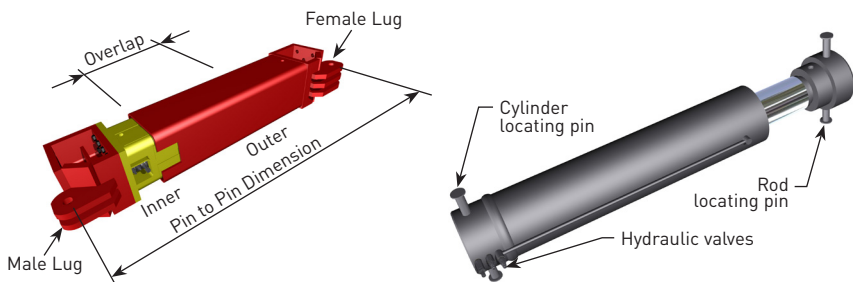
SAFE WORKING LOAD FOR MGF T700 BRACE (kN/m)



The above graph is based purely on the max. bending moment capacity of the T700 Brace when used in conjunction with 3500kN Bracing Struts. Joints and 406 UC components not taken into consideration.

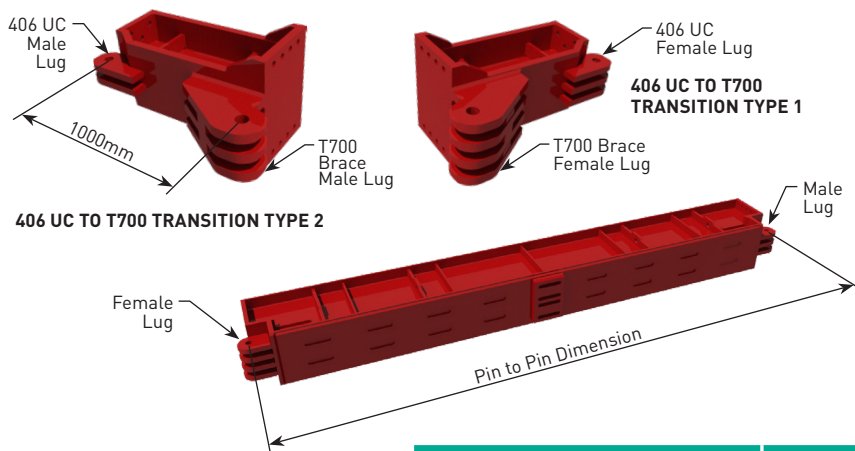
The load chart deflections are based on calculated values and not test data.





406 UC hydraulic ram assemblies comprise inner and outer sleeved steel box sections housing a double acting (DA) hydraulic ram to provide up to 800mm of leg adjustment.

Ram Assembly	Product ID	Pin to Pin Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
406 UC Ram	8.399	2096	2896	1490



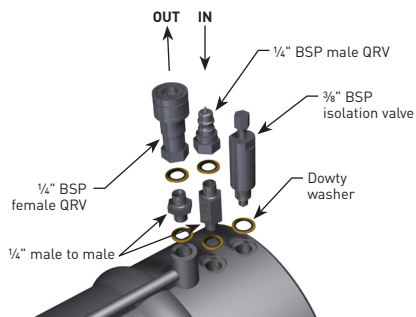
T700 Brace extension bars range in length from 6.0m to 12.0m and are connected to each other via a 4:3 female / male lug using a $\Phi 60$ mm pin and 8 No. grade 8.8 M30x120 (min.) bolts c/w nuts and washers.

		Product Description	Weight
			(kg)
Product ID	8.606	T700 Brace 6.0m Extension	3785
	8.609	T700 Brace 9.0m Extension	5445
	8.612	T700 Brace 12.0m Extension	6985
	8.601	406 UC to T700 Transition Type 1	670
	8.602	406 UC to T700 Transition Type 2	620

1250kN DOUBLE
ACTING HYDRAULIC
CYLINDER



Hydraulic Cylinder	Double Acting	
	Material	Steel
	Bore	200mm
	Max. Working Pressure	400 Bar (5800 psi)
	Test Pressure	400 Bar (5800 psi)
	Approx. Working Stroke	800mm
	Axial SWL	1250kN
	Min. FOS (by test)	2
	Working Temp Range	-50°C to +50°C
	Approx. Pre-Load	300kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Ø30



Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



MOTORISED PUMP UNITS

The motorised pumps are used to extend and retract the 406 UC Brace double acting hydraulic rams. The pumps contain neat bio-degradable Houghto Safe SF25 shoring fluid. Maximum recommended installation pressure 1500 psi (100 Bar). MGF supply 2 different types of motorised pump for 406 UC, electric and diesel.

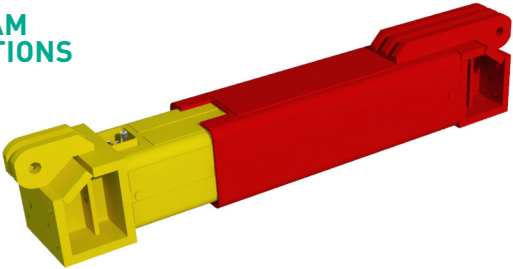


Component	Electric Pump		Diesel Pump	
	Rating	110V, 6.5kVA		8kW
	Product ID	8.4001U / 8.4003U		8.4006
	Capacity	120 / 190 litres		100 litres
	Weight (kg)	460 / 622		394
	Shoring Fluid	Houghto Safe SF25		Houghto Safe SF25
	Working Pressure (psi)	0-1500		0-1500



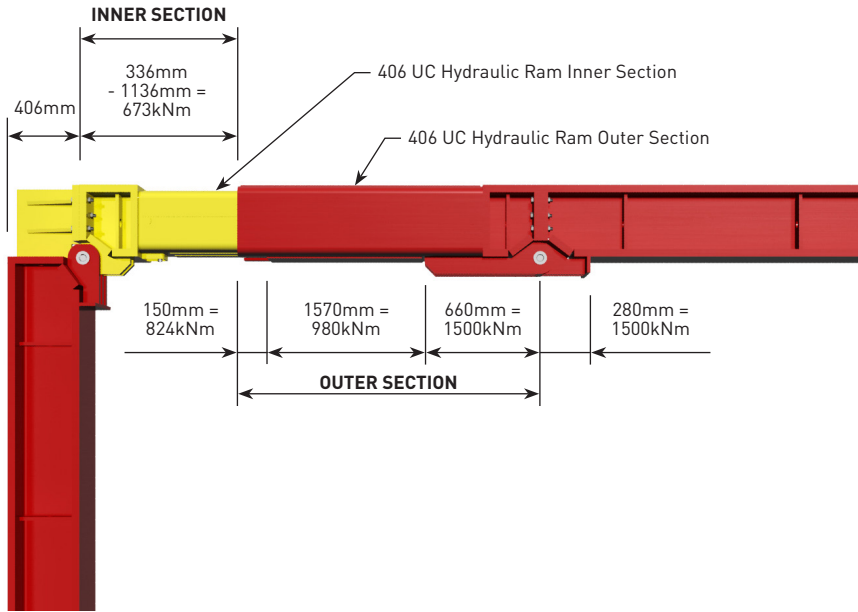
T700 Brace

1250kN HYDRAULIC RAM
ASSEMBLY SPECIFICATIONS



		Inner Section	Outer Section
Hydraulic Ram	Specification	350x350x16 SHS (+ 8 No. 100x4 thk. stiffening plates)	400x400x16 SHS (+ 280x8 thk. stiffening plates)
	Material Grade	S355	S355
	Unit Mass	191kg/m	226kg/m
	Axial SWL	1250kN	1250kN
	Moment SWL	673kNm	824kNm – 1500kNm

1250kN HYDRAULIC RAM OUTER SECTION –
MOMENT SWL DETAILS

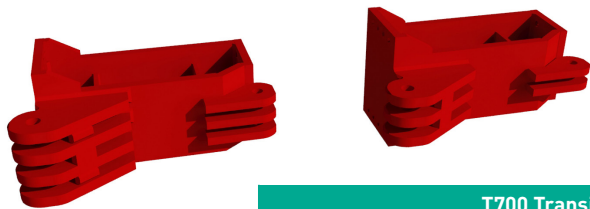


T700 BRACE EXTENSION BAR SPECIFICATIONS

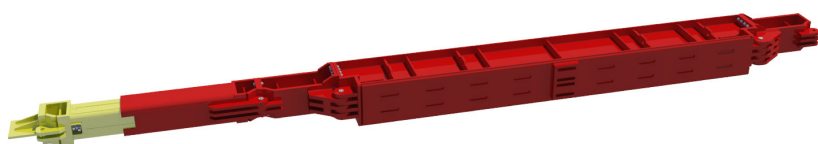


		T700 Brace Extension
Extension Bar	Specification	Twinned 686x254x152 UB c/w 20mm thk. plates
	Material Grade	S460
	Unit Mass	600kg/m
	Axial SWL	1250kN
	Moment SWL	4640kNm
	Joint Moment SWL	3750kNm
Bolting Details		8 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers

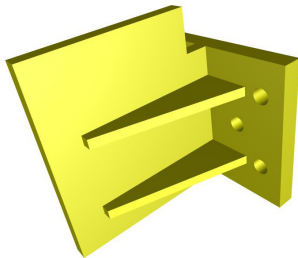
T700 TRANSITION SPECIFICATIONS



		T700 Transitions
Component	Specification	356x406x340UC
	Material Grade	S460
	Unit Mass	340kg/m
	Axial SWL	1250kN
	Moment SWL	1806kNm
	Joint Moment SWL	1500kNm
Bolting Details		6 No. M30x120 (min.) bolts and nuts c/w washers & 8 No. M30x120 (min.) bolts and nuts c/w washers



406 UC ANCILLARIES



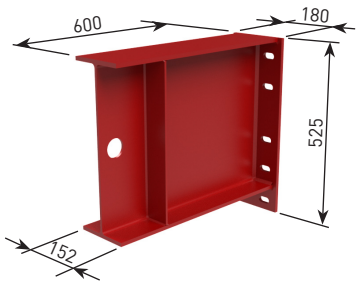
406 UC WALER CORNER BRACKET

Component	Weight	100kg
	Material	S275
	Bolting Details	6 No. M30x120 (min.) grade 8.8 bolts and nuts c/w washers



406 UC WALER CONNECTION PIN

Component	Pin	Φ50mm bar, 245mm long
	Material Grade	708M40 (EN19A)
	Shear SWL	1250kN
	Weight	4kg



406 UC STEEL SUPPORT BRACKET

Component	Product ID	8.4002
	Weight	42kg
	Material	457x152x52 UB, S355
	Weld Details	8mm single run fillet weld. No weld on bearing face
	SWL	30kN
	Hole Details	6 No. Φ18 holes min. 90mm c/c

T700 BRACE ANCILLARIES

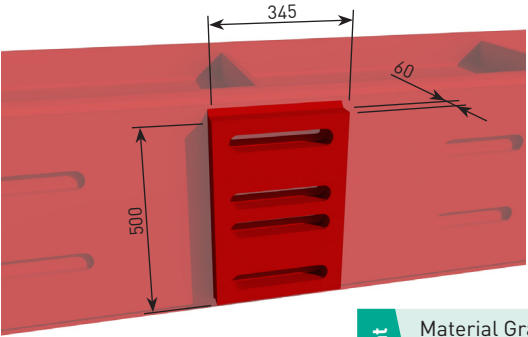


T700 BRACE CONNECTION PIN

Component	Pin	Φ60mm bar, 405mm long
	Material Grade	817M40 (EN24T)
	Weight	9kg



T700 BRACE ANCILLARIES

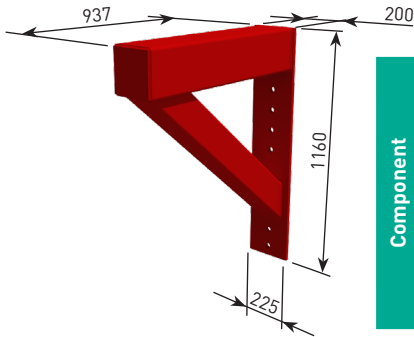


T700 BRACE SHEAR STOP

T700 Brace extension bars feature integrated shear stops at set locations. Bracing strut swivels simply bear up against the shear stops and are then physically clamped to the T700 flanges.

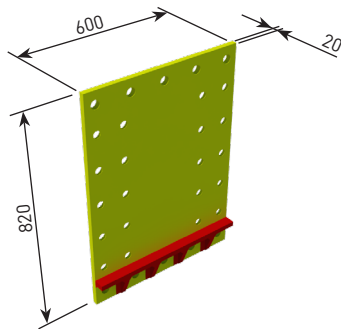
Component	Material Grade	60thk. S460
	Shear SWL	3500kN
	Weld Details	15mm multi run fillet weld. No weld on bearing face

T700 BRACE STEEL SUPPORT BRACKET



Component	Product ID	8.604
	Weight	145kg
	Material	S355
	Weld Details	8mm single run fillet weld. No weld on bearing face
	SWL	30kN
Hole Details		6 No. $\phi 22$ holes

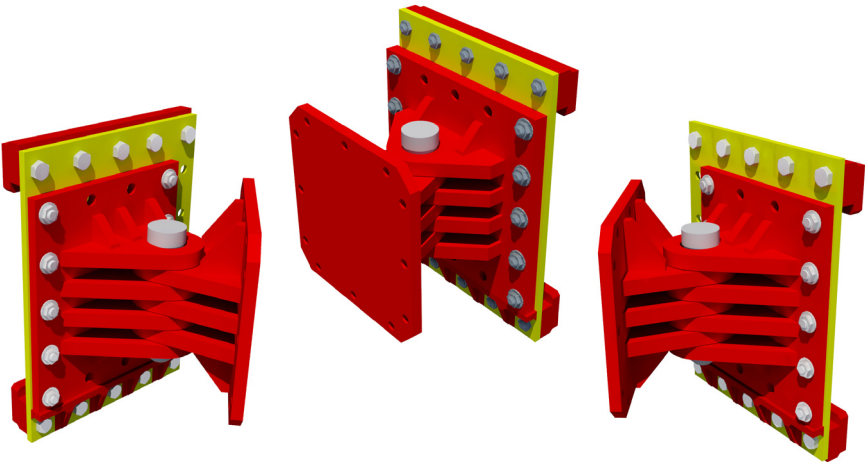
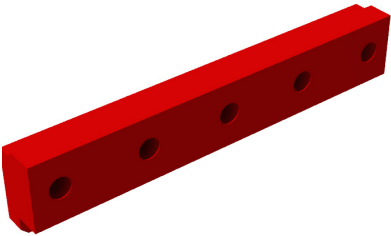
T700 BRACE 3500kN SWIVEL TRANSITION ADAPTOR



Component	Product ID	8.605
	Weight	80kg
	Material	S355
	Bolting Details	10 No. M24x100 (min.) grade 8.8 countersunk bolts and nuts c/w washer

T700 BRACE 3500kN SWIVEL TRANSITION CLAMP

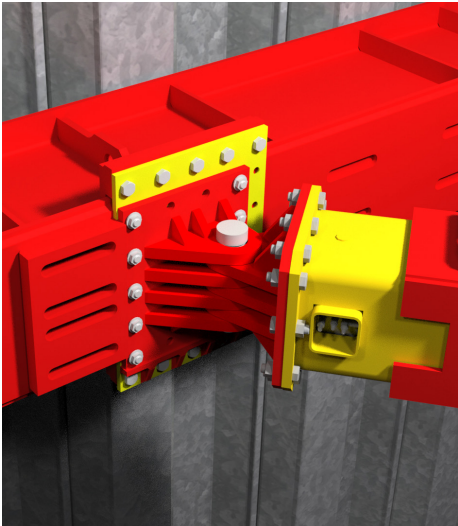
Component	Product ID	8.613
	Weight	35kg
	Material	S355
	Bolting Details	5 No. M30x140 (min.) grade 8.8 bolts and nuts c/w washers



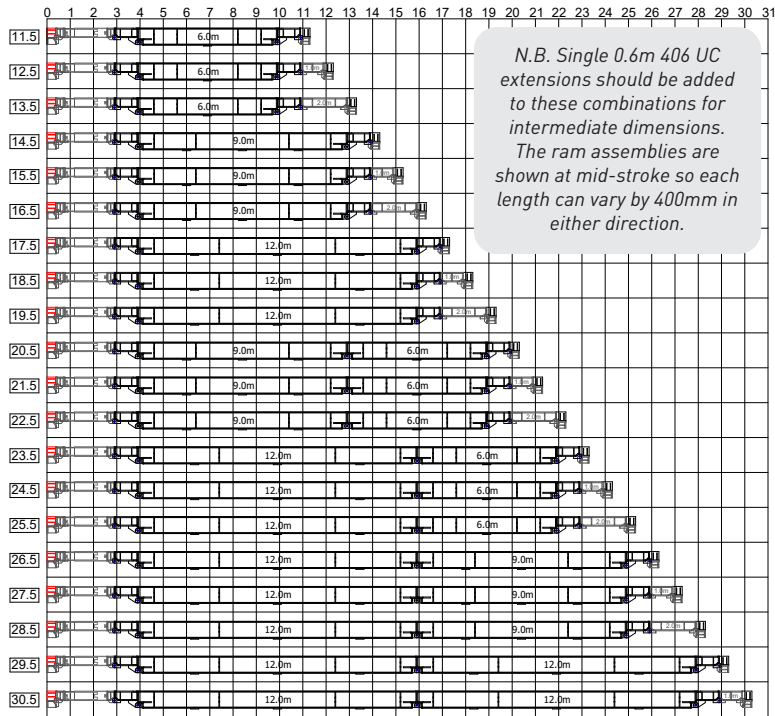
Type A swivels can be connected to the T700 Brace using the swivel transition adaptor in either orientation using 10 No. M24x100 (min.) countersunk bolts, nuts and washers, as shown above.

It is essential that the swivel is connected to the transition adaptor using the correct lines of bolting holes, so the bearing face is flush with the end of the transition plate so it fully bears onto the T700 shear stop. The swivel can only be installed in a horizontal plane.

Type B swivels connect to the swivel transition adaptor using the outer lines of bolt holes. The swivel can only be installed in a horizontal plane.

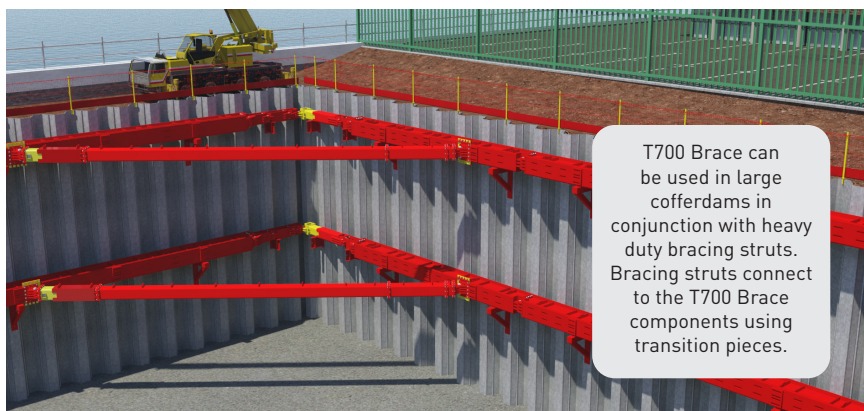
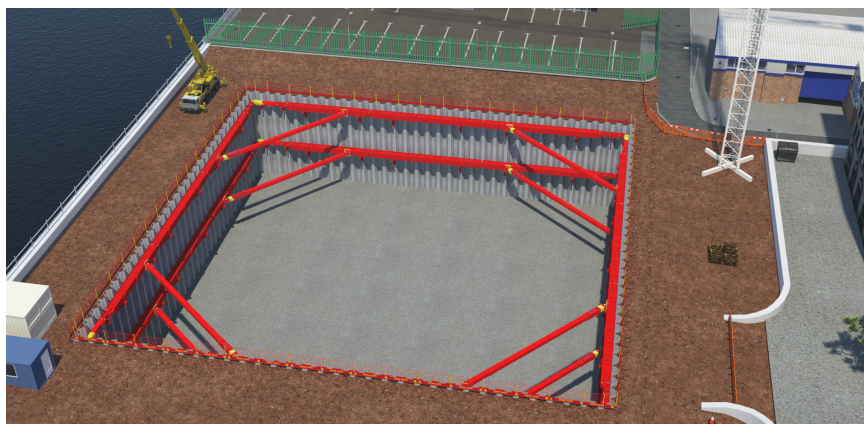
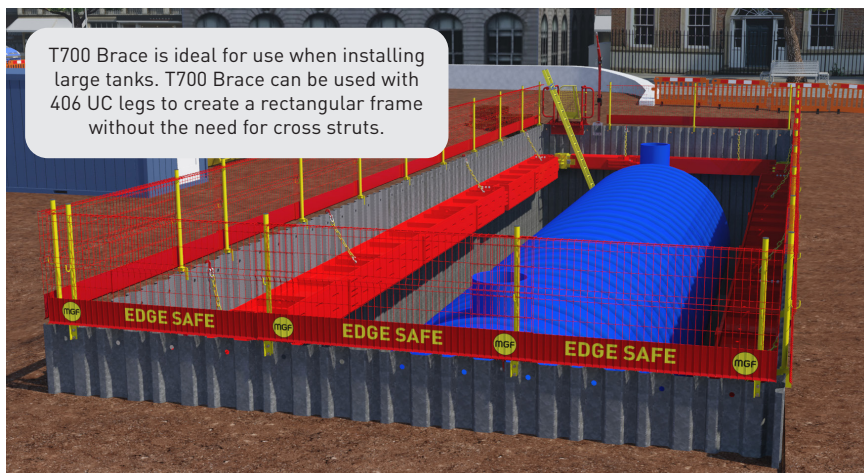


T700 BRACE RECOMMENDED EXTENSION COMBINATIONS



Sheet to Sheet Dimension	Min. Length	Max. Length	Weight
(m)	(mm)	(mm)	(kg)
11.5	10909	11709	6695
12.5	11909	12709	7207
13.5	12909	13709	7567
14.5	13909	14709	8355
15.5	14909	15709	8867
16.5	15909	16709	9227
17.5	16909	17709	9895
18.5	17909	18709	10407
19.5	18909	19709	10767
20.5	19909	20709	12149
21.5	20909	21709	12661
22.5	21909	22709	13021
23.5	22909	23709	13689
24.5	23909	24709	14201
25.5	24909	25709	14561
26.5	25909	26709	15349
27.5	26909	27709	15861
28.5	27909	28709	16221
29.5	28909	29709	16889
30.5	29909	30709	17401

T700 Brace is ideal for use when installing large tanks. T700 Brace can be used with 406 UC legs to create a rectangular frame without the need for cross struts.



T700 Brace can be used in large cofferdams in conjunction with heavy duty bracing struts. Bracing struts connect to the T700 Brace components using transition pieces.



T700 Brace



BESPOKE MANUFACTURING

At MGF we design, develop and manufacture our range of shoring, structural and lifting equipment in-house, providing our customers with the flexibility to meet their requirements with unique and complex schemes.

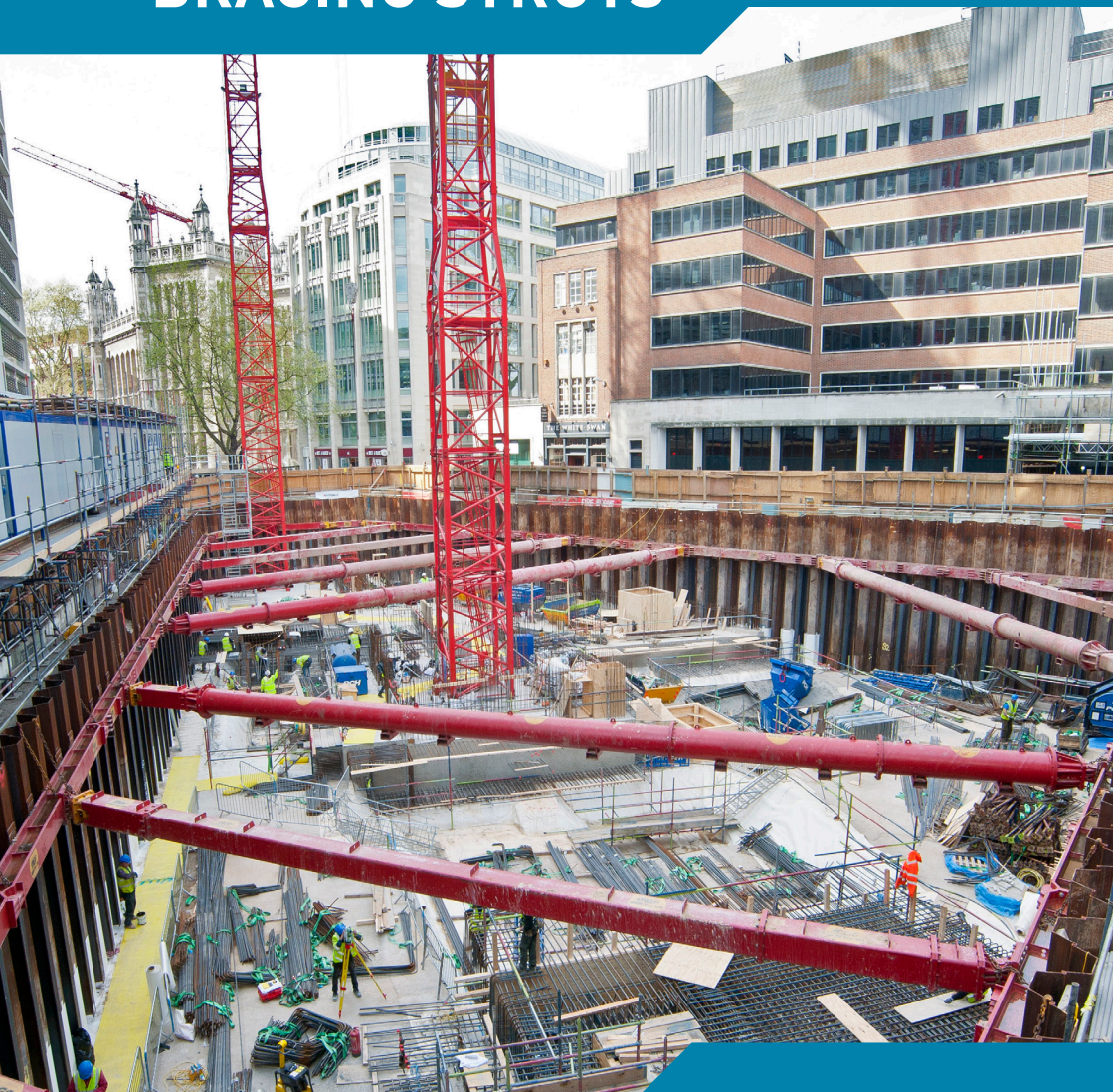
We have a fully qualified team of experienced welders and fabricators working alongside our engineering designers to ensure we can provide our customers with both straightforward and made to measure shoring, structural and specialised lifting equipment.

FIND OUT MORE ABOUT OUR TAILORED SOLUTIONS:

 mgf.co.uk



BRACING STRUTS



COMPATIBILITY GUIDE	5.0
200 SERIES STRUT	5.1
300 SERIES STRUT	5.2
400 SERIES STRUT	5.3
600 SERIES STRUT	5.4
1000 SERIES STRUT	5.5

MGF BRACING STRUT COMPATIBILITY TABLE

		Hydraulic Bracing Range				
		203 UC	203 UC+	305 UC	406 UC	T700 BRACE
Bracing Strut Range	200 Series	✓	✓	✓ (1)	✓ (1)	X
	300 Series	✓	✓	✓ (1)	✓ (1)	X
	400 Series	X	X	✓ (2)	✓	✓
	600 Series	X	X	✓ (2)	✓	✓
	1000 Series	X	X	X	✓	✓

(1) Knee Braces require 600kN Type A Swivel 305 UC Brace transition plate.
(2) Subject to detailed design checks when used in conjunction with 2500kN or 3500kN Hydraulic Struts.



HIGHLY VERSATILE, SIMPLE TO ASSEMBLE, MEDIUM DUTY MODULAR HYDRAULIC BRACING STRUTS DESIGNED PRIMARILY TO BE USED IN CONJUNCTION WITH MGF HYDRAULIC BRACING SYSTEMS.

The system can also be used in any plane to prop steel, concrete or masonry structures. Each strut comprises either hydraulic ram or mechanical jack assemblies together with various length strut extension bars. The system can support loads of up to 600kN and span from 0.625m to approx 10.5m. Components are heavy and are normally assembled on site prior to being lifted into place and installed within the excavation using either large excavators or cranes. A variety of end bearings are available allowing the struts to be used at a wide range of angles and within any plane.

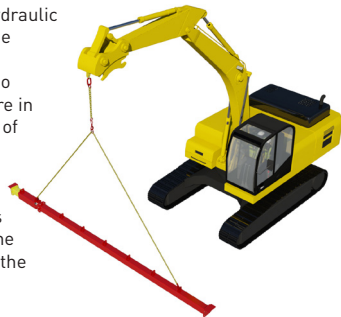
Fabricated from grade S355 200x200 steel box section the extensions are quickly assembled into the required strut lengths using flanged plates c/w bolt, nut and washer assemblies. Final length adjustment is provided by either a double acting hydraulic ram or a mechanical (screw thread adjusted) jack providing up to 745mm of stroke. Once located at the correct line and level the struts are pre-loaded (or tightened) against the faces to be supported using a hydraulic pump on the ram (or by striking the locking collar of the mechanical jack). Preloading of the legs ensures the strut cannot slip, takes up any slack or hogging in the system and minimises the extent of potential ground movements. Handling points are provided at regular intervals on each leg to assist assembly / removal.

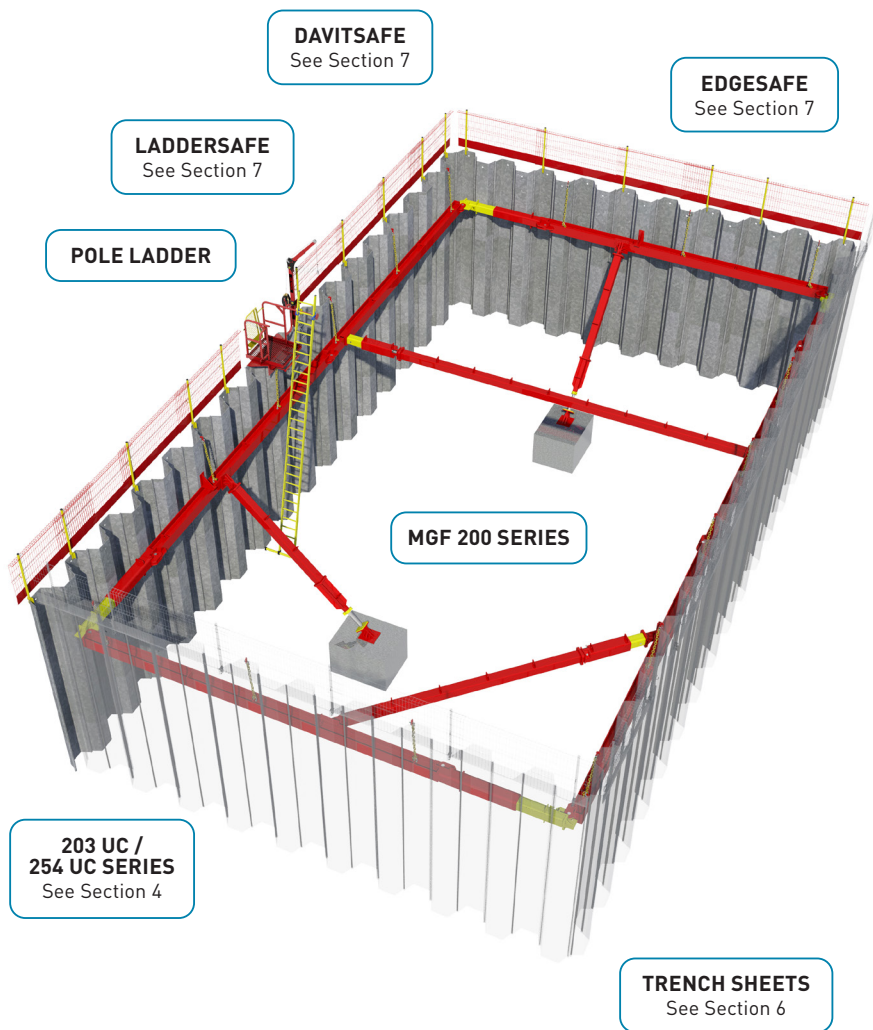
MGF can supply the systems with a full range of suitable handling chains, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment.

Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Strut systems are heavy and should only be assembled, installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines.
2. Installation is normally carried out by assembling the complete strut and then lowering into place (subject to crane / excavator capacity). Struts are normally long and unbalanced (due to the weight of ram / jack unit) and great care must be taken in preparing the lift / maintaining lift angle (tag lines strongly recommended). On the ram assembly max. pre-load pressure of 100Bar (1500psi) must not be exceeded unless design states otherwise.
3. Additional restraining chains or support brackets are normally provided to the brace at intermediate strut locations to carry the additional strut weight.
4. Ensure struts are fully pre-loaded or tightened, end fixings packed, all hydraulic ram isolation valves are closed prior to releasing strut from lifting chains and commencing works. When assembling on site ensure that all pins and retaining clips are in place and secured and all flange plate bolts are installed and fully tightened / torqued with a minimum two threads visible beyond the nut. Any gaps in bearing plates must be securely packed by using hardwood wedges or grout prior to final pre-loading of the hydraulic rams.
5. Individual components should be visually inspected for damage, excessive deflection, loss of ram pressure or loose locking collars prior to entering the excavation.
6. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
7. Prior to removal of systems the complete weight of the strut must be independently supported. Once this is accomplished the hydraulic rams (or struts) must be released and retracted to avoid the need for excessive extraction forces.
8. When installing struts at angles great care must be taken to ensure that the angles match the design, all shear stops are in place and all elements are supported / jacked and capable of transmitting loads effectively.
9. Extreme care must be taken when handling the mechanical jack as the screw thread is free to move within the outer and can accidentally retract or extend. It is therefore recommended that during handling operations the jack is fully extended and the locking collar closed against the outer to prevent any sudden movements.

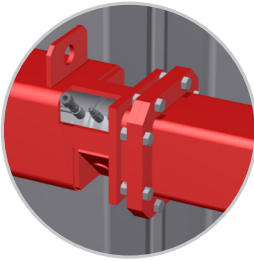




**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF BRACING STRUTS**

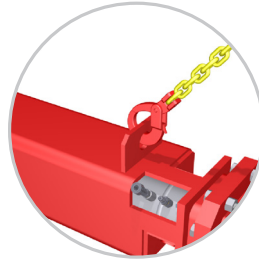
mgf.co.uk/products/200-series-strut





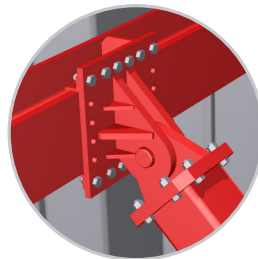
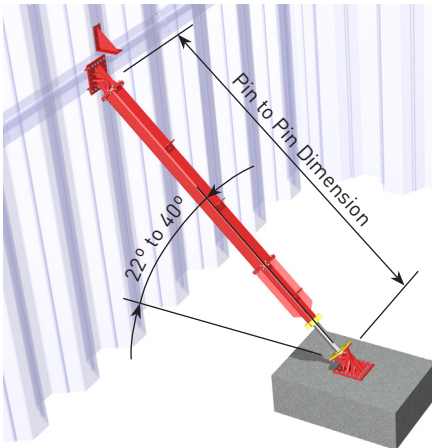
STRUT FLANGE CONNECTION DETAIL

200 Series struts and extensions are connected via a flange plate (300x300x20mm) using 8 No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers (recommended min. torque 300Nm).



HANDLING POINT WLL = 7.0T

Strut assemblies are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



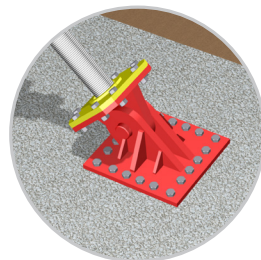
TOP SWIVEL BEARING DETAIL

The swivel is secured to the UC section by bolting on RSA sections to the swivel base plate using 12 No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers.



VERTICAL SHEAR RESTRAINT DETAIL

The vertical restraint detail should be used whenever there is a raking prop. It can either be welded to the pan of sheets or bolted to a concrete wall using anchors.

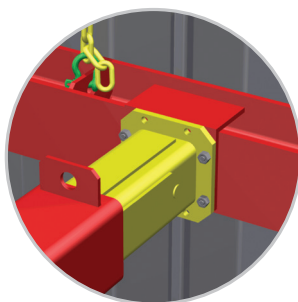
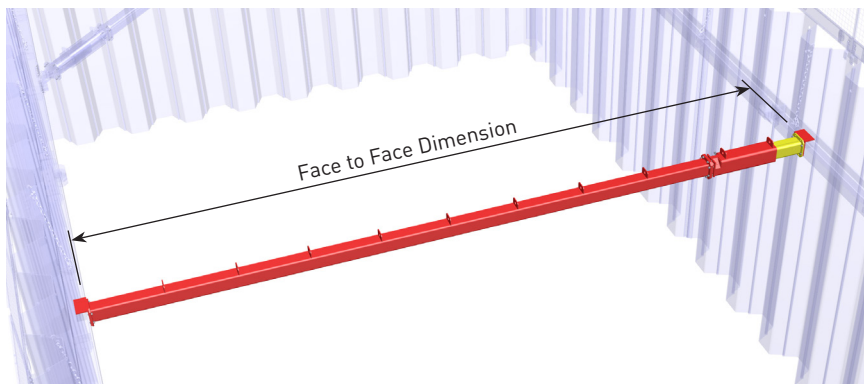


BASE SWIVEL BEARING DETAIL

The swivel can be secured to the floor slab using anchor bolts.

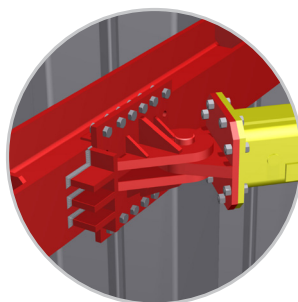
MGF can supply battery impact wrenches to facilitate assembly and removal of bolted connections.

Please contact MGF for details.



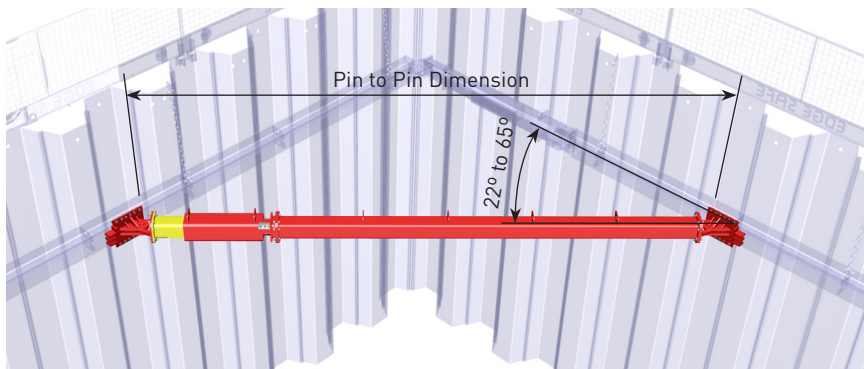
CLEAT END BEARING DETAIL

The end cleat is bolted to the strut or extension using 4 No. M20x65 (min.) grade 8.8 countersunk bolts and nuts c/w washers. The cleat then sits on the UC section. When using this end detail MGF recommend that restraining chains are used to lash the waler and strut together at each end to prevent the strut being dislodged if struck accidentally.

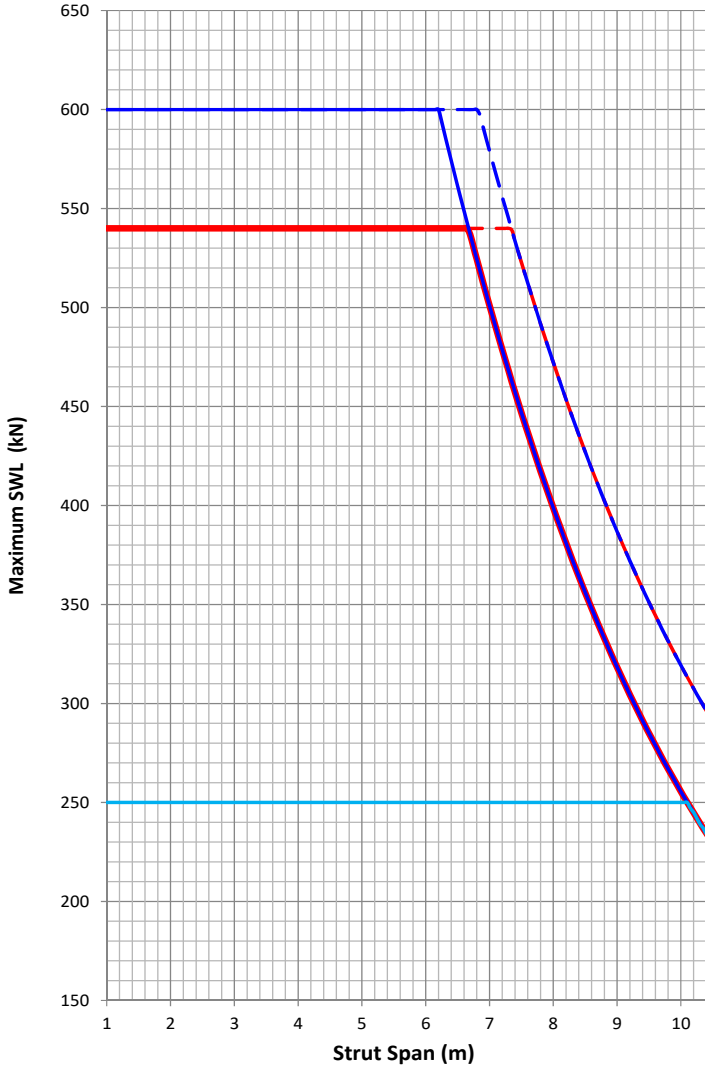


KNEE BRACE END BEARING DETAIL

The swivel is secured to the UC section by bolting RSA sections to the swivel base plate using 12 No. M20x65 (min.) grade 8.8 bolts and nuts c/w washers.



SAFE WORKING LOAD FOR MGF 200 SERIES (kN)



250kN HYDRAULIC STRUT

— Axial + 10kN
accidental load

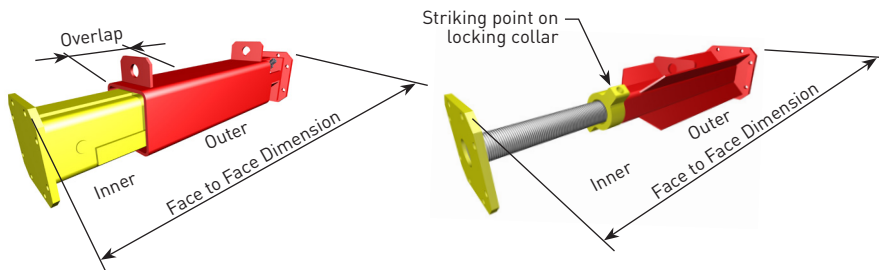
540kN MECHANICAL STRUT

--- Axial load only
— Axial + 10kN
accidental load

600kN HYDRAULIC STRUT

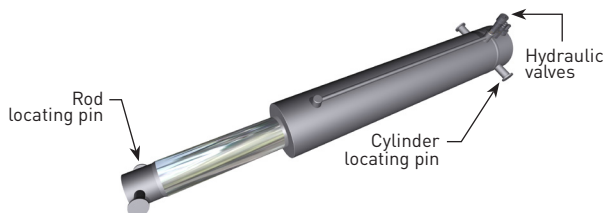
--- Axial load only
— Axial + 10kN
accidental load

Curves include allowance for self weight deflection, eccentricity and fabrication tolerances.

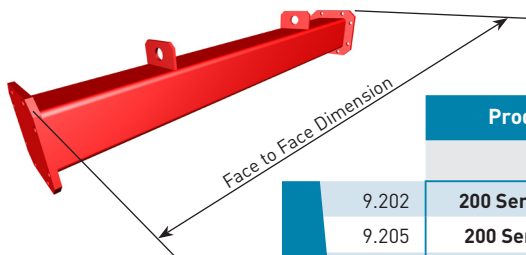


250kN and 600kN Hydraulic Strut assemblies comprise of inner and outer sleeved steel box sections housing a double acting (DA) hydraulic ram to provide up to 600mm of leg adjustment.

540kN Mechanical Strut assembly comprises inner screw threaded sections and outer sleeved steel sections combined with a threaded collar to provide up to 745mm of leg adjustment.



Product ID	Product Description	Face to Face Dimension		Weight (kg)
		Min. (mm)	Max. (mm)	
9.400	250kN Hydraulic Strut	625	925	100
9.015	540kN Mechanical Strut	1085	1830	147
9.016	600kN Hydraulic Strut	1150	1750	375

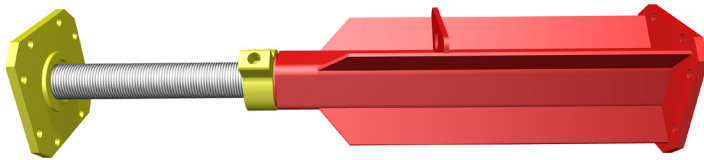


200 Series extension bars range in length from 0.25m to 6.0m and are connected to each other via 8 No. grade 8.8 M20x65 (min.) bolts c/w nuts and washers.

Product ID	Product Description	Weight (kg)
9.202	200 Series 0.25m Extension	40
9.205	200 Series 0.5m Extension	52
9.210	200 Series 1.0m Extension	76
9.215	200 Series 1.5m Extension	101
9.220	200 Series 2.0m Extension	124
9.230	200 Series 3.0m Extension	173
9.240	200 Series 4.0m Extension	223
9.250	200 Series 5.0m Extension	268
9.260	200 Series 6.0m Extension	316



Hydraulic Ram		Inner Section	Outer Section
	Specification	200x200x12.5 SHS (+ 4 No. 90x10mm thk. stiffening plates)	250x250x12.5 SHS
	Material Grade	S355	S355
	Unit Mass	95.8kg/m	91.9kg/m
	Axial SWL	600kN	600kN
	Moment SWL	100kNm	100kNm



Mechanical Jack		Inner Section	Outer Section
	Specification	Φ100x12.5 thk. CHS	120x120x8 SHS (+ 4 No. 90x8mm fin plates)
	Material Grade	ST52	S355
	Screw Thread Detail	Φ100, 24 pitch	Φ100, 24 pitch
	Unit Mass	27.0kg/m	50.8kg/m
	Axial SWL	540kN	540kN
	Moment SWL	22kNm	100kNm

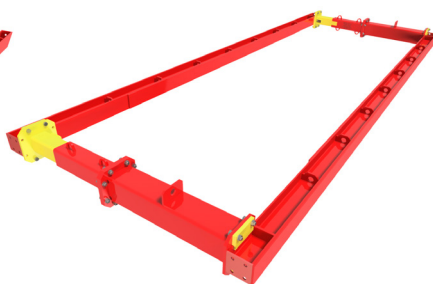
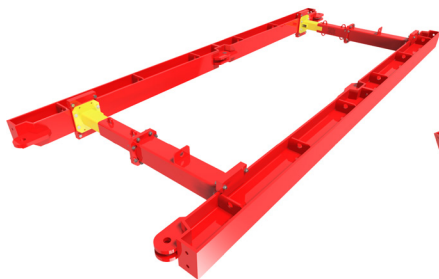


Extension Bar	Specification	200x200x8 SHS
	Material Grade	S355
	Unit Mass	47.7kg/m
	Axial SWL	600kN
	Moment SWL	100kNm
	Joint Moment SWL	100kNm
Extension Bar	Bolting Details	8 No. M20x65 (min.) bolts and nuts c/w washers

MGF's 250kN Hydraulic Strut has been designed for use with 203 UC and 203 UC+ Brace as well as MGF's 152 UC Waler. It is suitable for narrow trenches and is compatible with 200 Series extensions and adaptors.

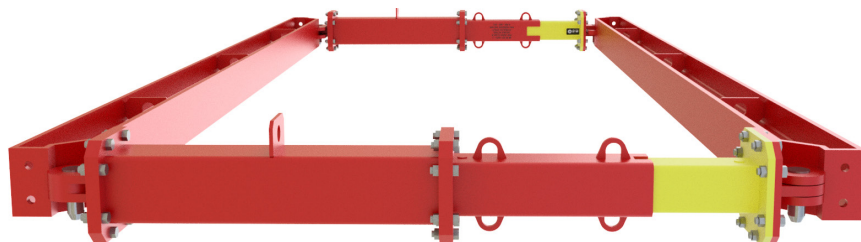


Hydraulic Ram	Specification	Inner Section	Outer Section
		140x140x8 SHS	160x160x8 SHS
	Material Grade	S355	S355
	Unit Mass	32.6kg/m	37.6kg/m
	Axial SWL	250kN	250kN
	Moment SWL	50kNm	65kNm

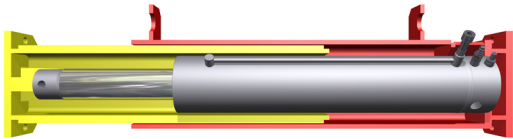


When used with the 152 UC Waler, the 250kN Hydraulic Struts must be clamped in position. The 250kN strut can also be used as Endsafe when used in the outermost position.

When used with 203 UC or 203 UC+ Brace, the 250kN hydraulic strut can either bear directly onto the UC using end cleats or clamping plates (5.1.11) as above, or connect to the UC Brace connecting lugs using 203 UC / 203 UC+ 200 Series Strut adaptors (4.3.11 & 4.4.12) as below. When using these Strut adaptors the 200 Series can also be used as an end protection strut.



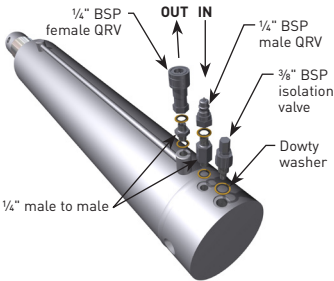
200 SERIES DOUBLE ACTING HYDRAULIC RAM ASSEMBLIES



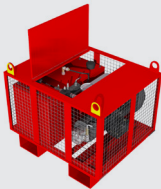
		250kN Double Acting	600kN Double Acting
Hydraulic Cylinder	Material	Steel	Steel
	Bore	85mm	140mm
	Max. Working Pressure	440 Bar (6400 psi)	390 Bar (5700 psi)
	Test Pressure	440 Bar (6400 psi)	390 Bar (5700 psi)
	Approx. Working Stroke	300mm	600mm
	Axial SWL	250kN	600kN
	Min. FOS (by test)	2	2
	Working Temp Range	-20°C* to +50°C	-20°C* to +50°C
	Approx. Pre-Load	60kN	150kN
		Approx. Pre-Load Pressure	100 Bar (1500 psi)
		Locating Pins	Ø22mm
			Ø22 and Ø26mm

* Winter mix required for shoring fluid at low temps.

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



PUMP UNITS

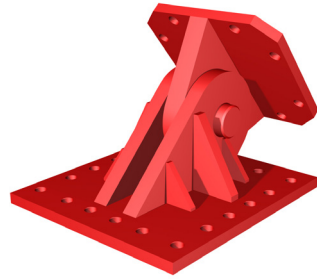
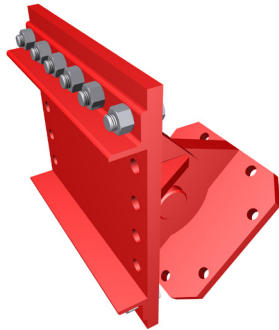


The pumps are used to extend and retract the 200 Series double acting hydraulic rams. The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 1500 psi (100 Bar). There are 2 types of pumps available, a manually operated bucket pump and a motorised petrol pump.



		Bucket Pump	Petrol Motorised Pump
Component	Product ID	1.603 (DA)	8.4007 (DA)
	Fluid Capacity (L)	20	70
	Weight (kg)	25	270
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25
	Working Pressure (psi)	0-1500	0-1500

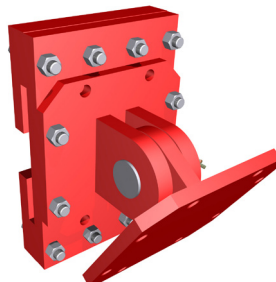
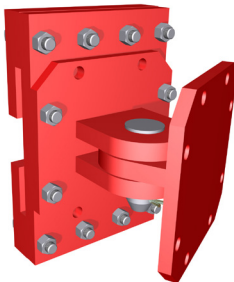
600kN TYPE A SWIVEL ASSEMBLY



'Type A' swivels can be connected directly to concrete structures or the 203 UC / 203 UC+ Brace systems by bolting on the associated clamp assemblies (product ID = 9.320). Type A swivels can also connect to 305 or 406 UC Brace in conjunction with a transition plate and clamp assemblies, as detailed on page 5.1.12.

		Type A	Type B
200 Series Swivel	Product ID	9.301	9.209 (single lug) & 9.2095 (double lug)
	Weight	75kg	32kg
	Raking Prop Operating Range	22° - 40°	65° - 90°
	Knee Brace / Cross Strut Operating Range	22° - 65°	65° - 90°
	Axial SWL	600kN	600kN
	Swivel Base Plate	385 x 420 x 30mm thk. (S355)	300 x 300 x 20mm thk. (S275)
	Base Plate Hole Details	20 No. $\Phi 22$ holes	8 No. $\Phi 22$ holes
	Pin Detail	$\Phi 62$ (080M40 / EN8)	$\Phi 50$, 150 long (708M40 / EN19A) – 203 UC / 203 UC+ water connection pin

600kN TYPE B SWIVEL ASSEMBLY



'Type B' swivels can be connected to both the 203 UC and 203 UC+ Brace systems by using the 200 Series clamping plate as detailed on page 5.1.11.

200 SERIES ANCILLARIES

200 SERIES END SEATING PLATE



Component	Product ID	9.300
	Weight	15kg
	Material	15mm thk. flat, S275
	Bolting Details	4 No. M20x65 (min.) grade 8.8 countersunk bolts and nuts c/w washers
	Bearing SWL	600kN

200 SERIES 152 UC WALER CLAMP

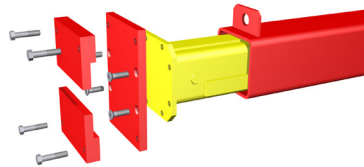


Component	Product ID	9.317
	Weight	3kg
	Material	S275
	Bolting Details	2No. grade 8.8 M20x80 (min.) c/w nuts and washers

When connecting 200 Series to 152 UC, 2 No. of the above clamps should be attached to each end of the strut.

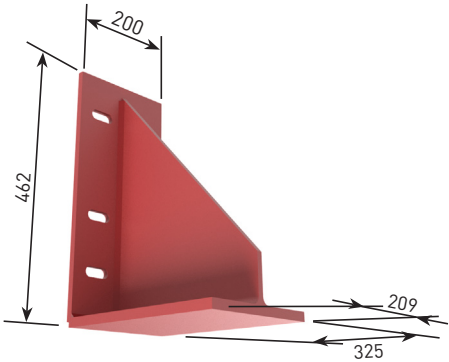
200 SERIES CLAMPING PLATE

Component	Product ID	Connecting Plate - 9.318, weight = 21kg 203 UC Clamp - 9.314, weight = 13kg 203 UC+ requires 203 UC clamp and 6mm spacer plate - 8.166, weight = 1.5kg
	Material	20mm thk. flat, S275
	Bolting Details	4No. grade 8.8 M20x65 (min.) countersunk bolts and 4No. grade 8.8 M20x80 (min.) bolts c/w nuts and washers
	Bearing SWL	600kN

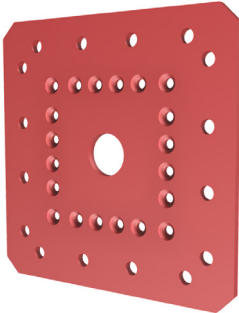


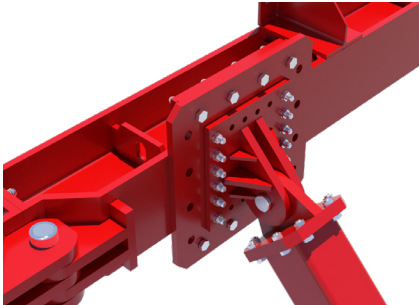
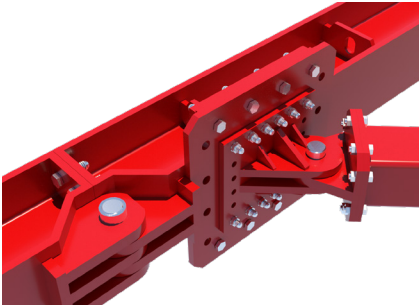
200 / 300 SERIES VERTICAL RESTRAINT

Component	Product ID	8.3003
	Weight	23kg
	Material	533x210x92 UB, S355

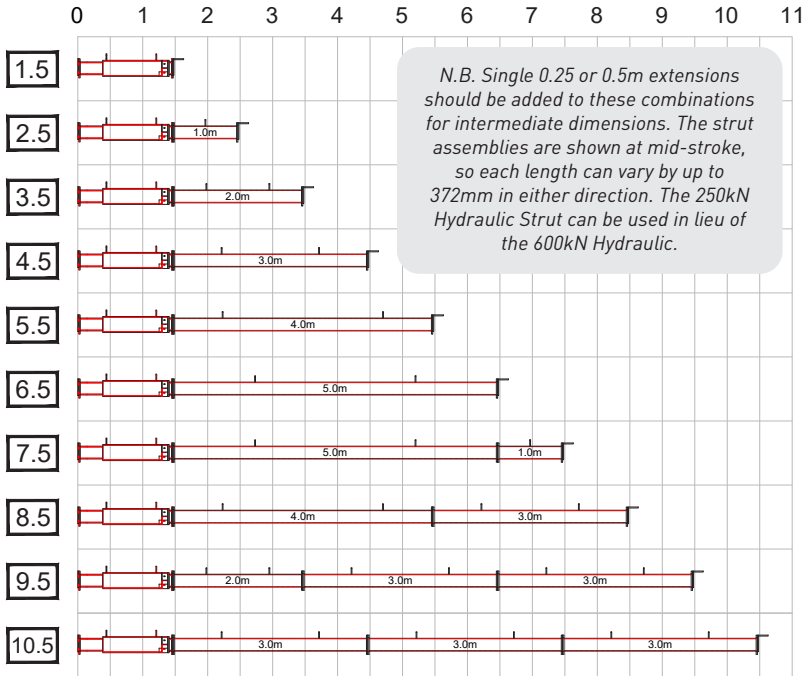


600kN TYPE A SWIVEL TO 305/406 UC BRACE TRANSITION PLATE

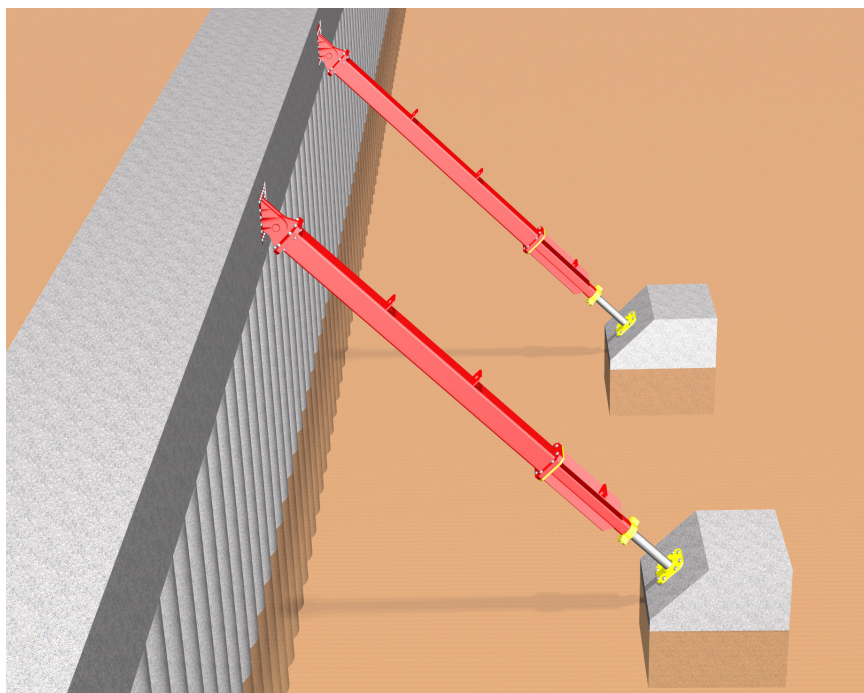
	Product ID	9.319
	Weight	76kg
	Material	25mm thk. flat, S355
	Plate Bolting Details	12No. grade 8.8 M20x80 (min.) countersunk bolts c/w nuts and washers - installed on 2 lines of bolt holes parallel to the orientation of the lugs (as shown below)
	Clamp Details	2No. 400 Series Swivel Clamp Type A to 305 UC (product ID = 8.303) 2No. 400 Series Swivel Clamp Type A to 406 UC Brace (product ID = 8.40016)
	Clamp Bolting Details	8No. grade 8.8 M30x140 (min.) bolts c/w nuts and washers



200 SERIES RECOMMENDED EXTENSION COMBINATIONS



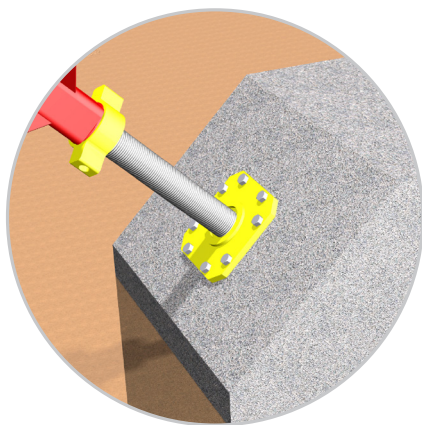
		250kN Hydraulic			540kN Mechanical			600kN Hydraulic		
		Min. Length	Max. Length	Leg Weight	Min. Length	Max. Length	Leg Weight	Min. Length	Max. Length	Leg Weight
		(mm)	(mm)	(kg)	(mm)	(mm)	(kg)	(mm)	(mm)	(kg)
Face to Face Dimension (m)	0.7	655	955	130	-	-	-	-	-	-
	1.5	1405	1705	222	1118	1863	197	1190	1790	405
	2.5	2405	2705	298	2118	2863	273	2190	2790	481
	3.5	3405	3705	346	3118	3863	321	3190	3790	529
	4.5	4405	4705	395	4118	4863	370	4190	4790	578
	5.5	5405	5705	445	5118	5863	420	5190	5790	628
	6.5	6405	6705	490	6118	6863	465	6190	6790	673
	7.5	7405	7705	566	7118	7863	541	7190	7790	749
	8.5	8405	8705	618	8118	8863	593	8190	8790	801
	9.5	9405	9705	692	9118	9863	667	9190	9790	875
	10.5	10405	10705	742	10118	10863	717	10190	10790	925



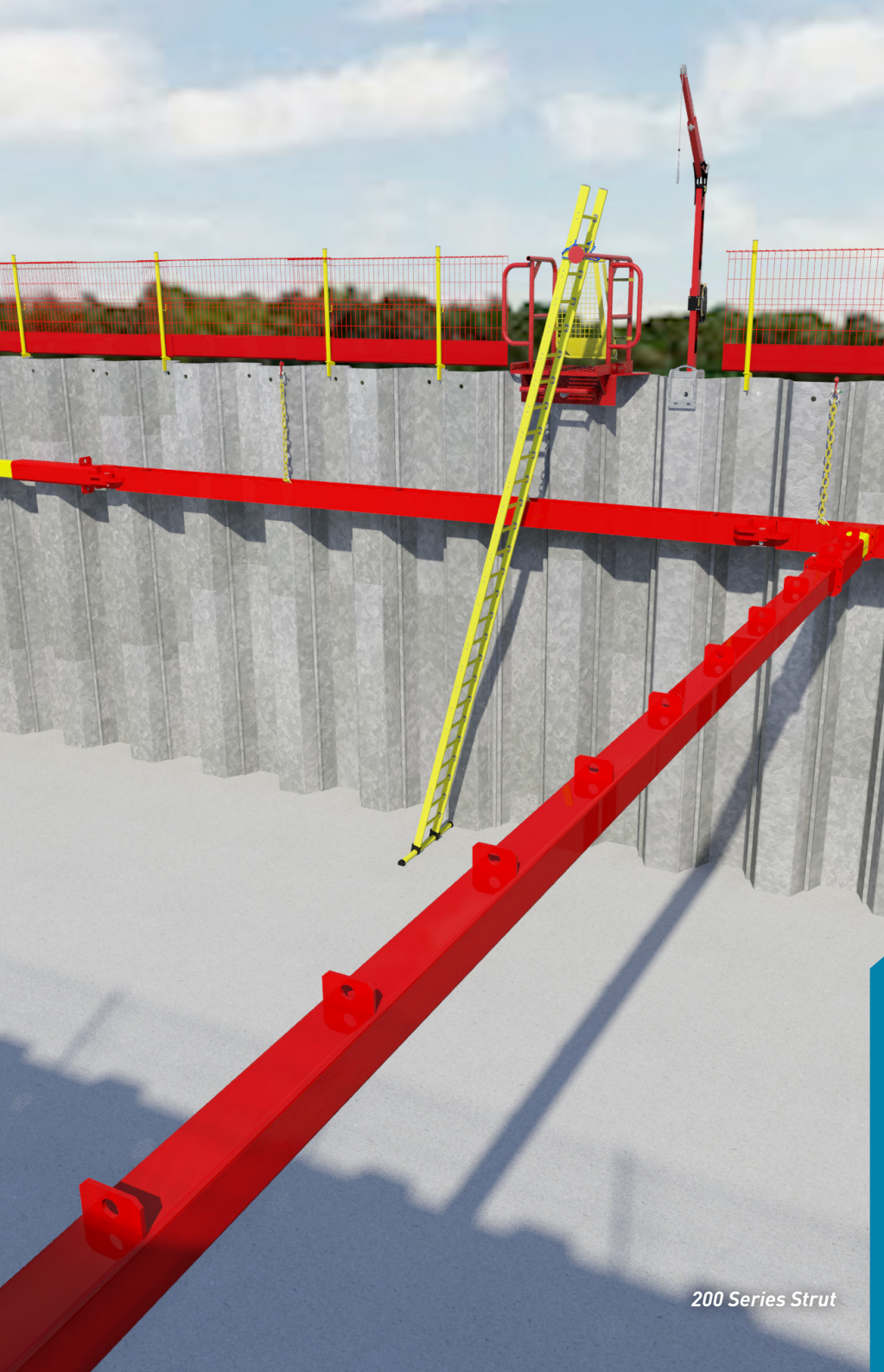
TYPICAL RAKING PROP APPLICATION



Typical bearing detail
on RC capping beam.



Typical bearing detail on
concrete thrust block.



200 Series Strut

HIGHLY VERSATILE, SIMPLE TO ASSEMBLE, MEDIUM DUTY, MODULAR BRACING STRUT SYSTEM DESIGNED PRIMARILY TO BE USED AS INTERMEDIATE STRUTS WITH MGF HYDRAULIC BRACING SYSTEMS.

The system can also be used in any plane to prop steel, concrete or masonry structures. Each strut comprises either hydraulic ram or mechanical jack assemblies together with various length strut extension bars. The system can support loads of up to 600kN and span from 1.1m to approx. 17.8m and can incorporate a central cruciform bar offering intermediate vertical support to perpendicular struts. Components are heavy and are normally assembled on site prior to being lifted into place and installed within the excavation using either large excavators or cranes. A variety of end bearings are available allowing the struts to be used at a wide range of angles and within any plane.

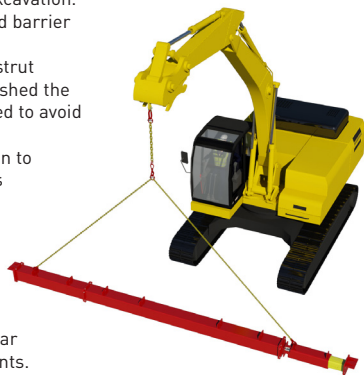
Fabricated from grade S355 300x300 steel box section the extensions are quickly assembled into the required strut lengths using flanged plates c/w bolt, nut and washer assemblies. Final length adjustment is provided by either a double acting hydraulic ram or a mechanical (screw thread adjusted) jack providing up to 745mm of stroke. Once located at the correct line and level the struts are pre-loaded (or tightened) against the faces to be supported using a hydraulic pump on the ram (or by striking the locking collar of the mechanical jack). Preloading of the legs ensures the strut cannot slip, takes up any slack or hogging in the system and minimises the extent of potential ground movements. Handling points are provided at regular intervals on each leg to assist assembly / removal.

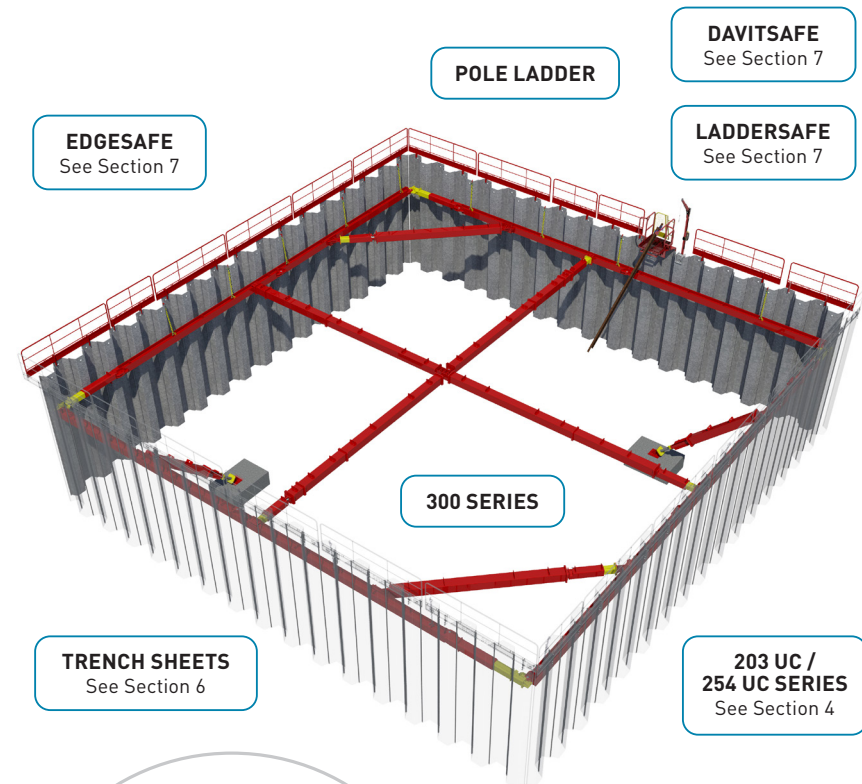
MGF can supply the systems with a full range of suitable handling chains, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment.

Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Strut systems are heavy and should only be assembled, installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines.
2. Installation is normally carried out by assembling the complete strut and then lowering into place (subject to crane / excavator capacity). Struts are normally long and unbalanced (due to the weight of ram / jack unit) and great care must be taken in preparing the lift / maintaining lift angle (tag lines strongly recommended). On the ram assembly max. pre-load pressure of 100Bar (1500psi) must not be exceeded unless design states otherwise.
3. Additional restraining chains or support brackets are normally provided to the brace at intermediate strut locations to carry the additional strut weight.
4. Ensure struts are fully pre-loaded or tightened, end fixings packed, all hydraulic ram isolation valves are closed prior to releasing strut from lifting chains and commencing works. When assembling on site ensure that all pins and retaining clips are in place and secured and all flange plate bolts are installed and fully tightened / torqued with a minimum two threads visible beyond the nut. Any gaps in bearing plates must be securely packed by using hardwood wedges or grout prior to final pre-loading of the hydraulic rams.
5. Individual components should be visually inspected for damage, excessive deflection, loss of ram pressure or loose locking collars prior to entering the excavation.
6. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
7. Prior to removal of systems the complete weight of the strut must be independently supported. Once this is accomplished the hydraulic rams (or struts) must be released and retracted to avoid the need for excessive extraction forces.
8. When installing struts at angles great care must be taken to ensure that the angles match the design, all shear stops are in place and all elements are supported / packed and capable of transmitting loads effectively.
9. Extreme care must be taken when handling the mechanical jack as the screw thread is free to move within the outer and can accidentally retract or extend. It is therefore recommended that during handling operations the jack is fully extended and the locking collar closed against the outer to prevent any sudden movements.





POLE LADDER

DAVITSAFE
See Section 7

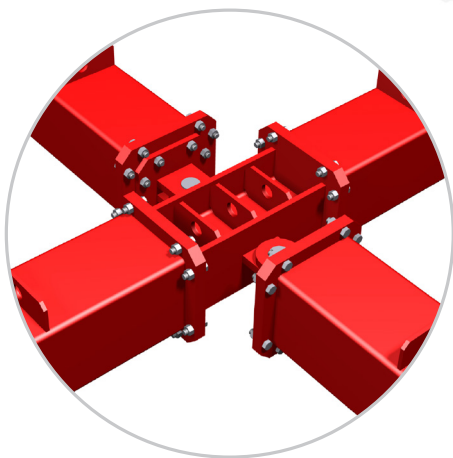
LADDERSAFE
See Section 7

EDGESAFE
See Section 7

300 SERIES

TRENCH SHEETS
See Section 6

**203 UC /
254 UC SERIES**
See Section 4



CRUCIFORM STRUT OPTION

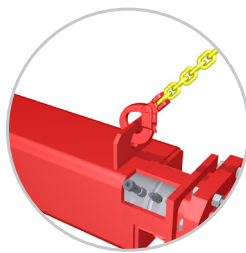
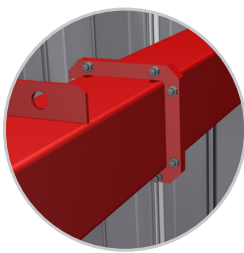
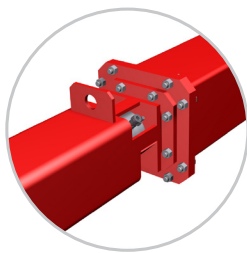
Compatible with 200 / 300 Series Struts using 254 UC 200 / 300 Series Strut adaptors.

Note: 300 Series cruciforms should not be used on strut lengths greater than 12.0m.

**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF BRACING STRUTS**

mgf.co.uk/products/300-series-strut



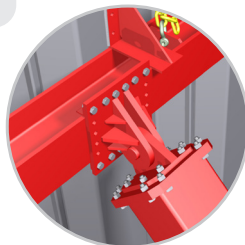
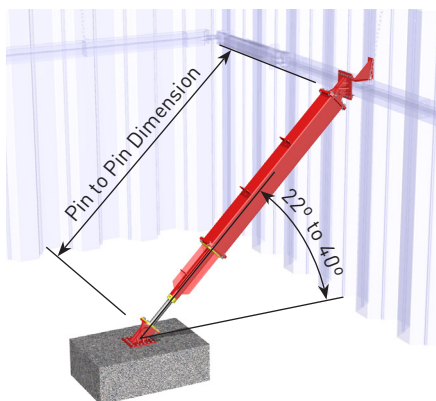


STRUT FLANGE CONNECTION DETAIL

300 Series Strut assemblies and swivel plates are connected to 300 Series extensions using a transition plate (400x400x20mm), 8No. grade 8.8 M20x65 (min.) countersunk bolts and 8No. grade 8.8 M20x65 (min.) bolts, c/w nuts and washers. 300 Series extensions are connected to each other via a flange plate (400x400x20mm) using 8No. grade 8.8 M20x65 (min.) bolts c/w nuts and washers (recommended min. torque 300Nm).

HANDLING POINT WLL = 7.0T

Strut assemblies are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



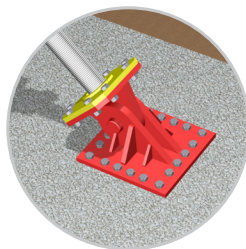
TOP SWIVEL BEARING DETAIL

The swivel is secured to the UC section by bolting RSA sections to the swivel base plate using 12No. grade 8.8 M20x65 (min.) bolts c/w nuts and washers.



VERTICAL SHEAR RESTRAINT DETAIL

The vertical restraint detail should be used whenever there is a raking prop. It can either be welded to the pan of sheets or bolted to a concrete wall using anchors.

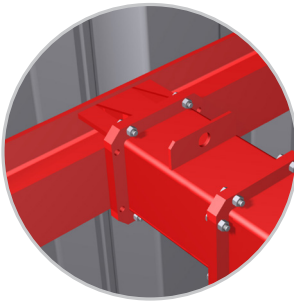
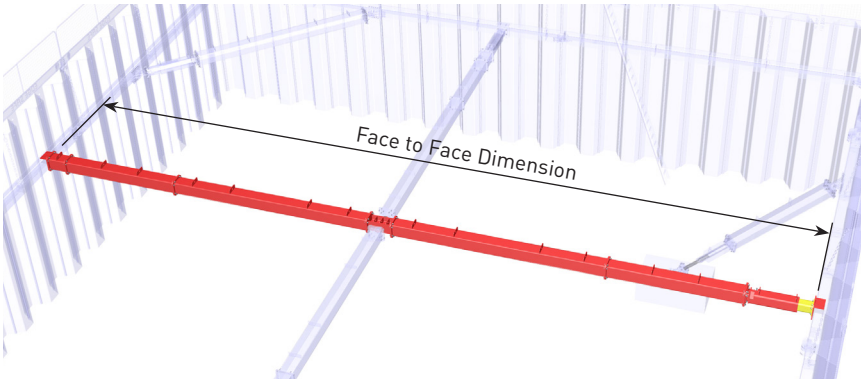


BASE SWIVEL BEARING DETAIL

The swivel can be secured to the floor slab using anchor bolts.

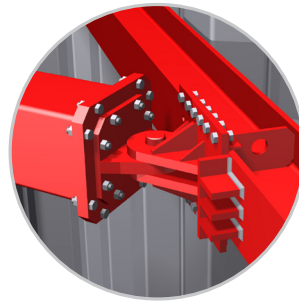
MGF can supply battery impact wrenches to facilitate assembly and removal of bolted connections. Please contact MGF for details.





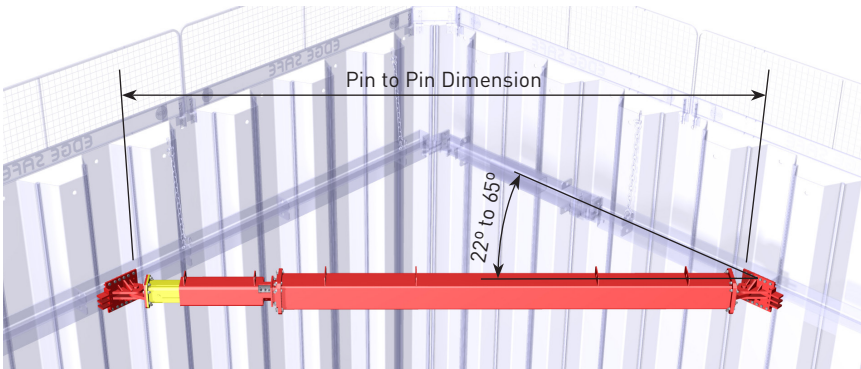
CLEAT END BEARING DETAIL

The end cleat is bolted to the strut or extension using 4No. grade 8.8 M20x65 (min.) bolts c/w nuts and washers. The cleat then sits on the UC section. When using this end detail MGF recommend that restraining chains are used to lash the waler and strut together at each end to prevent the strut being dislodged if struck accidentally.

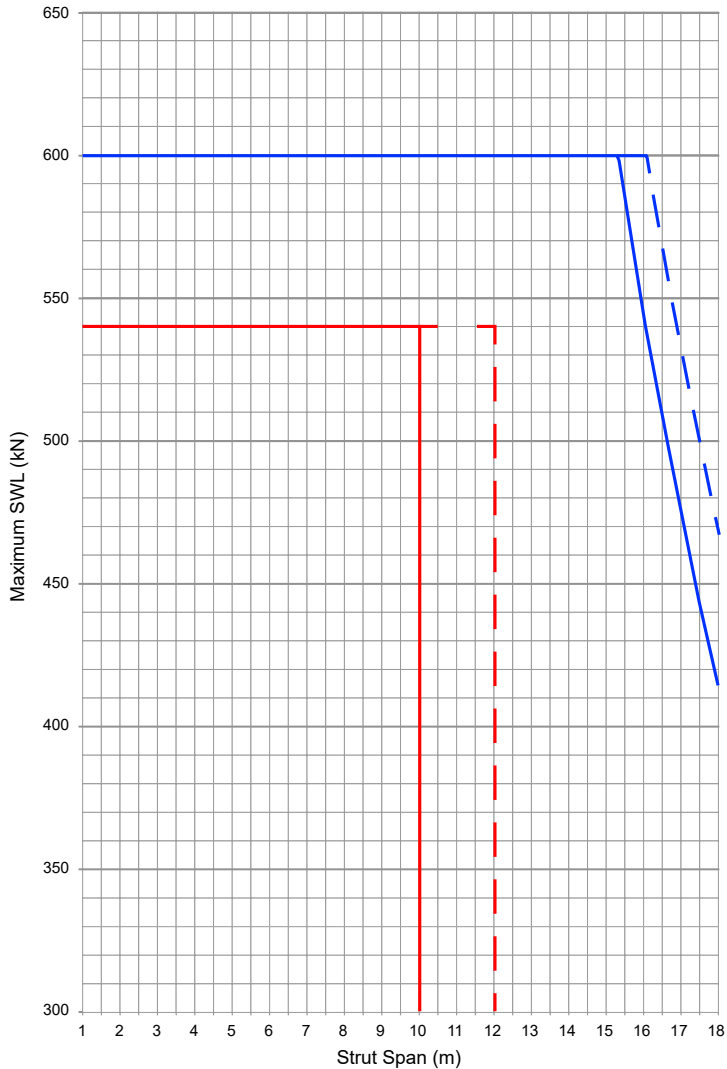


KNEE BRACE END BEARING DETAIL

The swivel is secured to the UC section by bolting RSA sections to the swivel base using 12No. grade 8.8 M20x65 (min.) bolts c/w nuts and washers.



SAFE WORKING LOAD FOR MGF 300 SERIES (kN)

**540kN MECHANICAL STRUT**

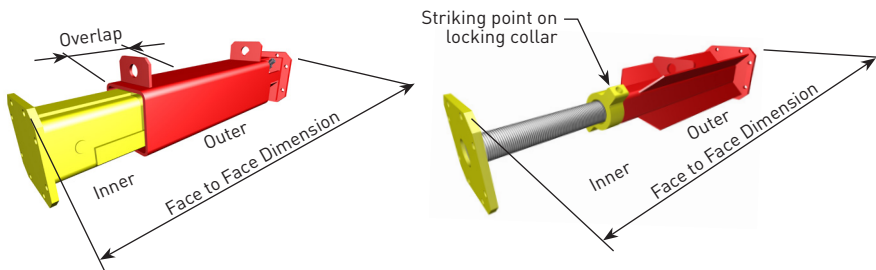
- Axial load only
- Axial + 10kN accidental load

600kN HYDRAULIC STRUT

- Axial load only
- Axial + 10kN accidental load

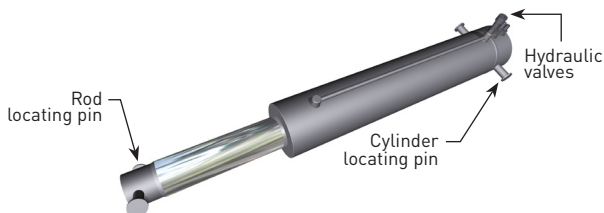
Curves include allowance for self weight deflection, eccentricity and fabrication tolerances.



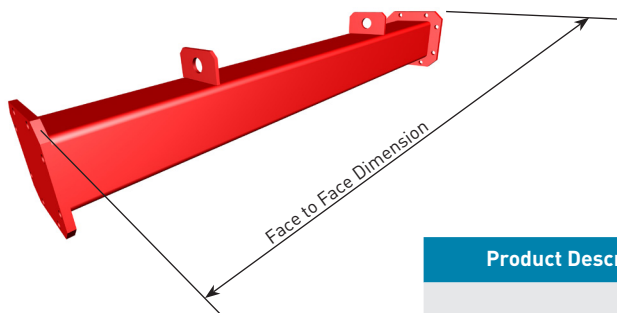


600kN Hydraulic Strut assembly comprises inner and outer sleeved steel box sections housing a double acting (DA) hydraulic ram to provide up to 600mm of leg adjustment.

540kN Mechanical Strut assembly comprises inner screw threaded sections and outer sleeved steel sections combined with a threaded collar to provide up to 745mm of leg adjustment.



Product ID	Product Description	Face to Face Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
9.015	540kN Mechanical Strut	1085	1830	147
9.016	600kN Hydraulic Strut	1150	1750	375

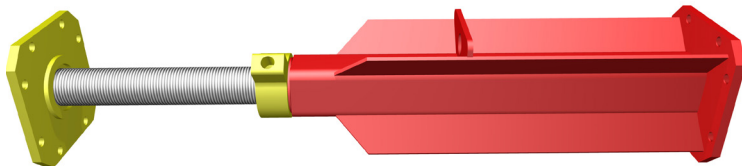


300 Series extension bars range in length from 0.5m to 5.0m and are connected to each other via 8No. grade 8.8 M20x65 (min.) bolts c/w nuts and washers.

Product Description		Weight
		(kg)
Product ID	9.000	300 Series 0.5m Extension
	9.001	300 Series 1.0m Extension
	9.002	300 Series 2.0m Extension
	9.003	300 Series 3.0m Extension
	9.005	300 Series 5.0m Extension
		107
		163
		280
		388
		610



Hydraulic Ram		Inner Section	Outer Section
	Specification	200x200x12.5 SHS (+ 4 No. 90x10mm thk. stiffening plates)	250x250x12.5 SHS
	Material Grade	S355	S355
	Unit Mass	95.8kg/m	91.9kg/m
	Axial SWL	600kN	600kN
	Moment SWL	100kNm	100kNm

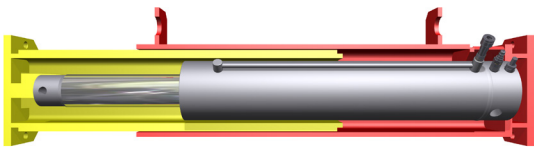


Mechanical Jack		Inner Section	Outer Section
	Specification	Φ100x12.5 thk. CHS	120x120x8 SHS (+ 4 No. 90x8mm fin plates)
	Material Grade	ST52	S355
	Screw Thread Detail	Φ100, 24 pitch	Φ100, 24 pitch
	Unit Mass	27.0kg/m	50.8kg/m
	Axial SWL	540kN	540kN
	Moment SWL	22kNm	100kNm



Extension Bar	Specification	300x300x12.5 SHS
	Material Grade	S355
	Unit Mass	112.0kg/m
	Axial SWL	600kN
	Moment SWL	308kNm
Extension Bar	Joint Moment SWL	126kNm

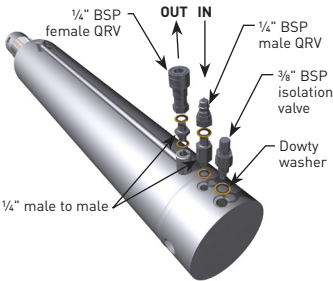
600kN DOUBLE ACTING HYDRAULIC RAM ASSEMBLY



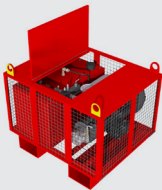
Hydraulic Cylinder	Double Acting	
	Material	Steel
	Bore	140mm
	Max. Working Pressure	390 Bar (5700 psi)
	Test Pressure	390 Bar (5700 psi)
	Approx. Working Stroke	600mm
	Axial SWL	600kN
	Min. FOS (by test)	2
	Working Temp Range	-20°C* to +50°C
	Approx. Pre-Load	150kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
	Locating Pins	Ø22 and Ø26mm

* Winter mix required for shoring fluid at low temps.

Shoring fluid is pumped into the full bore side of the piston, through the male quick release valve (QRV) to extend the ram. At the same time fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



PUMP UNITS

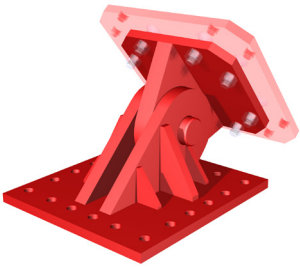
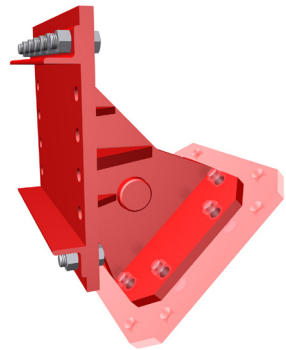


The pumps are used to extend and retract the 300 Series double acting hydraulic rams. The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 1500 psi (100 Bar). There are 2 types of pumps available, a manually operated bucket pump and a motorised petrol pump.



Component	Bucket Pump		Petrol Motorised Pump	
	Product ID	1.603 (DA)	8.4007 (DA)	
	Fluid Capacity (L)	20	70	
	Weight (kg)	25	270	
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25	
	Working Pressure (psi)	0-1500	0-1500	

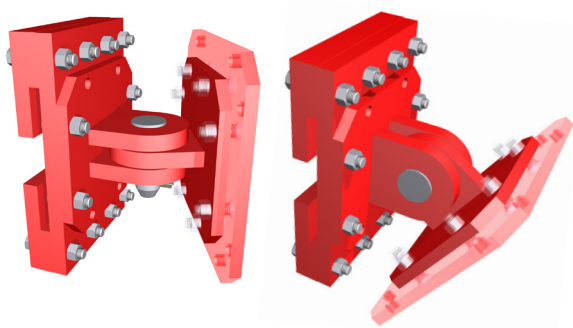
600kN TYPE A SWIVEL ASSEMBLY



'Type A' swivels can be connected directly to concrete structures or the 203 UC / 203 UC+ Brace systems by bolting on the associated clamp assemblies. Type A swivels can also connect to 305 or 406 UC Brace in conjunction with a transition plate and clamp assemblies, as detailed on page 5.2.11.

		Type A	Type B
200 Series Swivel	Product ID	9.301	9.209 (single lug) & 9.2095 (double lug)
	Weight	75kg	32kg
	Raking Prop Operating Range	22° - 40°	0° - 28°
	Knee Brace / Cross Strut Operating Range	22° - 65°	65° - 90°
	Axial SWL	600kN	600kN
	Swivel Base Plate	385 x 420 x 30mm thk. (S355)	300 x 300 x 20mm thk. (S275)
	Base Plate Hole Details	20 No. Ø22 holes	8 No. Ø22 holes
	Pin Detail	Ø62 (080M40 / EN8)	Ø50, 150 long (708M40 / EN19A) – 203 UC / 254 UC waler connection pin

600kN TYPE B SWIVEL ASSEMBLY



'Type B' swivels can be connected to both the 203 UC and 203 UC+ Brace systems by using the 200 Series clamping plate as detailed on page 5.1.11.



300 SERIES ANCILLARIES



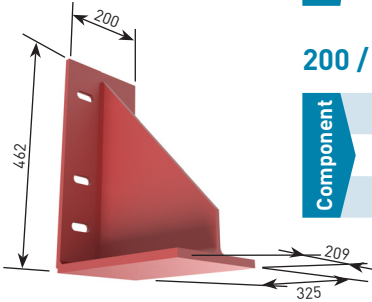
300 SERIES END SEATING PLATE

Component	Product ID	9.3005
	Weight	27kg
	Material	15mm thk. flat, S275
	Bolting Details	4No. grade 8.8 M20x65 (min.) bolts c/w nuts and washers
	Bearing SWL	600kN



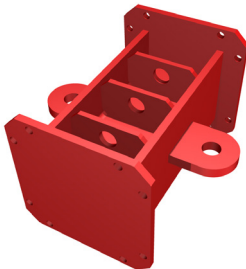
200-300 SERIES TRANSITION

Component	Product ID	9.303
	Weight	25kg
	Material	20mm thk. flat, S355
	Bolting Details	8No. grade 8.8 M20x65 (min.) bolts & 8No. grade 8.8 M20x65 (min.) countersunk bolts – c/w nuts and washers



200 / 300 SERIES VERTICAL RESTRAINT

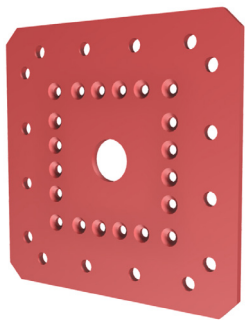
Component	Product ID	8.3003
	Weight	23kg
	Material	533x210x92 UB, S355



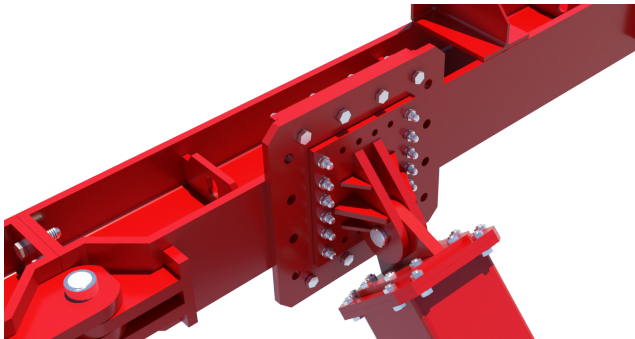
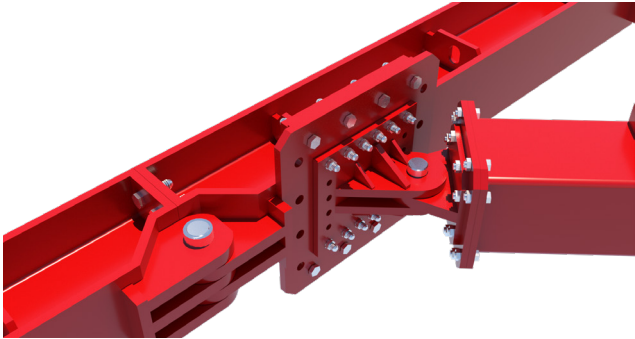
300 SERIES CRUCIFORM

Component	Product ID	9.011
	Weight	140kg
	Material	254x254x107 UC, S460
	Bolting Details	16No. grade 8.8 M20x65 (min.) bolts c/w nuts and washers
	Strut Adaptor SWL	600kN
	Axial SWL	600kN
	Moment SWL	308kNm

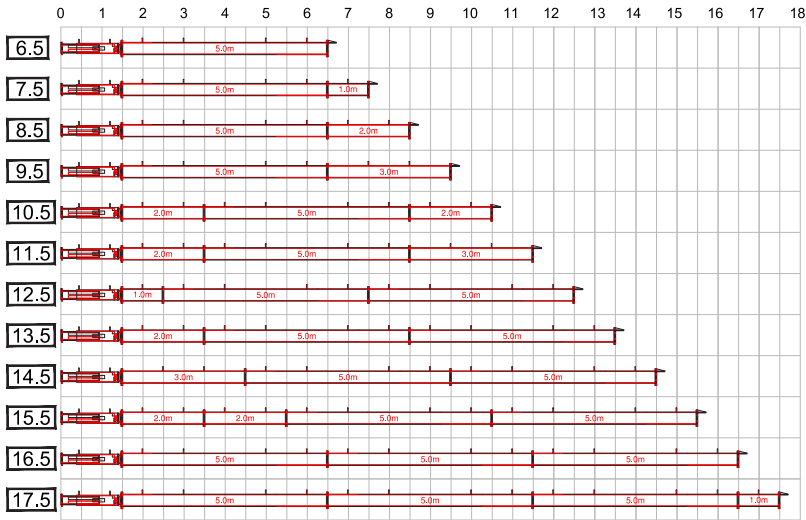
600kN TYPE A SWIVEL TO 305/406 UC BRACE TRANSITION PLATE



Component	Product ID	9.319
	Weight	76kg
	Material	25mm thk. flat, S355
	Plate Bolting Details	12No. grade 8.8 M20x80 (min.) countersunk bolts c/w nuts and washers – installed on 2 lines of bolt holes parallel to the orientation of the lugs (as shown below)
	Clamp Details	2No. 400 Series Swivel Clamp Type A to 305 UC (product ID = 8.303) 2No. 400 Series Swivel Clamp Type A to 406 UC (product ID = 8.40016)
	Clamp Bolting Details	8No. grade 8.8 M30x140 (min.) bolts c/w nuts and washers

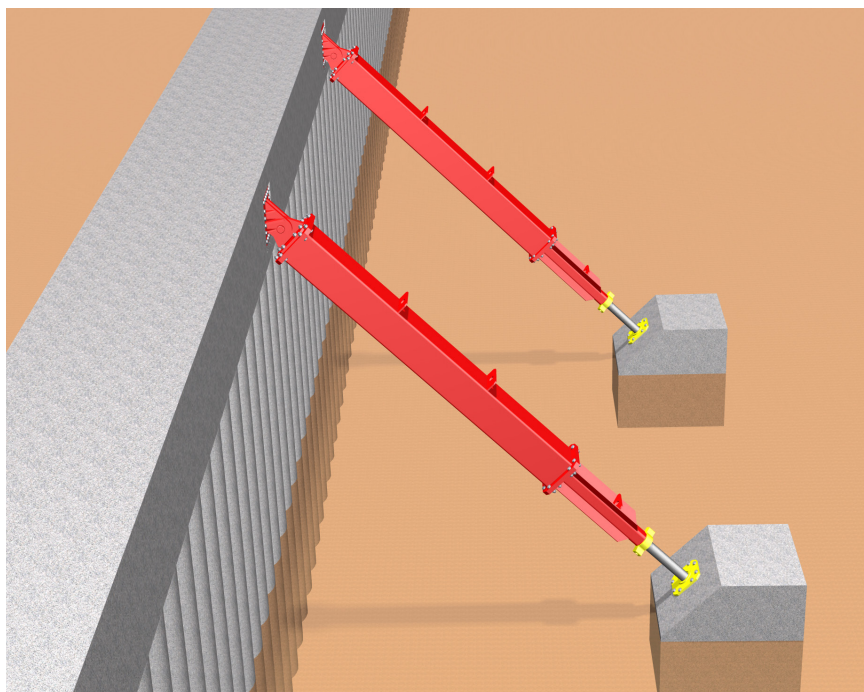


300 SERIES RECOMMENDED EXTENSION COMBINATIONS

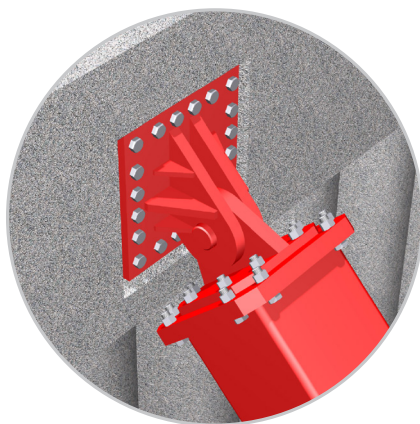


N.B. Single 0.5m extensions should be added to these combinations for intermediate dimensions. The strut assemblies are shown at mid-stroke, so each length can vary by up to 372mm in either direction.

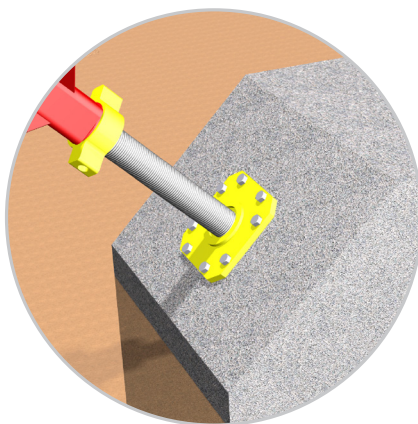
Face to Face Dimension (m)	540kN Mechanical			600kN Hydraulic		
	Min. Length	Max. Length	Leg Weight	Min. Length	Max. Length	Leg Weight
	(mm)	(mm)	(kg)	(mm)	(mm)	(kg)
6.5	6138	6883	852	6210	6810	1027
7.5	7138	7883	1015	7210	7810	1190
8.5	8138	8883	1132	8210	8810	1307
9.5	9138	9883	1240	9210	9810	1415
10.5	10138	10883	1412	10210	10810	1587
11.5	11138	11883	1520	11210	11810	1695
12.5	12138	12883	1625	12210	12810	1800
13.5	13138	13883	1742	13210	13810	1917
14.5	14138	14883	1850	14210	14810	2025
15.5	15138	15883	2022	15210	15810	2197
16.5	16138	16883	2072	16210	16810	2247
17.5	17138	17883	2235	17210	17810	2410



TYPICAL RAKING PROP APPLICATION



Typical bearing detail
on RC capping beam.



Typical bearing detail on
concrete thrust block.

HIGHLY VERSATILE, SIMPLE TO ASSEMBLE, HEAVY DUTY, MODULAR BRACING STRUT SYSTEM DESIGNED PRIMARILY TO BE USED AS INTERMEDIATE STRUTS WITH MGF HYDRAULIC BRACING SYSTEMS.

The system can also be used in any plane to prop steel, concrete or masonry structures. Each strut comprises either hydraulic ram or mechanical jack assemblies together with various length strut extension bars. The system can support loads of up to 3500kN and span from 1.6m to approx. 24.5m and can incorporate a central cruciform bar offering intermediate vertical support to perpendicular struts. Components are very heavy and are normally assembled on site prior to being lifted into place and installed within the excavation using either large excavators or cranes. A variety of end bearings are available allowing the struts to be used at a wide range of angles and within any plane.

Fabricated from grade S355 400x400 steel box section the extensions are quickly assembled into the required strut lengths using flanged plates c/w bolt, nut and washer assemblies. Final length adjustment is provided by either a double acting hydraulic ram or a mechanical (screw thread adjusted) jack providing up to 800mm of stroke. Once located at the correct line and level the struts are pre-loaded (or tightened) against the faces to be supported using a hydraulic pump on the ram (or by striking the locking collar of the mechanical jack). Preloading of the legs ensures the strut cannot slip, takes up any slack or hogging in the system and minimises the extent of potential ground movements. Handling points are provided at regular intervals on each leg to assist assembly / removal.

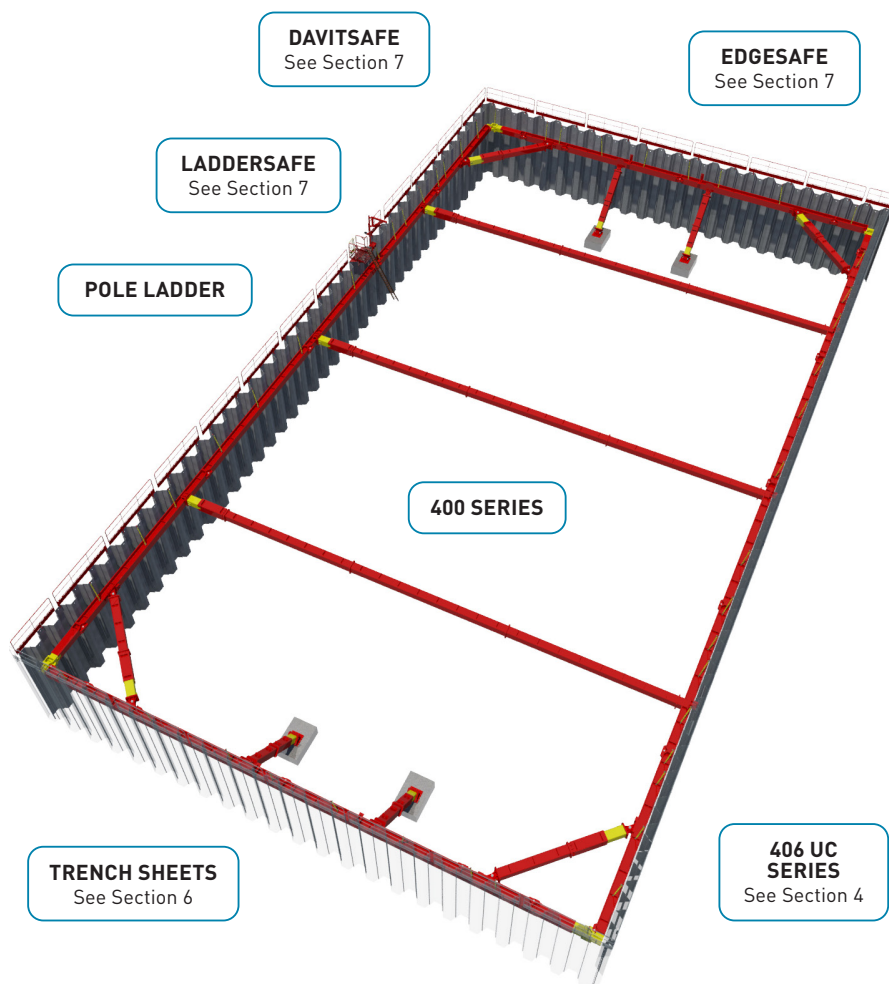
MGF can supply the systems with a full range of suitable handling chains, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment.

Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Strut systems are very heavy and should only be assembled, installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines.
2. Installation is normally carried out by assembling the complete strut and then lowering into place (subject to crane / excavator capacity). Struts are normally long and unbalanced (due to the weight of ram / jack unit) and great care must be taken in preparing the lift / maintaining lift angle (tag lines strongly recommended). On the ram assembly max. pre-load pressure of 100Bar (1500psi) must not be exceeded unless design states otherwise.
3. Additional restraining chains or support brackets are normally provided to the brace at intermediate strut locations to carry the additional strut weight.
4. Ensure struts are fully pre-loaded or tightened, end fixings packed, all hydraulic ram isolation valves are closed prior to releasing the strut from lifting chains and commencing works. When assembling on site ensure that all pins and retaining clips are in place and secured and all flange plate bolts are installed and fully tightened / torqued with a minimum of two threads visible beyond the nut. Any gaps in bearing plates must be securely packed by using hardwood wedges or grout prior to final pre-loading of the hydraulic rams.
5. Individual components should be visually inspected for damage, excessive deflection, loss of ram pressure or loose locking collars prior to entering the excavation.
6. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
7. Prior to removal of systems the complete weight of the strut must be independently supported. Once this is accomplished the hydraulic rams (or struts) must be released and retracted to avoid the need for excessive extraction forces.
8. When installing struts at angles great care must be taken to ensure that the angles match the design, all shear stops are in place and all elements are supported / packed and capable of transmitting loads effectively.
9. Extreme care must be taken when handling the mechanical jack as the screw thread can detach from the outer if fully wound out.





**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF BRACING STRUTS**

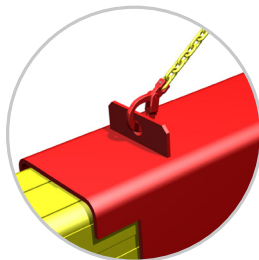
mgf.co.uk/products/400-series-strut





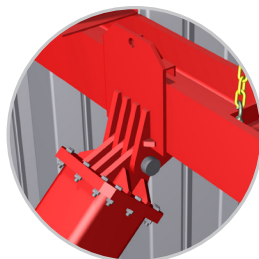
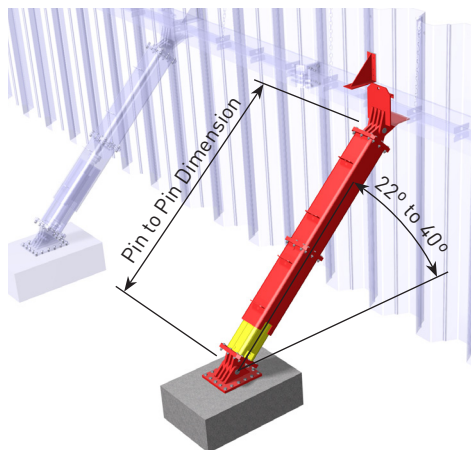
STRUT FLANGE CONNECTION DETAIL

400 Series Struts and extensions are connected to each other via a flange plate (520x520x30mm) using 12No. grade 8.8 M24x100 (min.) bolts c/w nuts and spring washers (recommended min. torque 400Nm).



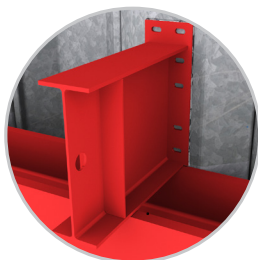
HANDLING POINT WLL = 7.0T

Strut assemblies are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.



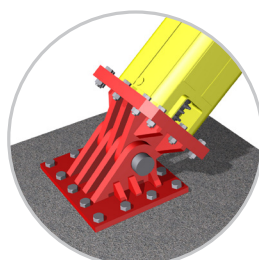
TOP SWIVEL BEARING DETAIL

The swivel hooks over the 406UC flange during installation, and when the strut is pre-loaded the birds mouth detail bears onto the UC flanges.



VERTICAL SHEAR RESTRAINT DETAIL

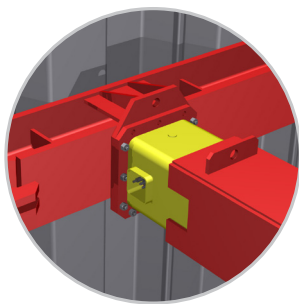
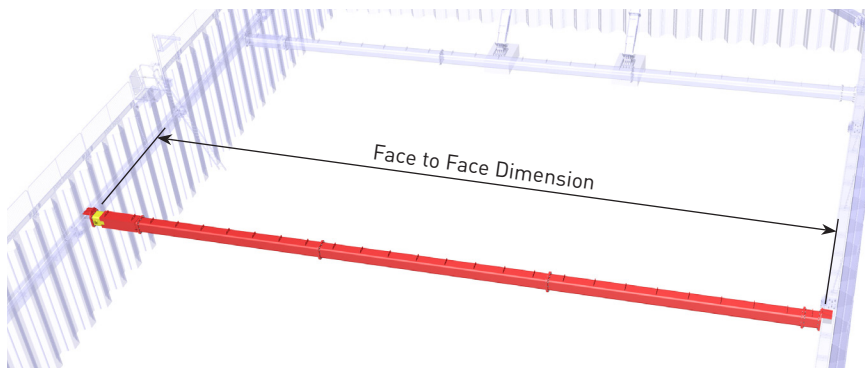
The vertical restraint detail should be used whenever there is a raking prop. It can either be welded to the pan of sheets or bolted to a concrete wall using anchors.



BASE SWIVEL BEARING DETAIL

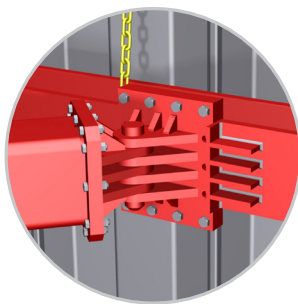
The swivel can be secured to the floor slab using anchor bolts.





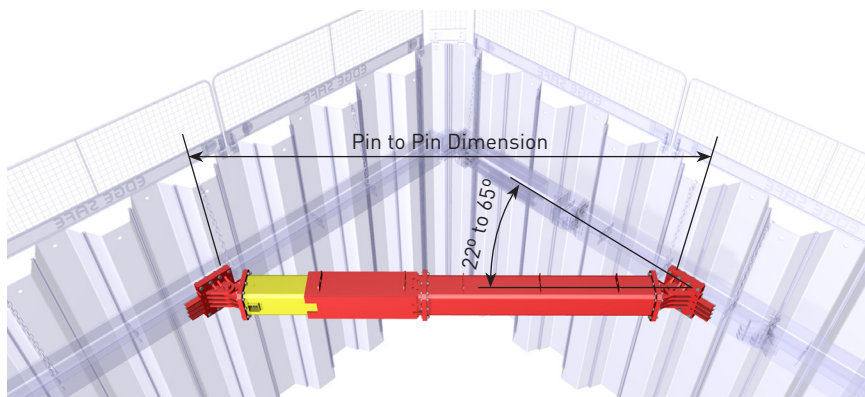
CLEAT END BEARING DETAIL

The end cleat is bolted to the strut or extension using 9No. grade 8.8 M24x100 (min.) countersunk bolts c/w nuts and spring washers. The cleat then sits on the UC section. When using this end detail, MGF recommend that restraining chains are used to lash the waler and strut together at each end to prevent the strut being dislodged if struck accidentally.

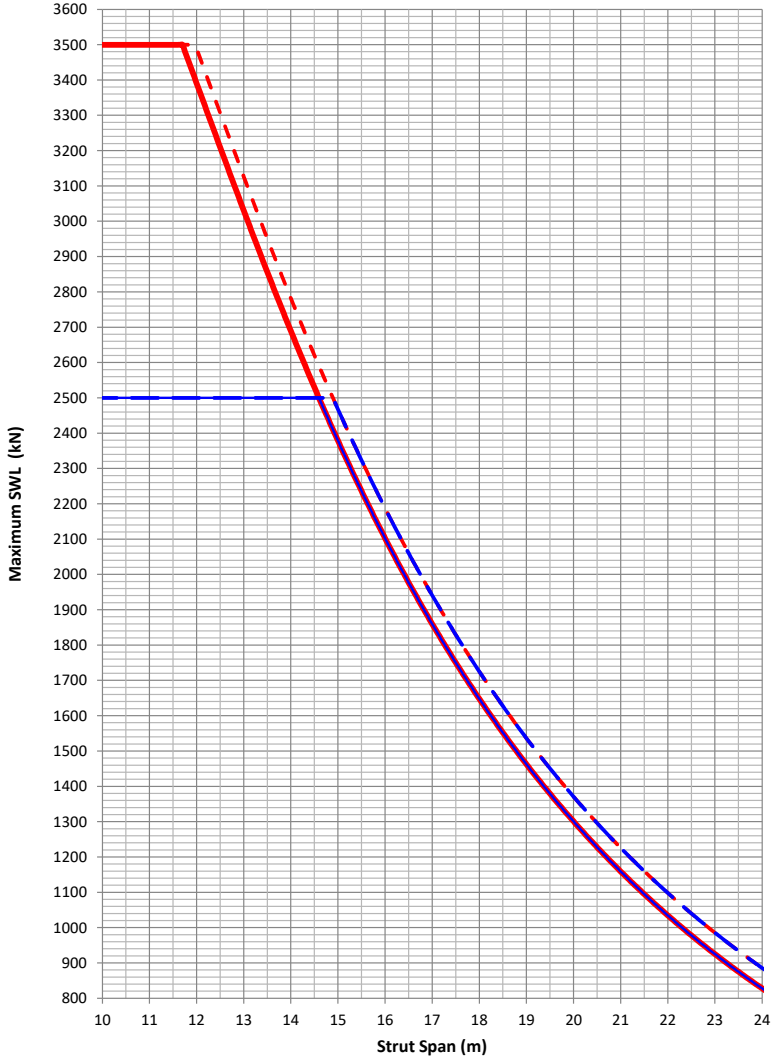


KNEE BRACE END BEARING DETAIL

The swivel is secured to the UC section using 2No. swivel clamps as detailed on page 5.3.13 using 8No. grade 8.8 M30x140 (min.) bolts c/w nuts and washers.



SAFE WORKING LOAD FOR MGF 400 SERIES (kN)



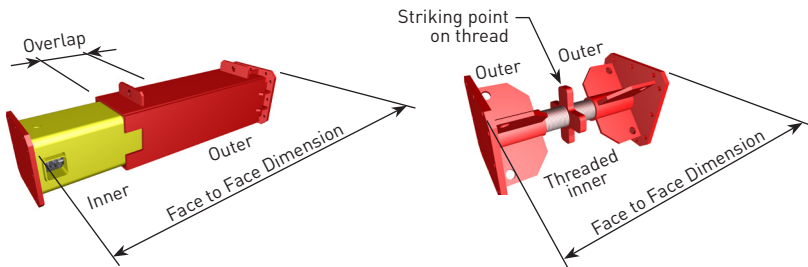
2500kN HYDRAULIC STRUT

- Axial load only
- Axial + 10kN accidental load

3500kN HYDRAULIC STRUT

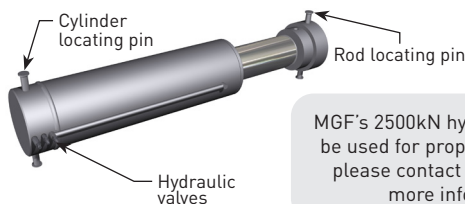
- Axial load only
- Axial + 10kN accidental load

Curves include allowance for self weight deflection, eccentricity and fabrication tolerances.



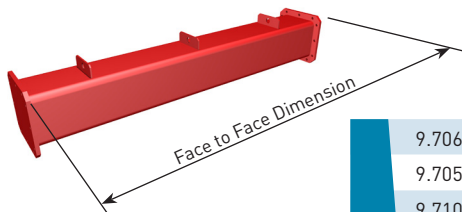
1250kN Mechanical Strut assembly comprises inner threaded rod and outer threaded tube providing up to 400mm of leg adjustment.

2500kN Hydraulic Strut assembly comprises inner and outer sleeved steel box sections housing a double acting (DA) hydraulic ram to provide up to 800mm of leg adjustment.



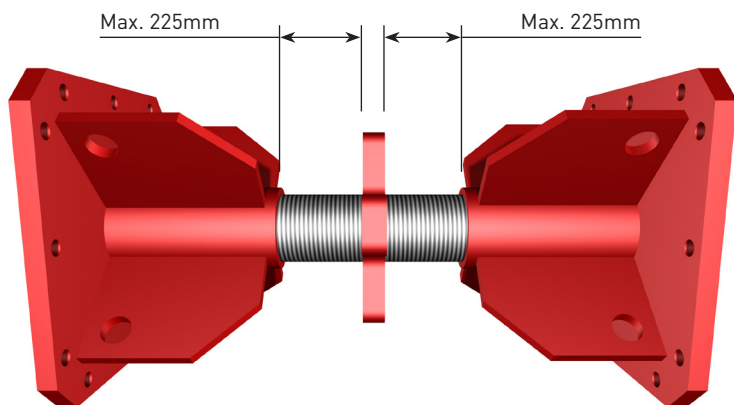
MGF's 2500kN hydraulic struts can be used for prop load monitoring, please contact MGF Design for more information.

Product ID	Product Description	Face to Face Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
9.701	1250kN Mechanical Strut	795	1170	326
8.500	2500kN Hydraulic Strut	1625	2425	1716

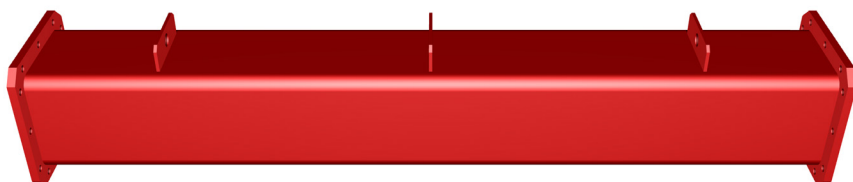


400 Series extension bars range in length from 0.25m to 10.0m and are connected to each other via 12No. grade 8.8 M24x100 (min.) bolts c/w nuts and spring washers.

		Product Description	Weight
			(kg)
Product ID	9.706	400 Series 0.25m Extension	165
	9.705	400 Series 0.5m Extension	214
	9.710	400 Series 1.0m Extension	310
	9.720	400 Series 2.0m Extension	505
	9.730	400 Series 3.0m Extension	697
	9.740	400 Series 4.0m Extension	889
	9.750	400 Series 5.0m Extension	1083
	9.760	400 Series 6.0m Extension	1275
	9.770	400 Series 7.0m Extension	1465
	9.780	400 Series 8.0m Extension	1660
9.799	400 Series 10.0m Extension	2048	



Mechanical Jack	Specification	Inner Section Ø127x25.4 thk. CHS	Outer Section Ø152.4x19.1 thk. CHS (+ 4 No. 280x200x20 fin plates)
	Material Grade	ST52	S355
	Screw Thread Detail	5" ACME	5" ACME
	Unit Mass	63.6kg/m	105kg
	Axial SWL	1250kN	1250kN
	Moment SWL	60kNm	277kNm

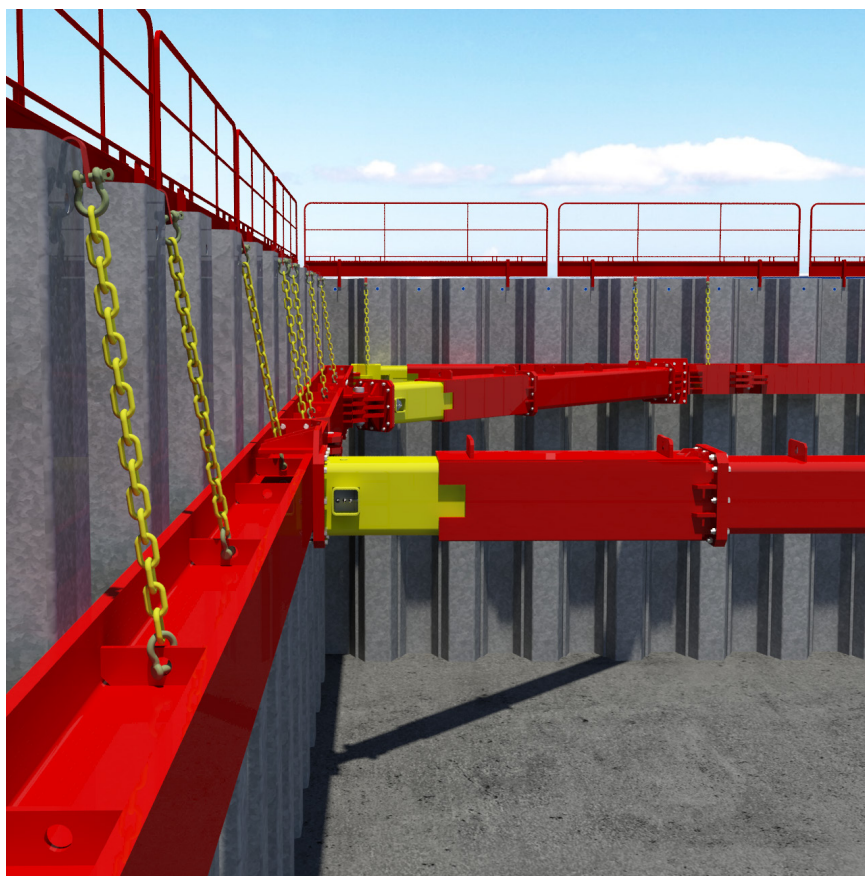


Extension Bar	Specification	400x400x16 SHS
	Material Grade	S355
	Unit Mass	191.0kg/m
	Axial SWL	3500kN
	Moment SWL	703kNm
	Joint Moment SWL	277kNm

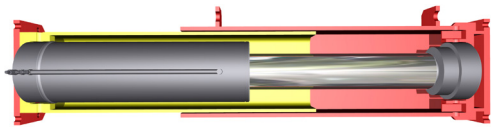
2500kN HYDRAULIC RAM



Hydraulic Ram		Inner Section	Outer Section
	Specification	400x400x16 SHS	450x450x20 SHS
	Material Grade	S355	S355
	Unit Mass	191kg/m	275kg/m
	Axial SWL	2500kN	2500kN
	Moment SWL	277kNm	277kNm

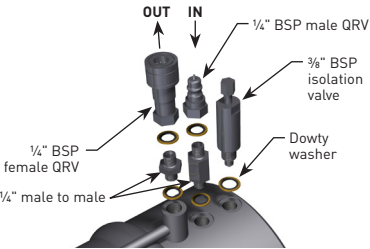


2500kN DOUBLE ACTING HYDRAULIC RAM ASSEMBLY



		2500kN Double Acting
Hydraulic Cylinder	Material	Steel
	Bore	250mm
	Max. Working Pressure	500 Bar (7250 psi)
	Test Pressure	500 Bar (7250 psi)
	Approx. Working Stroke	800mm
	Axial SWL	2500kN
	Min. FOS	2 (by test)
	Working Temp Range	-50°C to +50°C
	Approx. Pre-Load	500kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)
Locating Pins	Ø30	

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



MOTORISED PUMP UNITS

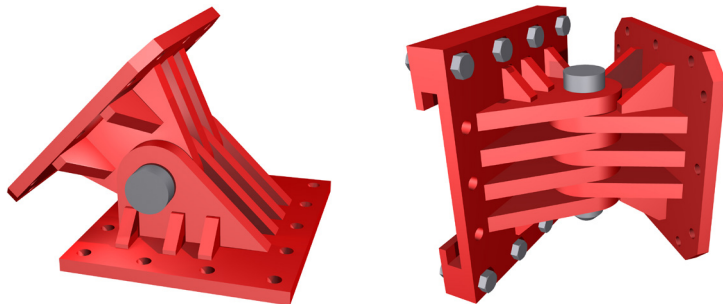
The motorised pumps are used to extend and retract the 400 Series double acting hydraulic rams. The pumps contain neat bio-degradable Houghto Safe SF25 shoring fluid. Maximum recommended installation pressure 1500 psi (100 Bar). MGF supply 2 different types of motorised pump for 400 Series, electric and diesel.



Component	Electric Pump		Diesel Pump	
	Rating	110V, 6.5kVA		8kW
	Product ID	8.4001U / 8.4003U		8.4006
	Capacity	120 / 190 litres		100 litres
	Weight (kg)	460 / 622		394
	Shoring Fluid	Houghto Safe SF25		Houghto Safe SF25
	Working Pressure	0-1500 psi		0-1500 psi



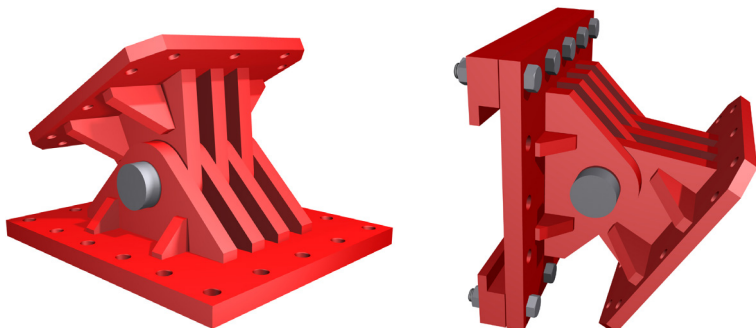
3500kN TYPE A SWIVEL ASSEMBLY



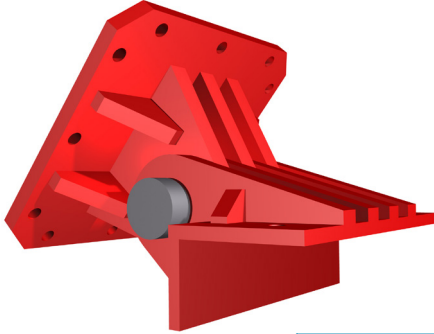
These swivels can be connected directly to concrete structures, 305 UC Brace or 406 UC Brace systems by bolting on the associated clamp assemblies detailed on page 5.3.13.

		Type A	Type B
400 Series Swivel	Product ID	9.704	9.310
	Weight	264kg	320kg
	Raking Prop Operating Range	22° - 40°	0° - 28°
	Knee Brace / Cross Strut Operating Range	22° - 65°	65° - 90°
	Axial SWL	3500kN	3500kN
	Swivel Base Plate	500 x 600 x 30mm thk. (S355)	600 x 600 x 40mm thk. (S355)
	Base Plate Hole Details	14 No. $\Phi 32$ holes	16 No. $\Phi 32$ holes
	Pin Detail	$\Phi 90$ (817M40 / EN24T)	$\Phi 90$ (817M40 / EN24T)

3500kN TYPE B SWIVEL ASSEMBLY



BIRDSMOUTH TYPE C SWIVEL ASSEMBLY



Type C swivels can bear directly onto the corners of concrete structures such as pile caps or capping beams.

		Type C	Type D
Birdsmouth	Product ID	9.315	9.312
	Weight	270kg	305kg
	Raking Prop Operating Range	22° - 40°	22° - 40°
	Bearing Plate	20mm thk. (S355)	20mm thk. (S355)
	Base Plate Hole Details	2 No. $\Phi 26$ holes	8 No. $\Phi 26$ holes
	Pin Detail	$\Phi 90$ (817M40 / EN24T)	$\Phi 90$ (817M40 / EN24T)
Axial SWL		2500kN*	2500kN

* Subject to verification of concrete.

BIRDSMOUTH TYPE D SWIVEL ASSEMBLY

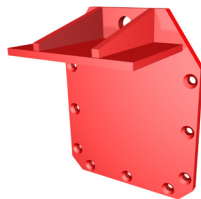


Type D swivels can be connected directly to the 406 UC Brace Systems.

400 SERIES ANCILLARIES

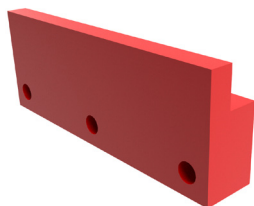
400 SERIES END SEATING PLATE

Component	Product ID	9.703
	Weight	102kg
	Material	30mm thk. flat, S275
	Bolting Details	9No. grade 8.8 M24x100 (min.) countersunk bolts c/w nuts and spring washers
	Bearing SWL	3500kN



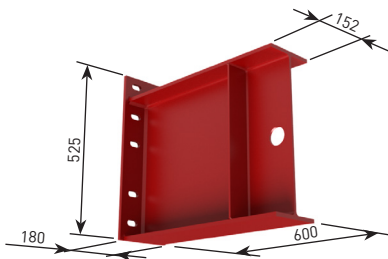
400 SERIES END SEATING PLATE CLAMP

Component	Product ID	9.7035
	Weight	25kg
	Material	S275
	Bolting Details	3No. grade 8.8 M24x170 (min.) bolts c/w nuts and washers



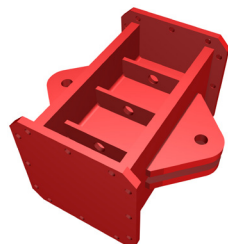
400 SERIES VERTICAL RESTRAINT

Component	Product ID	8.4002
	Weight	42kg
	Material	457x152x52 UB, S355



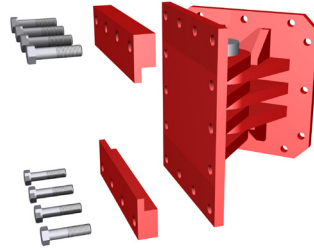
400 SERIES CRUCIFORM

Component	Product ID	9.609
	Weight	475kg
	Material	356x406x340UC, S460
	Bolting Details	24No. grade 8.8 M24x100 (min.) bolts c/w nuts and spring washers
	Strut Adaptor SWL	1250kN
	Axial SWL	1250kN
	Moment SWL	703kNm
	Max. Span	16m



3500kN SWIVEL CLAMPING PLATES TYPE A

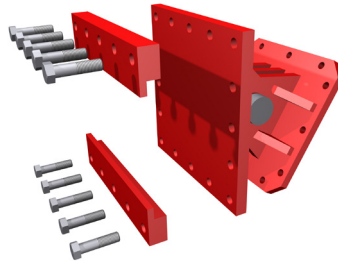
Swivel Clamp Type A is to be used on 3500kN Swivel Type A, when used on a knee brace connected to 305 UC / 406 UC.



Component		Swivel Clamp Type A	Swivel Clamp Type B	Modular Swivel Cleat
	Product ID	8.303 (305 UC) 8.40016 (406 UC)	8.304 (305 UC) 8.40017 (406 UC)	9.809
	Weight	34kg (305 UC) 46kg (406 UC)	45kg (305 UC) 54kg (406 UC)	53kg
	Material	30mm & 25mm thk. (305 UC) or 40mm thk. (406 UC) flat, 500 long, S275	30mm & 25mm thk. (305 UC) or 40mm thk. (406 UC) flat, 600 long, S275	40mm thk. flat, 600 long, S275
	Bolting Details	8No. grade 8.8 M30x140 (min.) bolts c/w nuts and washers	10No. grade 8.8 M30x150 (min.) bolts c/w nuts and washers	5No. M30x120 (min.) grade 8.8 bolts c/w nuts and washers
	Bearing SWL	3500kN	3500kN	570kN

3500kN SWIVEL CLAMPING PLATES TYPE B

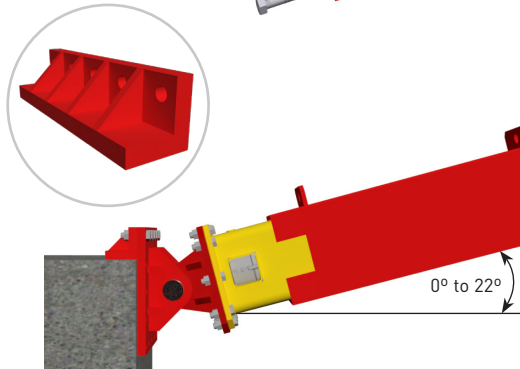
Swivel Clamp Type B is to be used on 3500kN Swivel Type B, when used as a cross strut connected to 305 UC / 406 UC.



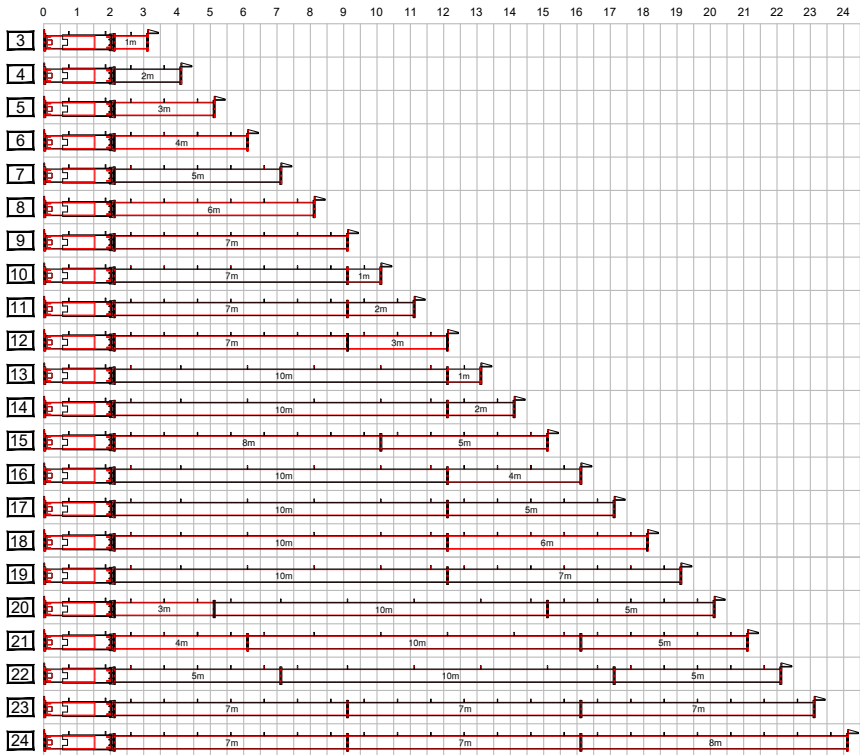
3500kN SWIVEL TYPE A & B - MODULAR SWIVEL CLEAT

The Modular Swivel Cleat is compatible with the 3500kN Swivels, Type A & B. They simply bolt onto the swivel base plate to allow bracing struts to cleat onto concrete capping beams or thrust blocks without anchoring into the concrete.

Suitable for use at angles between 0°-22°.



400 SERIES RECOMMENDED EXTENSION COMBINATIONS

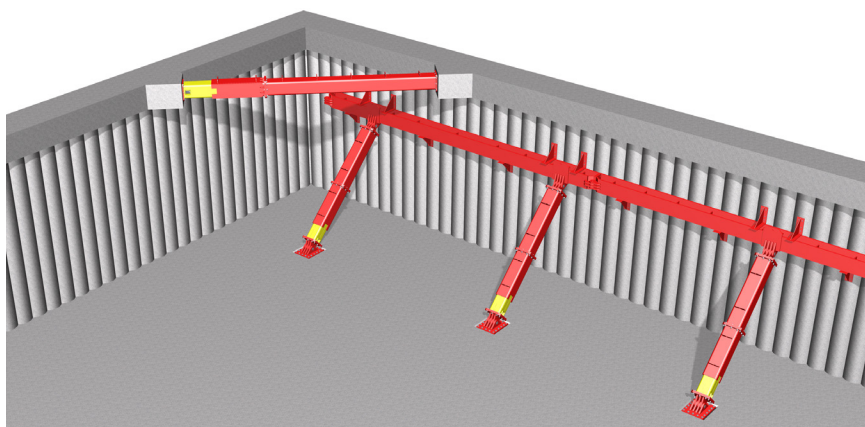


N.B. Single 0.25m and 0.5m extensions should be added to these combinations for intermediate dimensions. The strut assemblies are shown at mid-stroke, so each length can vary by up to 400mm in either direction.

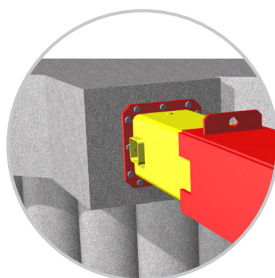


Face to Face Dimension (m)

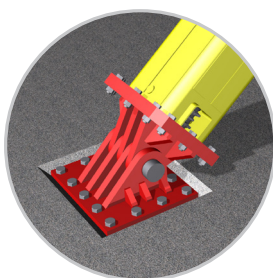
2500kN Hydraulic			3500kN Hydraulic		
Min. Length	Max. Length	Leg Weight	Min. Length	Max. Length	Leg Weight
(mm)	(mm)	(kg)	(mm)	(mm)	(kg)
2685	3485	2026	2730	3330	2510
3685	4485	2221	3730	4330	2705
4685	5485	2412	4730	5330	2896
5685	6485	2605	5730	6330	3089
6685	7485	2799	6730	7330	3283
7685	8485	2989	7730	8330	3473
8685	9485	3181	8730	9330	3665
9685	10485	3491	9730	10330	3975
10685	11485	3686	10730	11330	4170
11685	12485	3878	11730	12330	4362
12685	13485	4074	12730	13330	4558
13685	14485	4269	13730	14330	4753
14685	15485	4459	14730	15330	4943
15685	16485	4653	15730	16330	5137
16685	17485	4847	16730	17330	5331
17685	18485	5037	17730	18330	5521
18685	19485	5229	18730	19330	5713
19685	20485	5544	19730	20330	6028
20685	21485	5736	20730	21330	6220
21685	22485	5930	21730	22330	6414
22685	23485	6111	22730	23330	6595
23685	24485	6497	23730	24330	6981



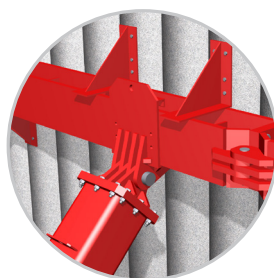
TYPICAL CONCRETE PROPPING APPLICATION



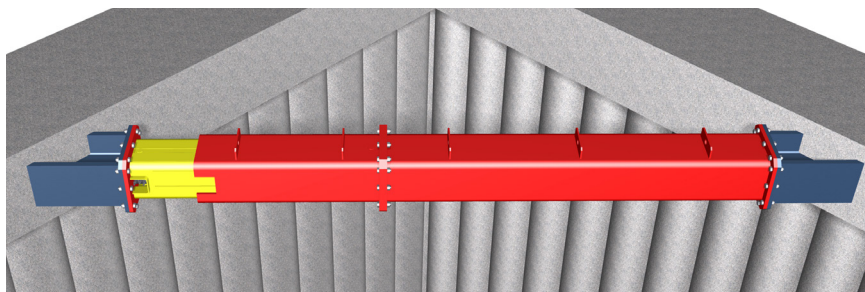
Typical bearing detail
on RC capping beam
concrete corbel.



Typical bearing detail
on concrete floor.



Typical bearing detail
on concrete piles.



Typical steel corbel knee brace application.



Bracing Strut System

SIMPLE TO ASSEMBLE, HEAVY DUTY, MODULAR BRACING STRUT SYSTEMS DESIGNED PRIMARILY TO BE USED AS CROSS STRUTS WITH THE MGF 305 / 406 UC AND T700 HYDRAULIC BRACING SYSTEMS ON MAJOR EXCAVATIONS.

The system can also be used to prop reinforced concrete piles and capping beams forming the walls of major basement structures. Each strut comprises hydraulic ram assemblies together with various length strut extension bars. The system can support loads of up to 3500kN and span up to approx. 30.6m unsupported. Components are very heavy and are normally assembled on site prior to being lifted into place and installed within the excavation using large cranes. A variety of end bearings are available allowing the struts to be used at a range of angles.

Fabricated from a API grade X70 610x12.5 hollow circular steel section, and S355 grade 660x20 / 25 CHS, the extensions are quickly assembled into the required strut lengths using circular flanged plates c/w bolt, nut and washer assemblies. Final length adjustment is provided by a double acting hydraulic ram providing up to 800mm of stroke. Once located at the correct line and level the struts are pre-loaded (or tightened) against the faces to be supported using a hydraulic pump on the ram. Pre-loading of the legs ensures the strut cannot slip, takes up any slack or hogging in the system and minimises the extent of potential ground movements. Handling points are provided at regular intervals on each leg to assist assembly / removal.

MGF can supply the systems with a full range of suitable handling chains, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment.

Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Strut systems are very heavy and should only be assembled, installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines.
2. Installation is normally carried out by assembling the complete strut and then lowering into place (subject to crane / excavator capacity). Struts are normally long and unbalanced (due to the weight of ram / jack unit) and great care must be taken in preparing the lift / maintaining lift angle (tag lines strongly recommended). On the ram assembly max. pre-load pressure of 100Bar (1500psi) must not be exceeded unless the design states otherwise.
3. Additional restraining chains or support brackets are normally provided to the brace at intermediate strut locations to carry the additional strut weight.
4. Ensure struts are fully pre-loaded or tightened, end fixings fully packed, all hydraulic ram isolation valves are closed prior to releasing the strut from lifting chains and commencing works. When assembling on site ensure that all pins and retaining clips are in place and secured and all flange plate bolts are installed and fully tightened / torqued with a minimum two threads visible beyond the nut. Any gaps in bearing plates must be securely packed using grout prior to final pre-loading of the hydraulic rams.
5. Individual components should be visually inspected for damage, excessive deflection, loss of ram pressure prior to entering the excavation.
6. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
7. Prior to removal of systems the complete weight of the strut must be independently supported. Once this is accomplished the hydraulic rams (or struts) must be released and retracted to avoid the need for excessive extraction forces.
8. When installing struts at angles great care must be taken to ensure that the angles match the design, all shear stops are in place and all elements are supported / packed and capable of transmitting loads effectively. On large unsupported spans the pre-load must be applied prior to removing vertical support to minimise sagging.



406 UC SERIES
See Section 4

EDGESAFE
See Section 7

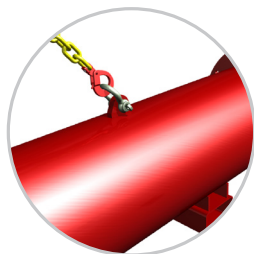
600 SERIES

TRENCH SHEETS
See Section 6

DAVITSAFE
See Section 7

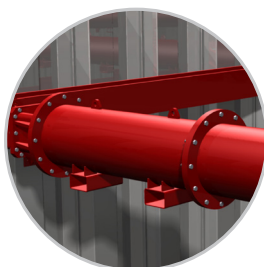
LADDERSAFE
See Section 7

POLE LADDER



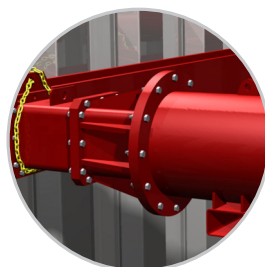
HANDLING POINTS WLL = 12.0T

Strut assemblies are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown. Assemblies can also be handled using a fork lift on the pockets on the underside of the extensions.



STRUT FLANGE CONNECTION DETAIL

600 Series Struts and extensions are connected to each other via a flange plate (Ø850x30mm) using 12No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers (recommended min. torque 400Nm).



TRANSITION FLANGE CONNECTION DETAIL

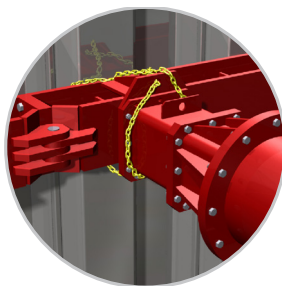
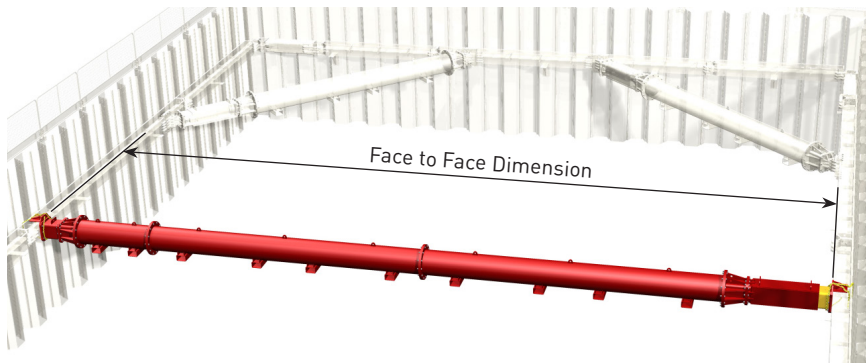
The transition adaptor is connected to the hydraulic strut or 400 Series extension via a square flange plate (520x520x30mm) and connects to 600 Series via a circular end plate (Ø850x30mm) both connections using 12 No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers (recommended min. torque 400Nm).



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF BRACING STRUTS**

mgf.co.uk/products/600-series-strut

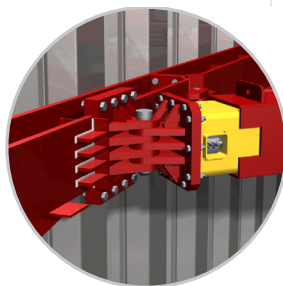




CLEAT END BEARING DETAIL

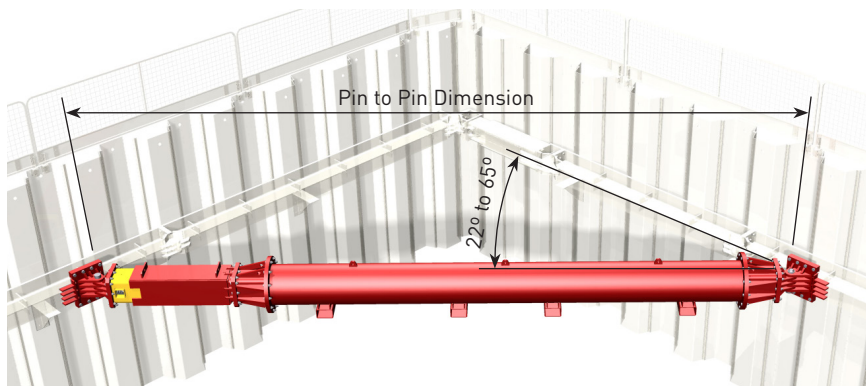
The end cleat is bolted to the strut or extension / transition using 9 No. grade 8.8 M24x100 (min.) countersunk bolts c/w nuts and washers.

The cleat then sits on the UC section. When using this end detail MGF recommend that restraining chains are used to prevent the strut being dislodged if struck accidentally.



SWIVEL END BEARING DETAIL

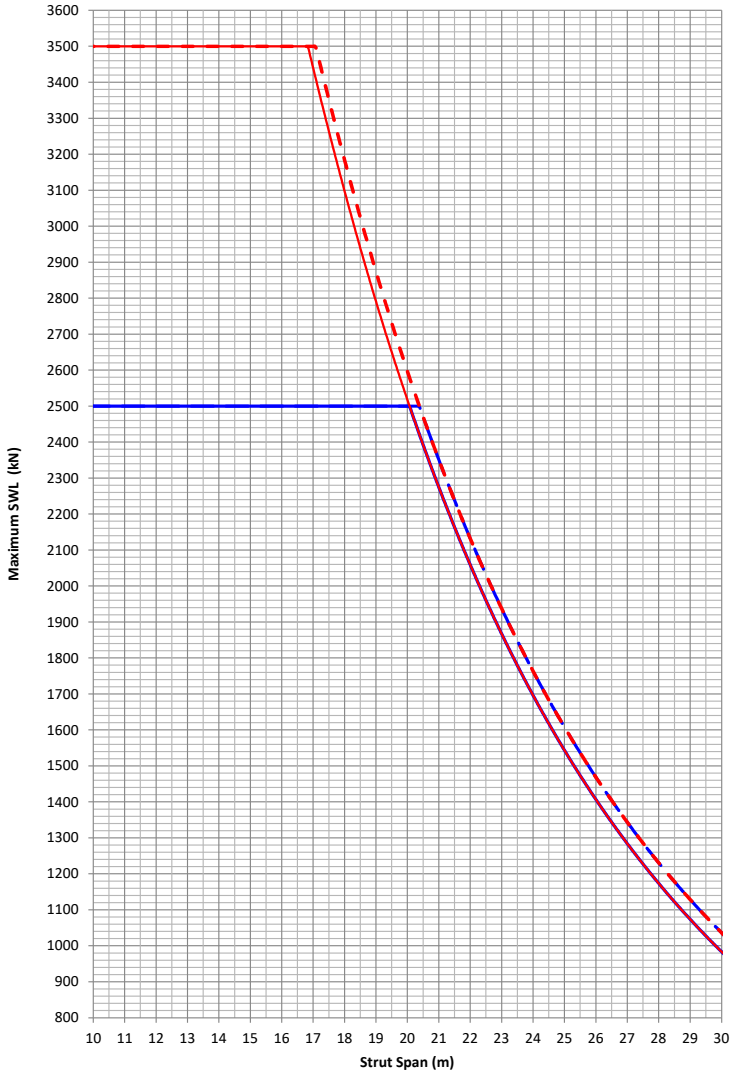
Swivels can be anchored directly to concrete or clamped to the UC Brace system using 2 No. swivel clamps as detailed on page 5.4.13.



MGF can supply battery impact wrenches to facilitate assembly and removal of bolted connections. Please contact MGF for details.



SAFE WORKING LOAD FOR MGF 600 SERIES (kN)



2500kN HYDRAULIC STRUT

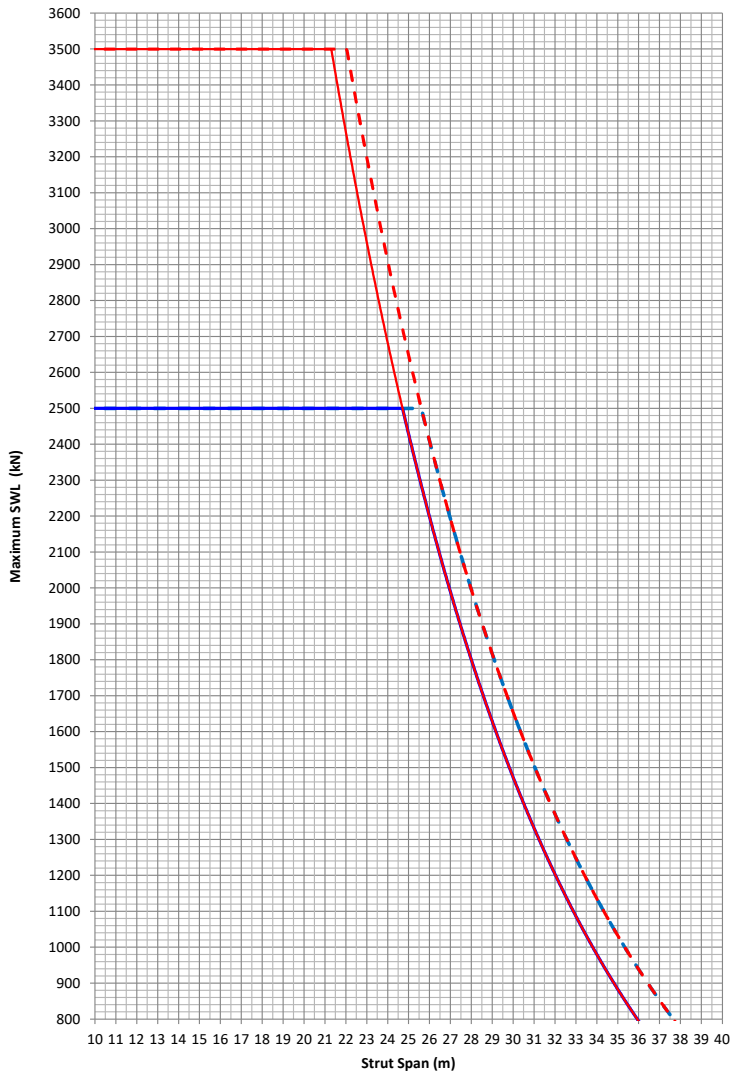
- Axial load only
- Axial + 10kN accidental load

3500kN HYDRAULIC STRUT

- Axial load only
- Axial + 10kN accidental load

Curves include allowance for self weight deflection, eccentricity and fabrication tolerances.

SAFE WORKING LOAD FOR MGF 660 SERIES (kN)

**2500kN HYDRAULIC STRUT**

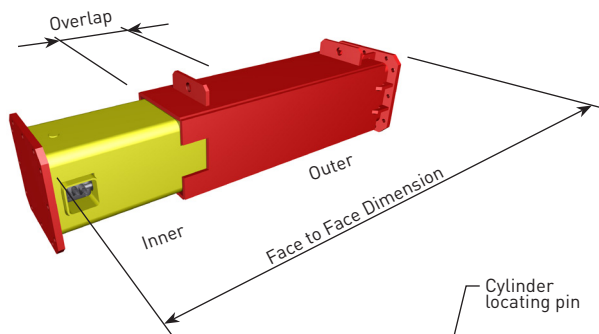
- Axial load only
- Axial + 10kN accidental load

3500kN HYDRAULIC STRUT

- Axial load only
- Axial + 10kN accidental load

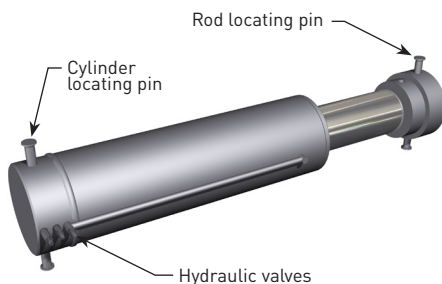
Curves include allowance for self weight deflection, eccentricity and fabrication tolerances.



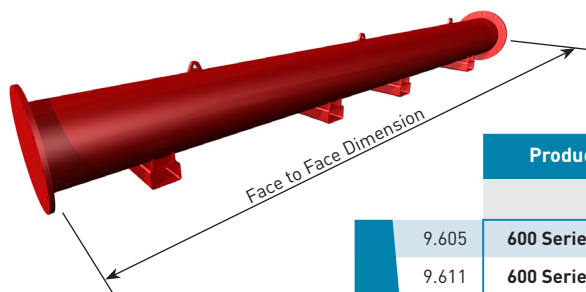


MGF's 2500kN and 3500kN Hydraulic Struts can be used for prop load monitoring, please contact MGF Design for more information.

2500kN and 3500kN Hydraulic Strut assembly comprises inner and outer sleeved steel box sections housing a double acting (DA) hydraulic ram to provide up to 800mm of leg adjustment.



Product ID	Product Description	Face to Face Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
8.500	2500kN Hydraulic Strut	1625	2425	1716
8.700	3500kN Hydraulic Strut	1670	2270	2200



600/660 Series extension bars range in length from 1.0m to 11.5m and are connected to each other via 12No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers.

Product ID	Product Description		Weight
			(kg)
9.605	600 Series 1.0m Extension		480
9.611	600 Series 2.0m Extension		700
9.610	600 Series 3.0m Extension		880
9.606	600 Series 4.0m Extension		1065
9.607	600 Series 7.0m Extension		1680
9.608	600 Series 11.5m Extension		2600
9.612	660 Series 5.0m Extension		2316
9.613	660 Series 10.0m Extension		4352
9.614	660 Series 3.5m Extension		1710

2500kN HYDRAULIC RAM



Hydraulic Ram		Inner Section	Outer Section
	Specification	400x400x16 SHS	450x450x20 SHS
	Material Grade	S355	S355
	Unit Mass	191kg/m	275kg/m
	Axial SWL	2500kN	2500kN
	Moment SWL	277kNm	277kNm

3500kN HYDRAULIC RAM



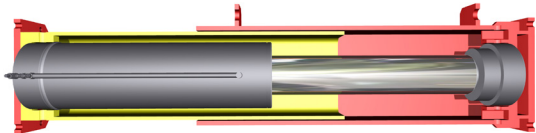
Hydraulic Ram		Inner Section	Outer Section
	Specification	559x16 CHS	610x20 CHS
	Material Grade	S355	S355
	Unit Mass	214kg/m	291kg/m
	Axial SWL	3500kN	3500kN
	Moment SWL	847kNm	1251kNm



Extension Bar		600 Series	660 Series
	Specification	610x12.5 CHS	660x25 CHS
	Material Grade	X70	S355
	Unit Mass	184kg/m	391kg/m
	Axial SWL	3500kN	3500kN
	Moment SWL	1418kNm	1885kNm
	Joint Moment SWL	396kNm	396kNm

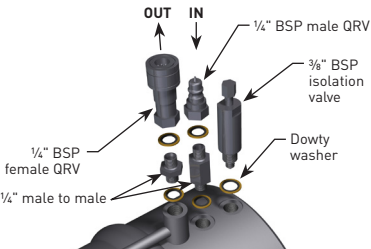


2500kN AND 3500kN DOUBLE ACTING HYDRAULIC RAM ASSEMBLY



		2500kN Double Acting	3500kN Double Acting
Hydraulic Cylinder	Material	Steel	Steel
	Bore	250mm	300mm
	Max. Working Pressure	500 Bar (7250 psi)	495 Bar (7200 psi)
	Test Pressure	500 Bar (7250 psi)	495 Bar (7200 psi)
	Approx. Working Stroke	800mm	600mm
	Axial SWL	2500kN	3500kN
	Min. FOS	2 (by test)	1.78 (by design)
	Working Temp Range	-50°C to +50°C	-50°C to +50°C
	Approx. Pre-Load	500kN	700kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)	100 Bar (1500 psi)
Locating Pins		Φ30	Φ40

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



MOTORISED PUMP UNITS

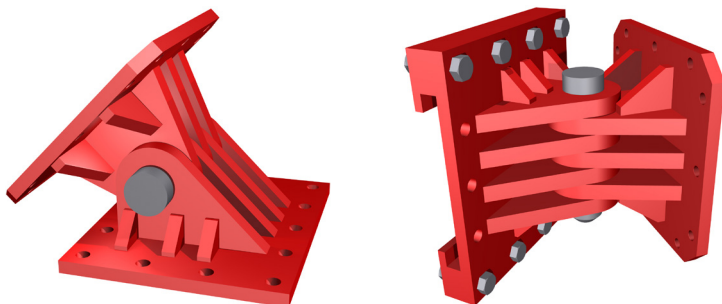


The motorised pumps are used to extend and retract the 600 Series double acting hydraulic rams. The pumps contain neat bio-degradable Houghto Safe SF25 shoring fluid. Maximum recommended installation pressure 1500 psi (100 Bar). MGF supply 2 different types of motorised pump for 600 Series, electric and diesel.



		Electric Pump	Diesel Pump
Component	Rating	110V, 6.5kVA	8kW
	Product ID	8.4001U / 8.4003U	8.4006
	Capacity	120 / 190 litres	100 litres
	Weight (kg)	460 / 622	394
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25
	Working Pressure	0-1500 psi	0-1500 psi

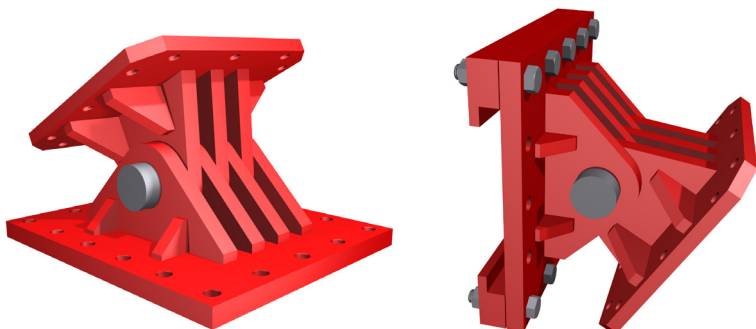
3500kN TYPE A SWIVEL ASSEMBLY



These swivels can be connected directly to concrete structures or the 305 UC or 406 UC Brace systems by bolting on the associated clamp assemblies detailed on page 5.4.13.

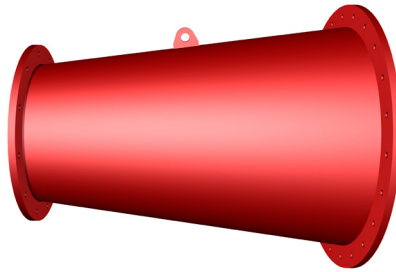
		Type A	Type B
400 Series Swivel	Product ID	9.704	9.310
	Weight	264kg	320kg
	Knee Brace / Cross Strut Operating Range	22° - 65°	65° - 90°
	Axial SWL	3500kN	3500kN
	Swivel Base Plate	500 x 600 x 30mm thk. (S355)	600 x 600 x 40mm thk. (S355)
	Base Plate Hole Details	14 No. $\Phi 32$ holes	16 No. $\Phi 32$ holes
Pin Detail		$\Phi 90$ (817M40 / EN24T)	$\Phi 90$ (817M40 / EN24T)

3500kN TYPE B SWIVEL ASSEMBLY



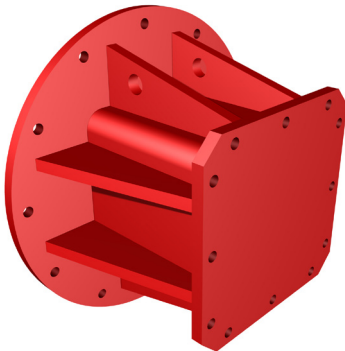
600 SERIES ADAPTORS

1000 / 600 SERIES TRANSITION

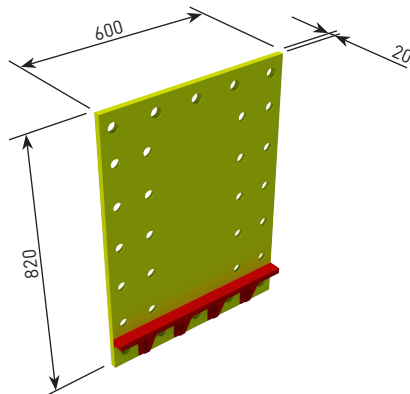


Transition		1000 / 600	600 / 400	T700 3500kN SWIVEL TRANSITION
	Product ID	9.800	9.604	8.605
	Weight	475kg	352kg	80kg
	Material	14.6 thk. tube, X65	400x400x16 SHS, S355	20mm thk. S355 plate
	Bolting Details	24 / 12No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers	12No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers	10No. M24x100 (min.) countersunk bolts, nuts and washers
	Strut Adaptor SWL	3500kN	3500kN	3500kN
	Axial SWL	3500kN	3500kN	3500kN
	Moment SWL	1125kNm	396kNm	-
	Joint Moment SWL	1125 / 396kNm	396 / 277kNm	-

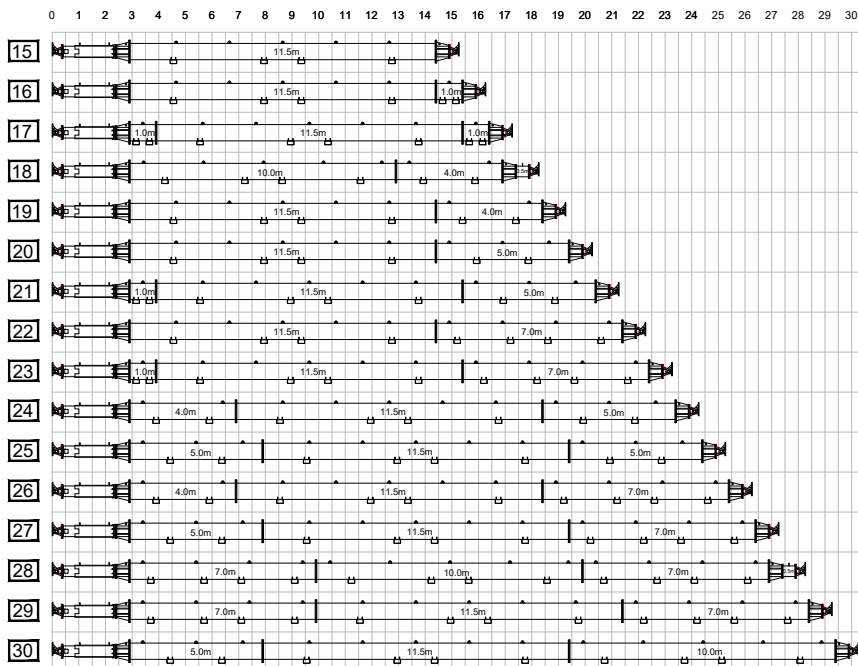
600 / 400 SERIES TRANSITION



T700 SWIVEL TRANSITION PLATE



600 SERIES RECOMMENDED EXTENSION COMBINATIONS



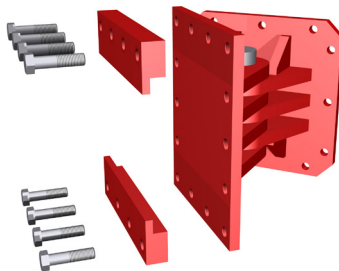
N.B. Single 0.25 or 0.5m 400 Series extensions should be added to these combinations for intermediate dimensions. The strut assemblies are shown at mid-stroke, so each length can vary by up to 400mm in either direction. Individual 7m pieces can be exchanged for a 3m and 4m. Additional compatible extensions are available (660 diameter / 1000 Series). Contact MGF Design department for details.

The above strut combinations use the 600 Series extensions (610 tube).

Face to Face Dimension (m)		2500kN Hydraulic			3500kN Hydraulic		
		Min. Length	Max. Length	Leg Weight	Min. Length	Max. Length	Leg Weight
		(mm)	(mm)	(kg)	(mm)	(mm)	(kg)
	15	14875	15675	5660	14420	15020	5792
	16	15875	16675	6140	15420	16020	6272
	17	16875	17675	6620	16420	17020	6752
	18	17875	18675	6634	17420	18020	6766
	19	18875	19675	6785	18420	19020	6917
	20	19875	20675	7265	19420	20020	7397
	21	20875	21675	7575	20420	21020	7707
	22	21875	22675	7340	21420	22020	7472
	23	22875	23675	7910	22420	23020	8042
	24	23875	24675	8220	23420	24020	8352
	25	24875	25675	8314	24420	25020	8446
	26	25875	26675	8465	25420	26020	8597
	27	26875	27675	8474	26420	27020	8606
	28	27875	28675	8954	27420	28020	9086
	29	28875	29675	9020	28420	29020	9152
	30	29875	30675	9330	29420	30020	9462

3500kN SWIVEL CLAMPING PLATES TYPE A

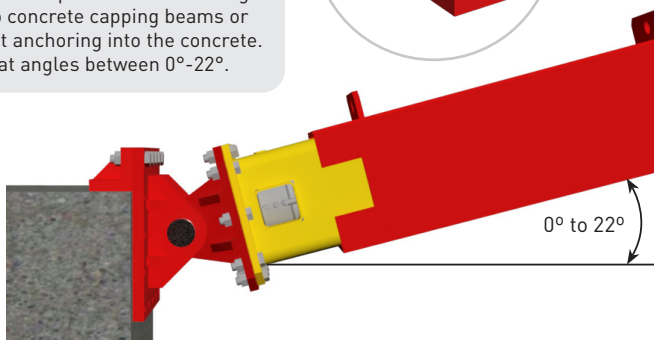
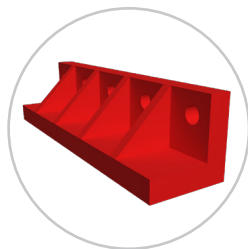
Swivel Clamp Type A is to be used on 3500kN Swivel Type A, when used on a knee brace connected to 305 UC / 406 UC.



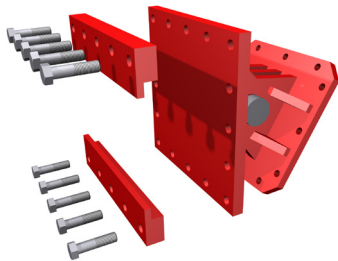
		Swivel Clamp Type A	Swivel Clamp Type B	Modular Swivel Cleat	T700 3500kN Swivel Transition Clamp
Component	Product ID	8.303 (305 UC) 8.40016 (406 UC)	8.304 (305 UC) 8.40017 (406 UC)	9.809	8.613
	Weight	34kg (305 UC) 46kg (406 UC)	45kg (305 UC) 54kg (406 UC)	53kg	35kg
	Material	30mm & 25mm thk. (305 UC) or 40mm thk. (406 UC) flat, 500 long, S275	30mm & 25mm thk. (305 UC) or 40mm thk. (406 UC) flat, 600 long, S275	40mm thk. flat, 600 long, S275	40mm thk. flat, 600 long, S275
	Bolting Details	8No. grade 8.8 M30x140 (min.) bolts c/w nuts and washers	10No. grade 8.8 M30x150 (min.) bolts c/w nuts and washers	5No. M30x120 (min.) grade 8.8 bolts c/w nuts and washers	5No. M30x140 (min.) grade 8.8 bolts c/w nuts and washers
	Bearing SWL	3500kN	3500kN	570kN	3500kN

3500kN SWIVEL TYPE A & B - MODULAR SWIVEL CLEAT

The Modular Swivel Cleat is compatible with the 3500kN Swivels, Type A & B. They simply bolt onto the swivel base plate to allow bracing struts to cleat onto concrete capping beams or thrust blocks without anchoring into the concrete. Suitable for use at angles between 0°-22°.

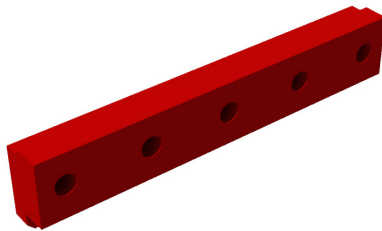


3500kN SWIVEL CLAMPING PLATES TYPE B

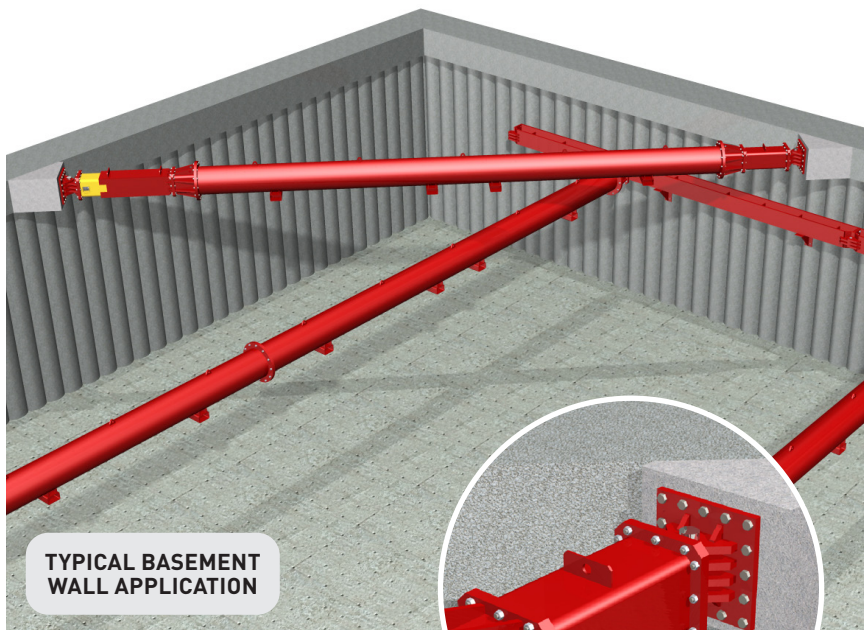


Swivel Clamp Type B is to be used on 3500kN Swivel Type B, when used as a cross strut connected to 305 UC / 406 UC.

T700 3500kN SWIVEL TRANSITION CLAMP



The T700 3500kN swivel transition clamps are used to connect the T700 3500kN swivel transition plate to T700 extension bars.



TYPICAL BASEMENT WALL APPLICATION

Typical bearing detail on RC corbel.

600 Series Strut



SIMPLE TO ASSEMBLE, HEAVY DUTY, MODULAR BRACING STRUT SYSTEM DESIGNED PRIMARILY TO BE USED AS CROSS STRUTS WITH THE MGF 406 UC AND T700 HYDRAULIC BRACING SYSTEM ON MAJOR EXCAVATIONS.

The system can also be used to prop reinforced concrete piles and capping beams forming the walls of major basements structures. Each strut comprises hydraulic ram assemblies together with various length strut extension bars. The system can support loads of up to 3500kN and span up to approx. 46.0m unsupported (clear unsupported spans of up to 55.0m possible using MGF Super 1000 Series, please contact MGF Design for further details). Components are extremely heavy and are normally assembled on site prior to being lifted into place and installed within the excavation using large cranes. A variety of end bearings are available allowing the struts to be used at a range of angles.

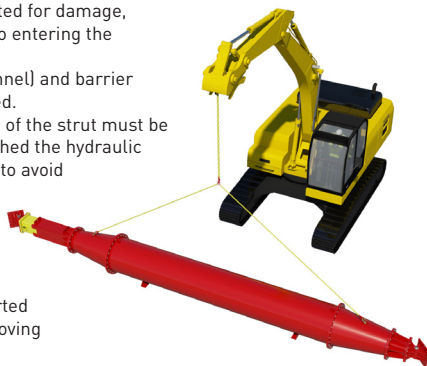
Fabricated from API grade X65 1067x14.3 or S355 1067x19.1 hollow circular steel section, the extensions are quickly assembled into the required strut lengths using circular flanged plates c/w bolt, nut and washer assemblies. Final length adjustment is provided by a double acting hydraulic ram providing up to 800mm of stroke. Once located at the correct line and level the struts are pre-loaded (or tightened) against the faces to be supported using a hydraulic pump on the ram. Pre-loading of the legs ensures the strut cannot slip, takes up any slack or hogging in the system and minimises the extent of potential ground movements. Handling points are provided at regular intervals on each leg to assist assembly / removal.

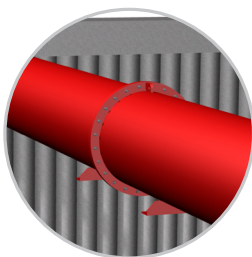
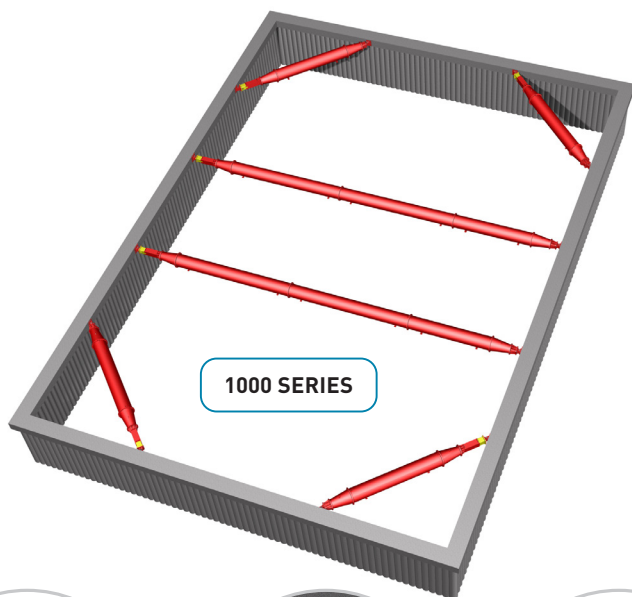
MGF can supply the systems with a full range of suitable handling chains, hydraulic pump installation kits (including bio-degradable shoring fluid and hydraulic hoses) and confined spaces regime equipment.

Manufactured and designed in accordance with BS EN 14653:2005 Parts 1 and 2 Manually operated shoring systems for groundwork support and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

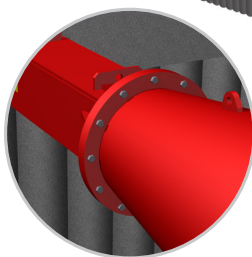
1. Strut systems are extremely heavy and should only be assembled, installed and removed by competent persons in accordance with a site specific detailed design & installation sequence and MGF installation guidelines.
2. Installation is normally carried out by assembling the complete strut and then lowering into place (subject to crane / excavator capacity). Struts are normally long and unbalanced (due to the weight of ram / jack unit) and great care must be taken in preparing the lift / maintaining lift angle (tag lines strongly recommended). On the ram assembly max. pre-load pressure of 100Bar (1500psi) must not be exceeded unless the design states otherwise.
3. Additional restraining chains or support brackets are normally provided to the brace at intermediate strut locations to carry the additional strut weight.
4. Ensure struts are fully pre-loaded or tightened, end fixings fully packed, all hydraulic ram isolation valves are closed prior to releasing the strut from lifting chains and commencing works. When assembling on site ensure that all pins and retaining clips are in place and secured and all flange plate bolts are installed and fully tightened / torqued with a minimum two threads visible beyond the nut. Any gaps in bearing plates must be securely packed using grout prior to final pre-loading of the hydraulic rams.
5. Individual components should be visually inspected for damage, excessive deflection loss of ram pressure prior to entering the excavation.
6. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered.
7. Prior to removal of systems the complete weight of the strut must be independently supported. Once this is accomplished the hydraulic rams (or struts) must be released and retracted to avoid the need for excessive extraction forces.
8. When installing struts at angles great care must be taken to ensure that the angles match the design, all shear stops are in place and all elements are supported / packed and capable of transmitting loads effectively. On large unsupported spans the pre-load must be applied prior to removing vertical support to minimise sagging.





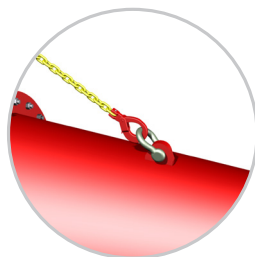
STRUT FLANGE CONNECTION DETAIL

1000 Series Struts and extensions are connected to each other via a flange plate (Ø1270x30mm) using 24No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers (recommended min. torque 400Nm).



TRANSITION FLANGE CONNECTION DETAIL

The transition adaptor is connected to the hydraulic strut or 600/400 Series transition via a flange plate (Ø850x30mm) using 12No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers (recommended min. torque 400Nm).



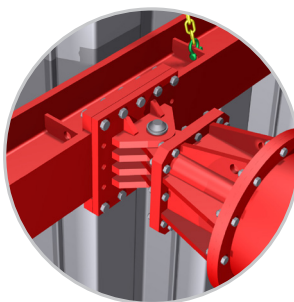
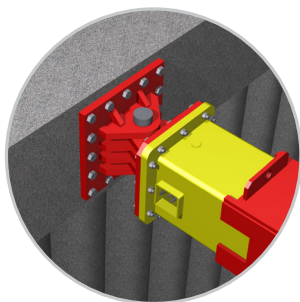
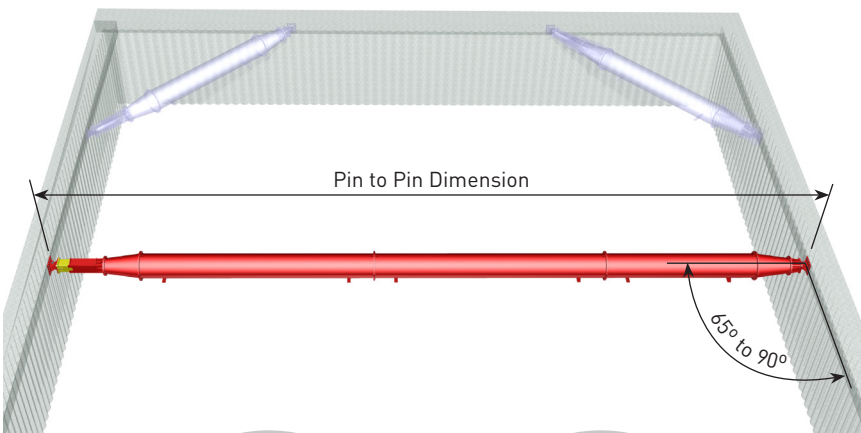
HANDLING POINT WLL = 12.0T

Strut assemblies are lifted and handled by attaching MGF lifting chains to the handling / restraining points as shown.

**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF BRACING STRUTS**

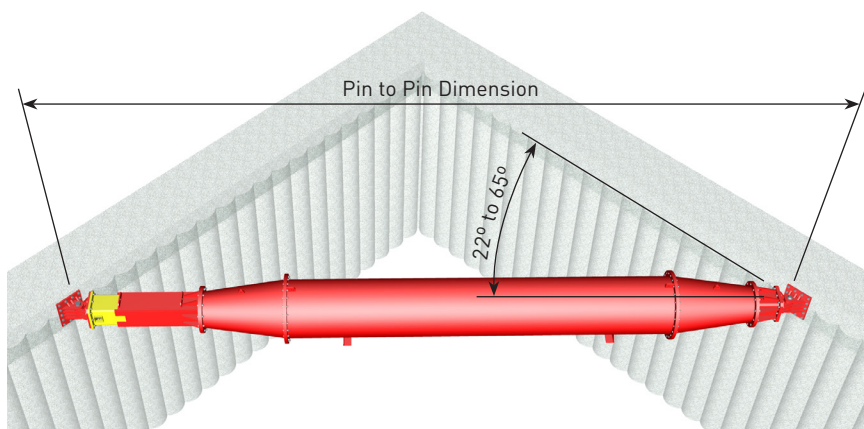
mgf.co.uk/products/1000-series-strut



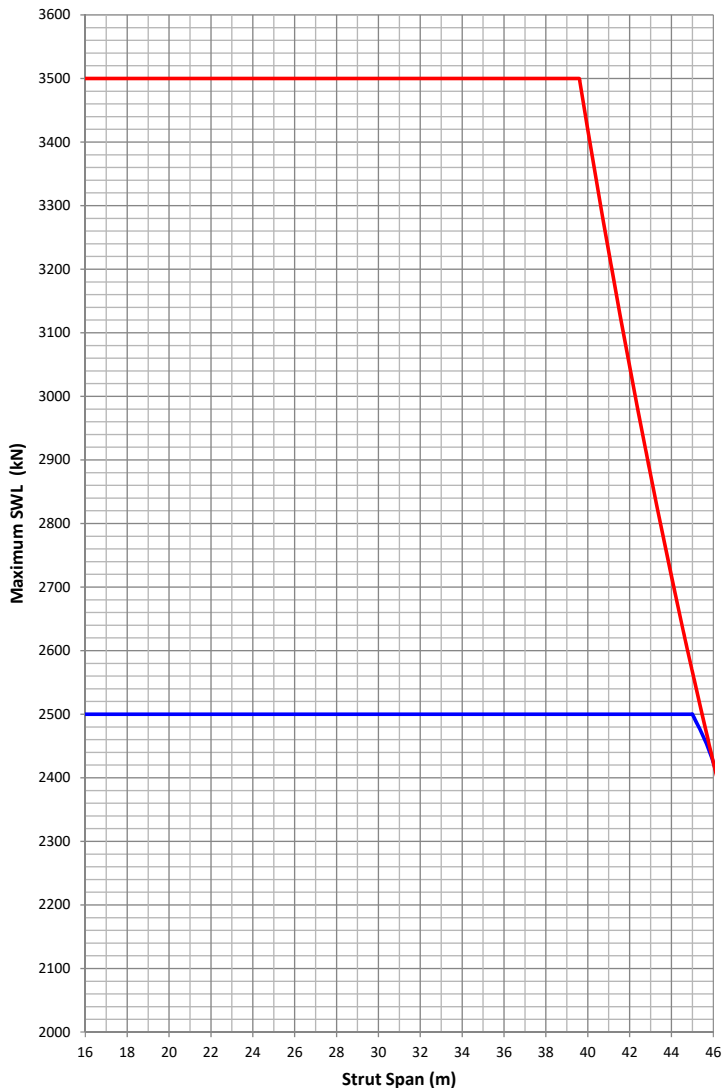


SWIVEL END BEARING DETAIL

Swivels can be anchored directly to concrete or clamped to the 406 UC Brace or T700 Brace using 2 No. swivel clamps as detailed on page 5.5.13.



SAFE WORKING LOAD FOR MGF 1000 SERIES (kN)



2500kN HYDRAULIC STRUT

— Axial + 25kN
accidental load

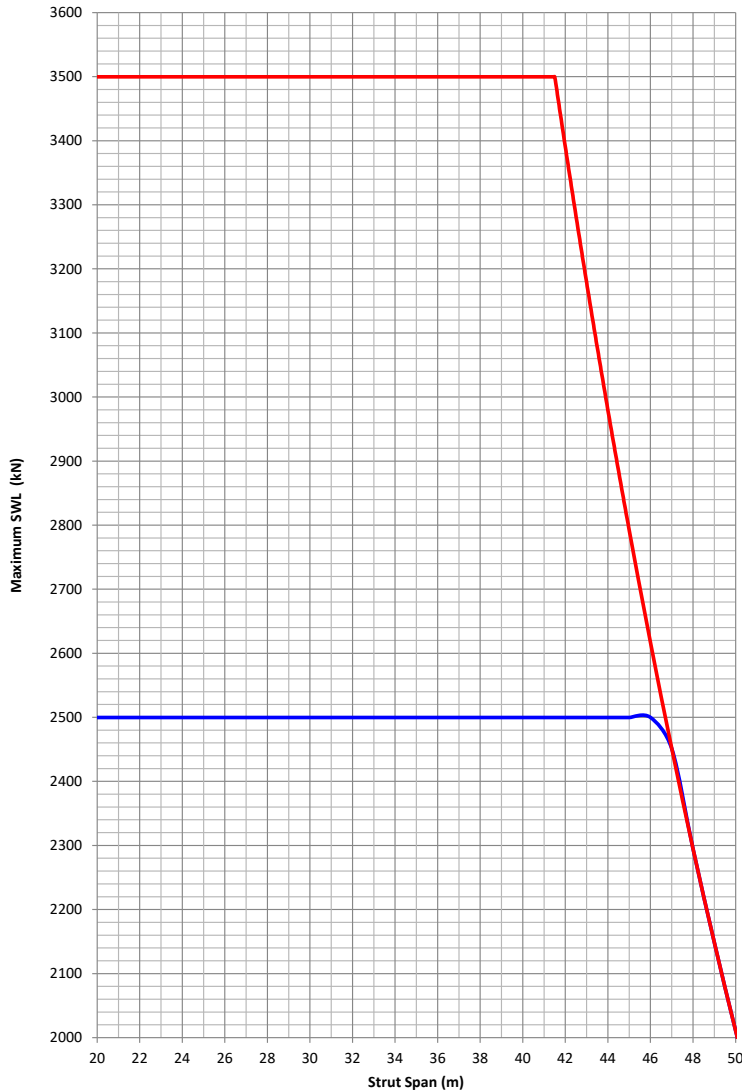
3500kN HYDRAULIC STRUT

— Axial + 25kN
accidental load

Curves include allowance for self weight deflection, eccentricity and fabrication tolerances.



SAFE WORKING LOAD FOR MGF SUPER 1000 SERIES (kN)



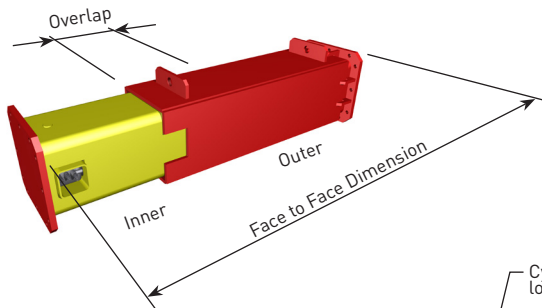
2500kN HYDRAULIC STRUT

— Axial + 25kN
accidental load

3500kN HYDRAULIC STRUT

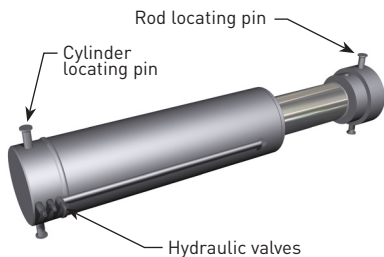
— Axial + 25kN
accidental load

Curves include allowance for self weight deflection, eccentricity and fabrication tolerances.

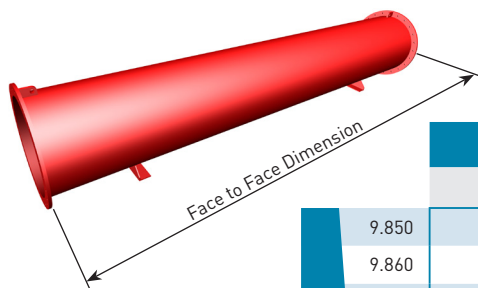


2500kN and 3500kN hydraulic strut assembly comprises inner and outer sleeved steel box sections housing a double acting (DA) hydraulic ram to provide up to 800mm of leg adjustment.

MGF's 2500kN and 3500kN hydraulic struts can be used for prop load monitoring, please contact MGF Design for more information.



Product ID	Product Description	Face to Face Dimension		Weight
		Min.	Max.	
		(mm)	(mm)	(kg)
8.500	2500kN Hydraulic Strut	1625	2425	1716
8.700	3500kN Hydraulic Strut	1670	2270	2200



1000 Series extension bars range in length from 5.0m to 11.5m. Super 1000 Series extension bars range in length from 2.605m to 14.05m. Both sections are connected to each other via 24 No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers.

		Product Description	Weight
			(kg)
Product ID	9.850	1000 Series 5.0m Extension	2105
	9.860	1000 Series 6.0m Extension	2480
	9.870	1000 Series 7.0m Extension	2850
	9.899	1000 Series 10.0m Extension	4000
	9.900	1000 Series 11.5m Extension	4930
	9.901	Super 1000 Series 2.605m Extension	1884
	9.902	Super 1000 Series 6.15m Extension	3609
	9.903	Super 1000 Series 11.03m Extension	6050
	9.904	Super 1000 Series 11.10m Extension	6100
	9.905	Super 1000 Series 13.5m Extension	7200
	9.906	Super 1000 Series 14.05m Extension	7500



2500kN HYDRAULIC RAM



Hydraulic Ram		Inner Section	Outer Section
	Specification	400x400x16 SHS	450x450x20 SHS
	Material Grade	S355	S355
	Unit Mass	191kg/m	275kg/m
	Axial SWL	2500kN	2500kN
	Moment SWL	277kNm	277kNm

3500kN HYDRAULIC RAM

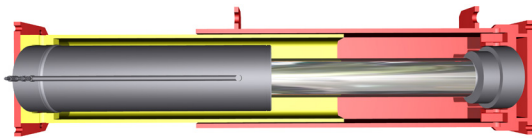


Hydraulic Ram		Inner Section	Outer Section
	Specification	559x16 CHS	610x20 CHS
	Material Grade	S355	S355
	Unit Mass	214kg/m	291kg/m
	Axial SWL	3500kN	3500kN
	Moment SWL	847kNm	1251kNm



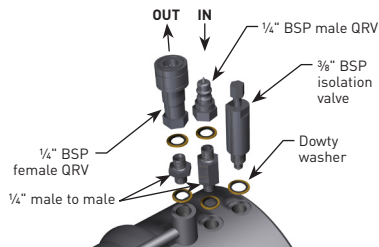
Extension Bar		1000 Series	Super 1000 Series
	Specification	1067x14.3 CHS	1067x19.1 CHS
	Material Grade	X65 (448N/mm ²)	S355
	Unit Mass	371kg/m	493kg/m
	Axial SWL	3500kN	3500kN
	Moment SWL	3668kNm	3722kNm
	Joint Moment SWL	1125kNm	1466kNm

2500kN AND 3500kN DOUBLE ACTING HYDRAULIC RAM ASSEMBLY



Hydraulic Cylinder		2500kN Double Acting	3500kN Double Acting
	Material	Steel	Steel
	Bore	250mm	300mm
	Max. Working Pressure	500 Bar (7250 psi)	495 Bar (7200 psi)
	Test Pressure	500 Bar (7250 psi)	495 Bar (7200 psi)
	Approx. Working Stroke	800mm	600mm
	Axial SWL	2500kN	3500kN
	Min. FOS	2 (by test)	1.78 (by design)
	Working Temp Range	-50°C to +50°C	-50°C to +50°C
	Approx. Pre-Load	500kN	700kN
	Approx. Pre-Load Pressure	100 Bar (1500 psi)	100 Bar (1500 psi)
	Locating Pins	Ø30	Ø40

Shoring fluid is pumped into the full bore side of the piston through the male quick release valve (QRV) to extend the ram. At the same time fluid from the return side of the piston is returned to the pump via the female QRV. Retraction is a reverse of extension. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



MOTORISED PUMP UNITS

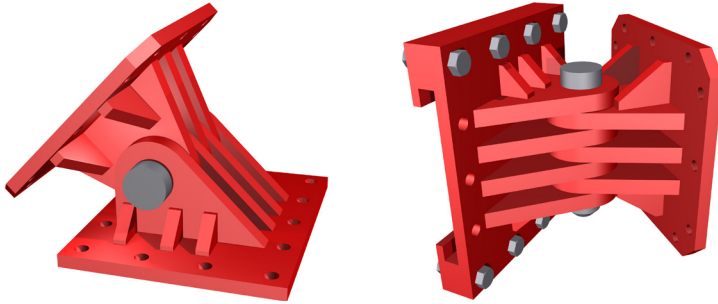
The motorised pumps are used to extend and retract the 1000 Series double acting hydraulic rams. The pumps contain neat bio-degradable Houghto Safe SF25 shoring fluid. Maximum recommended installation pressure 1500 psi (100 Bar). MGF supply 2 different types of motorised pump for 1000 Series, electric and diesel.



Component		Electric Pump	Diesel Pump
	Rating	110V, 6.5kVA	8kW
	Product ID	8.4001U / 8.4003U	8.4006
	Capacity	120 / 190 litres	100 litres
	Weight (kg)	460 / 622	394
	Shoring Fluid	Houghto Safe SF25	Houghto Safe SF25
	Working Pressure	0-1500 psi	0-1500 psi



3500kN TYPE A SWIVEL ASSEMBLY



These swivels can be connected directly to concrete structures or the 406 UC Brace systems by bolting on the associated clamp assemblies detailed on page 5.5.13.

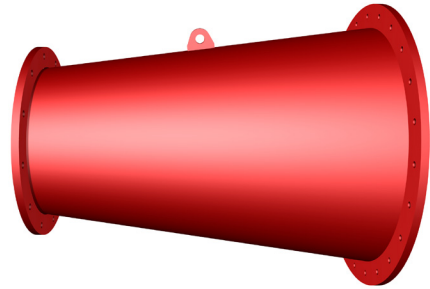
		Type A	Type B
400 Series Swivel	Product ID	9.704	9.310
	Weight	264kg	320kg
	Knee Brace / Cross Strut Operating Range	22° - 65°	65° - 90°
	Axial SWL	3500kN	3500kN
	Swivel Base Plate	500 x 600 x 30mm thk. (S355)	600 x 600 x 40mm thk. (S355)
	Base Plate Hole Details	14 No. Ø32 holes	16 No. Ø32 holes
Pin Detail		Ø90 (817M40 / EN24T)	Ø90 (817M40 / EN24T)

3500kN TYPE B SWIVEL ASSEMBLY



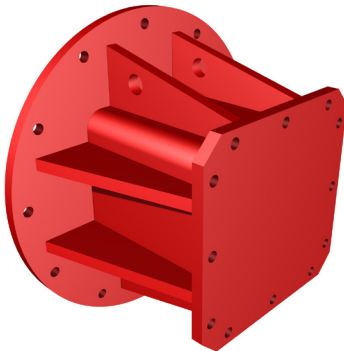
1000 SERIES ADAPTORS

1000 / 600 SERIES TRANSITION

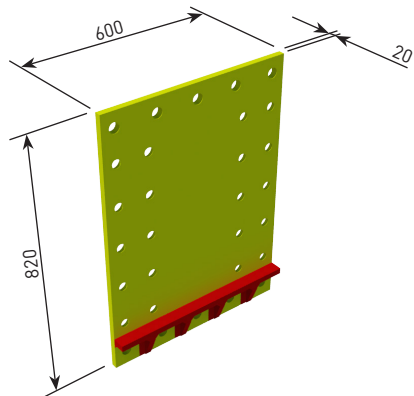


Transition		1000 / 600	600 / 400	T700 3500kN SWIVEL TRANSITION
	Product ID	9.800	9.604	8.605
	Weight	475kg	352kg	80kg
	Material	14.6 thk. tube, S355	400x400x16 SHS, S355	20mm thk. S355 plate
	Bolting Details	24 / 12No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers	12No. grade 8.8 M24x100 (min.) bolts c/w nuts and washers	10No. M24x100 (min.) countersunk bolts, nuts and washers
	Strut Adaptor SWL	3500kN	3500kN	3500kN
	Axial SWL	3500kN	3500kN	3500kN
	Moment SWL	1125kNm	396kNm	-
	Joint Moment SWL	1125 / 396kNm	396 / 277kNm	-

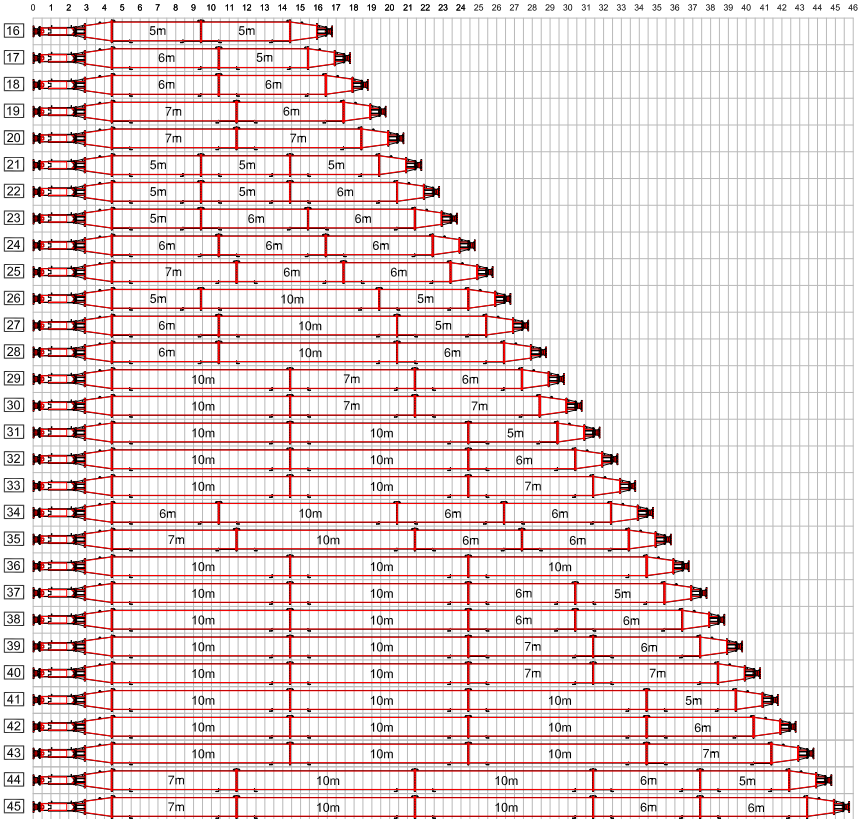
600 / 400 SERIES TRANSITION



T700 SWIVEL TRANSITION PLATE



1000 SERIES RECOMMENDED EXTENSION COMBINATIONS



N.B. Single 0.25m or 0.5m 400 Series extensions should be added to these combinations for intermediate dimensions. The strut assemblies are shown at mid-stroke, so each length can vary by up to 400mm in either direction. The above strut combinations use the 1000 Series extensions.



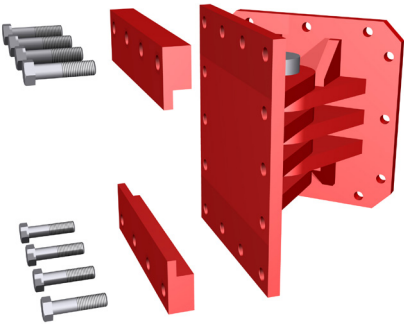
		2500kN Hydraulic			3500kN Hydraulic		
		Min. Length	Max. Length	Approx. Leg Weight	Min. Length	Max. Length	Approx. Leg Weight
		(mm)	(mm)	(kg)	(mm)	(mm)	(kg)
Face to Face Dimension (m)	16	16395	17195	8220	15940	16540	8352
	17	17395	18195	8595	16940	17540	8727
	18	18395	19195	8970	17940	18540	9102
	19	19395	20195	9340	18940	19540	9472
	20	20395	21195	9710	19940	20540	9842
	21	21395	22195	10325	20940	21540	10457
	22	22395	23195	10700	21940	22540	10832
	23	23395	24195	11075	22940	23540	11207
	24	24395	25195	11450	23940	24540	11582
	25	25395	26195	11820	24940	25540	11952
	26	26395	27195	12220	25940	26540	12352
	27	27395	28195	12595	26940	27540	12727
	28	28395	29195	12970	27940	28540	13102
	29	29395	30195	13340	28940	29540	13472
	30	30395	31195	13710	29940	30540	13842
	31	31395	32195	14115	30940	31540	14247
	32	32395	33195	14490	31940	32540	14622
	33	33395	34195	14860	32940	33540	14992
	34	34395	35195	15450	33940	34540	15582
	35	35395	36195	15820	34940	35540	15952
	36	36395	37195	16010	35940	36540	16142
	37	37395	38195	16595	36940	37540	16727
	38	38395	39195	16970	37940	38540	17102
	39	39395	40195	17340	38940	39540	17472
	40	40395	41195	17710	39940	40540	17842
	41	41395	42195	18115	40940	41540	18247
	42	42395	43195	18490	41940	42540	18622
	43	43395	44195	18860	42940	43540	18992
	44	44395	45195	19445	43940	44540	19577
	45	45395	46195	19820	44940	45540	19952

Clear unsupported spans of up to 55.0m possible using MGF Super 1000 Series, please contact MGF Design for further details.



3500kN SWIVEL CLAMPING PLATES TYPE A

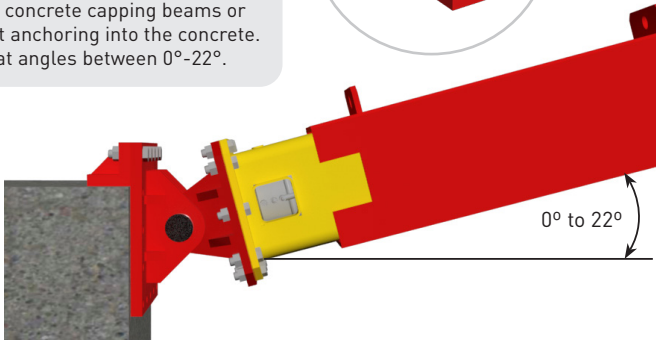
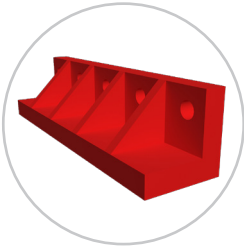
Swivel Clamp Type A is to be used on 3500kN Swivel Type A, when used on a knee brace connected to 406 UC.



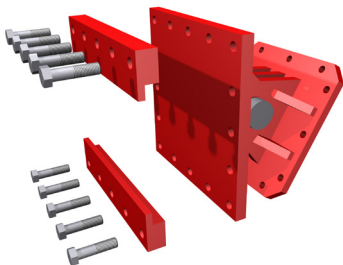
		Swivel Clamp Type A	Swivel Clamp Type B	Modular Swivel Cleat	T700 3500kN Swivel Transition Clamp
Component	Product ID	8.40016	8.40017	9.809	8.613
	Weight	46kg	54kg	53kg	35kg
	Material	30mm & 40mm thk. flat, 500 long, S275	30mm & 40mm thk. flat, 600 long, S275	40mm thk. flat, 600 long, S275	40mm thk. flat, 600 long, S275
	Bolting Details	8No. grade 8.8 M30x140 (min.) bolts c/w nuts and washers	10No. grade 8.8 M30x150 (min.) bolts c/w nuts and washers	5No. M30x120 (min.) grade 8.8 bolts c/w nuts and washers	5No. M30x140 (min.) grade 8.8 bolts c/w nuts and washers
	Bearing SWL	3500kN	3500kN	570kN	3500kN

3500kN SWIVEL TYPE A & B - MODULAR SWIVEL CLEAT

The Modular Swivel Cleat is compatible with the 3500kN Swivels, Type A & B. They simply bolt onto the swivel base plate to allow bracing struts to cleat onto concrete capping beams or thrust blocks without anchoring into the concrete. Suitable for use at angles between 0°-22°.

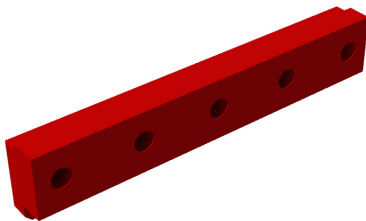


3500kN SWIVEL CLAMPING PLATES TYPE B

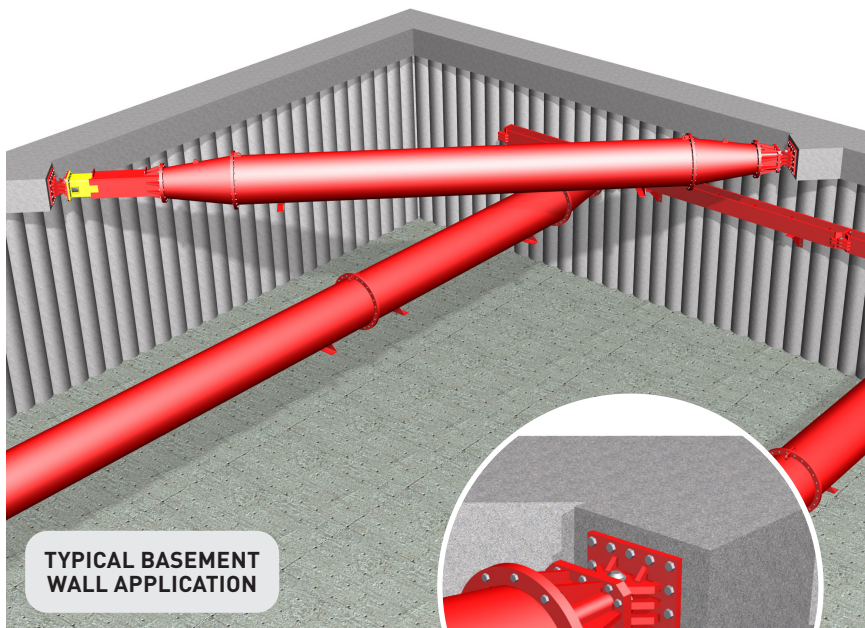


Swivel Clamp Type B is to be used on 3500kN Swivel Type B when used as a cross strut connected to 406 UC.

T700 3500kN SWIVEL TRANSITION CLAMP



The T700 3500kN swivel transition clamps are used to connect the T700 3500kN swivel transition plate to T700 extension bars.



TYPICAL BASEMENT WALL APPLICATION

Typical bearing detail on RC corbel.





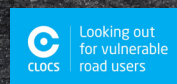
1000 Series Strut



LARGEST FULLY OWNED SHORING TRANSPORT FLEET IN THE UK

We operate our own transport fleet yielding logistical control of our operations and flexibility to respond rapidly to meet customer delivery requirements.

- A fleet of commercial vehicles
- Operating from strategically placed locations
- FORS silver accredited across the entire business
- Full logistical control
- Maximum flexibility



TRENCH SHEETS, SHEET PILES AND ANCILLARIES



TRENCH SHEETS	6.1	ANCILLARIES:	6.6
SHEET PILES	6.2	DRIVING CAPS	
WALER AND TIE BACK SYSTEM	6.3	QUICK RELEASE PITCHING SHACKLES	
TRENCH STRUTS	6.4	EXTRACTORS	
TELESCOPIC / ACROW PROPS	6.5	DRIVESAFE	
		PILING HAMMERS (EMVS)	6.7
		AUGER	6.8

*Trench sheets used in combination
with the MGF Tie Back and Water
system to retain canal banks*



MGF TRENCH SHEETS ARE AVAILABLE IN A WIDE RANGE OF PROFILES AND LENGTHS AND ARE GENERALLY SPECIFIED TO SUPPORT THE VERTICAL FACES OF MOST SMALL TO MEDIUM SIZED TRENCHES AND EXCAVATIONS BETWEEN 1M AND 9M IN DEPTH.

The sheets are primarily designed to be handled and installed by excavators using the bucket to drive the sheets vertically into the ground and are fully compatible with the complete MGF shoring range. The sheets are manufactured in the UK by MGF in a variety of steel grades to BS EN 10249 Part 1. The range includes both lapped and interlocking systems. Handling holes are provided as standard at one end of the sheet, all MGF FLP, ER, KKD and FKD trench sheets are supplied with 2 handling holes at the top of the sheet. Extra handling holes can be provided upon request. MGF design and specify the sheets in accordance with BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework and the Piling Handbook 9th Edition (revised 2016) by Arcelor Mittal.

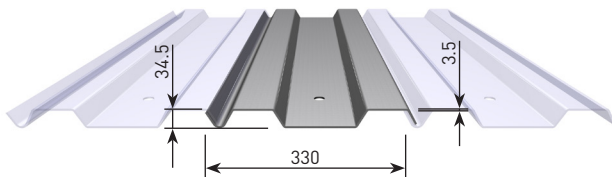
MGF can supply the sheets with a range of compatible driving caps, Drivesafe quick hitch driving caps, lifting chains, Quick Release Shackles, extractors, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders and Davitsafe retrieval / fall arrest systems.

PRODUCT NOTES

1. Trench sheets should only be installed and removed by a person with the relevant skills and experience using excavators specified to suit the size of trench sheet and the anticipated ground conditions / site constraints.
2. Trench sheets are heavy and difficult to handle / pitch on site and these operations should only be carried out by experienced banksmen. Always ensure that the sheets are not lifted over personnel and that the trailing ropes on Quick Release Shackles cannot snag. Great care should be taken to avoid trapping fingers whilst pitching the sheets. Additional care must be taken in windy conditions when it is recommended that at least 2 persons are used to pitch the sheets.
3. MGF strongly recommend that a driving cap is always used to prevent unnecessary damage to the tops of the trench sheet when being driven into the ground using the excavator bucket.
4. When stacking sheets on site it is recommended that they are placed in bundles of no more than 6 sheets and staggered on timber spacers to allow for ease of handling and to minimise the risk of trapping hands / fingers.
5. Other sheet lengths, profiles and grades are available upon request. MGF can also provide sheets for sale with a galvanised finish.
6. In order to assist installation MGF can supply guide walings and piling frames. For availability and details contact MGF direct.
7. Trench sheets must only be removed using MGF extractors. Use of a Quick Release Shackle for extraction will lead to damage of the spring mechanism.
8. MGF offer a complete re-roll and refurbishment facility for damaged trench sheets.
9. MGF interlocking trench sheets can provide limited protection against groundwater ingress and should always be used with caution where high water flows are anticipated.
10. Trench sheets are generally not recommended for cantilevered designs as deflections can be a significant issue.

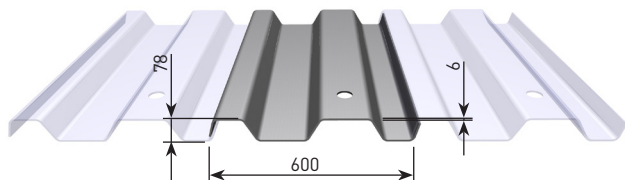
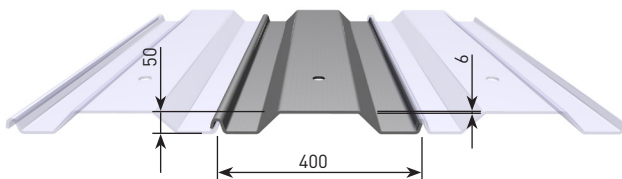


LAPPED SHEETS



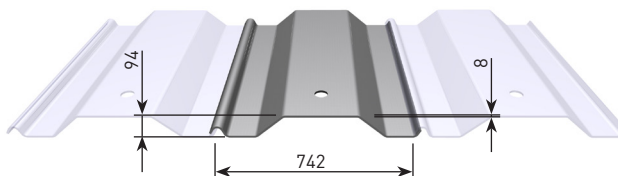
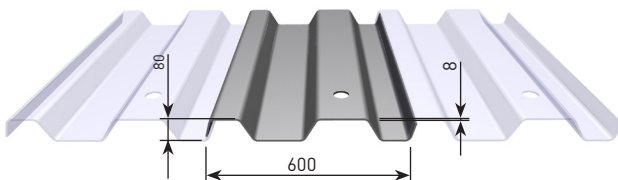
STANDARD
Product ID: 3.10
Available lengths:
2m-4m

FKD 400/6
Product ID: 3.2
Available lengths:
2m-6m



KKD 600/6
Product ID: 3.3
Available lengths:
3m-7m

KKD 600/8
Product ID: 3.4
Available lengths:
4m-8m



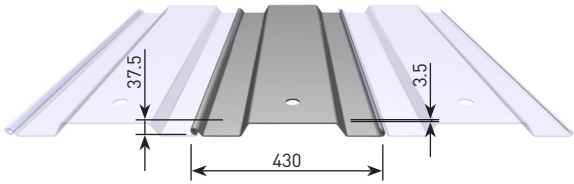
ER 750/8
Product ID: 3.7
Available lengths:
4m-9m



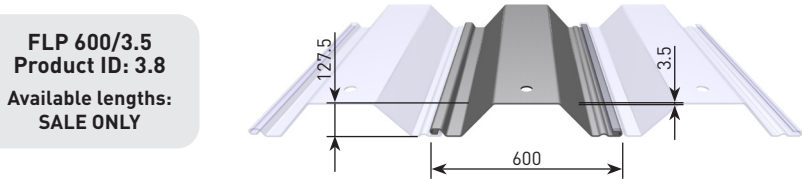
Sheet Type	Material Grade	Max. SWL (kNm/m)	Section Modulus (cm ³ /m)	Moment of Inertia (cm ⁴ /m)	Weight per m (kg/m)	Weight per m ² (kg/m ²)
STANDARD	S275 JRC	9.3	45.7	84.8	11.3	34.4
FKD 400/6	S275 JRC	19.8	98.8	250.1	22.1	55.3
KKD 600/6	S275 JRC	36.8	184	717.5	37.5	62.5
KKD 600/8	S275 JRC	48.4	242	947	50	83.3
ER 750/8	S355 J0C	66.0	254	1197.2	53.6	72.2
L8	S275 JRC	10.7	52.3	98.15	14.4	33.2
FLP 600/3.5	S275 JRC	33.5	183	1215.1	23.1	38.5
FLP 600/6	S275 JRC	61.2	306	2067.2	38.8	64.6

Max. SWL based on temporary works allowable stresses.

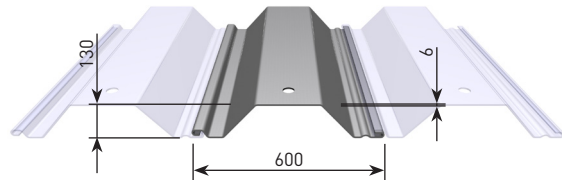
INTERLOCKING SHEETS



L8
Product ID: 3.9
Available lengths:
SALE ONLY



FLP 600/3.5
Product ID: 3.8
Available lengths:
SALE ONLY



FLP 600/6
Product ID: 3.5
Available lengths:
4m-7m

All MGF FLP, ER, KKD and FKD trench sheets are supplied with 2 handling holes at the top of the sheet. Extra handling holes to any sheet can be provided upon request.



EXPORT OPPORTUNITIES AVAILABLE



MGF have developed a solid reputation and are recognised as market leaders in the design, manufacture and provision of modular and bespoke excavation support systems.

We have been exporting products and services internationally for over 25 years from trench sheets and trench boxes through to hydraulic bracings and struts; establishing ourselves as trusted exporters.

CONTACT OUR EXPORTS TEAM FOR MORE INFORMATION:



exports@mgf.co.uk



08083 028 832



MGF INTERLOCKING STEEL SHEET PILES ARE A HIGH STRENGTH SHEETING SYSTEM GENERALLY SPECIFIED TO SUPPORT THE VERTICAL FACES OF LARGE EXCAVATIONS BETWEEN 4M AND 13M IN DEPTH.

The piles are fully compatible with the MGF shoring product range. Interlocking piles should be specified to help reduce ground water ingress. Additional design checks are required to determine a suitable toe length. They are installed using specialist equipment such as impact hammers, vibrating pile drivers or hydraulic presses (subject to suitability of the equipment for driving the piles into the anticipated ground conditions). The piles are sourced in 0.5m increments of length from major EU steel mills in grade S390 (BS EN 10248 Part 1). Handling holes are provided as standard at one end of the sheet. MGF design and specify the piles in accordance with BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework and the Piling Handbook 9th Edition (revised 2016) by Arcelor Mittal.

MGF can supply the piles with a range of compatible lifting chains, Quick Release Shackles, extractors, Edgesafe edge protection panels, Laddersafe access platforms and GRP or wooden pole ladders and Davitsafe retrieval / fall arrest systems.

PRODUCT NOTES

1. Interlocking steel sheet piles should only be specified, installed and removed by a person with the relevant skills and experience using specialist equipment selected to suit the size of sheet pile and the anticipated ground conditions / site constraints.
2. Sheet piles are heavy and difficult to handle / pitch on site and these operations should only be carried out by experienced banksmen. Always ensure that the excavator has sufficient reach to safely lift the sheets, the piles are not lifted over personnel and that the trailing ropes on Quick Release Shackles cannot snag. Great care should be taken to avoid trapping fingers whilst pitching the piles. Additional care must be taken in windy conditions when it is recommended that at least 2 persons are used to pitch the piles.
3. A range of corner piles are available when groundwater is anticipated to maintain full interlocks along the perimeter of cofferdam structures. Waterproof clutch sealants can be supplied by MGF to provide additional water tightness.
4. For cantilevered sheet pile wall designs a suitable Site Investigation must be provided with a location plan of the SI in relation to the proposed works.
5. When stacking piles on site it is recommended that they are placed in bundles of no more than 6 sheets and staggered on timber spacers to allow for ease of handling and to minimise the risk of trapping hands / fingers.
6. Other pile lengths, profiles and grades are available upon request.
7. Sheet piles must only be removed using MGF extractors. Use of a Quick Release Shackle for extraction will lead to damage of the spring mechanism.

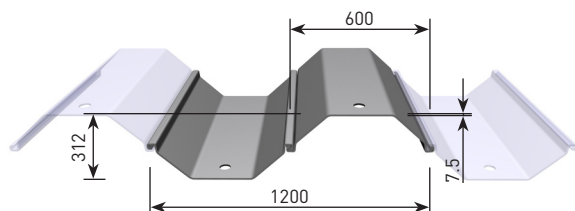


Sheet Type	Material Grade	Max. SWL	Elastic Section Modulus	Plastic Section Modulus	Moment of Inertia	Weight per m	Weight per m ²	Coating Area **	Class EC3: Part 5
		Temporary							
		[kNm/m]	[cm ³ /m]	[cm ³ /m]	[cm ⁴ /m]	[kg/m]	[kg/m ²]	[m ² /m]	
GU8N	S390 GP	223.3 (108.8)	770 (375)	935	12010 (4033)	48.5	80.9	1.51 (0.76)	3
GU13N	S390 GP	368.3 (190.8)	1270 (658)	1535	26590 (9066)	59.9	99.8	1.69 (0.85)	2
GU16N	S390 GP	484.3 (229.7)	1670 (792)	1988	35950 (11600)	72.6	121.0	1.72 (0.87)	2
GU21N	S390 GP	597.4 (258.7)	2060 (892)	2422	46380 (14100)	81.9	136.5	1.79 (0.90)	2
GU23N	S390 GP	677.2 (268.3)	2335 (925)	2735	52510 (15033)	90.4	150.7	1.79 (0.90)	2
PU28-1*	S390 GP	774.2 (278.4)	2680 (960)	3087	60580 (16233)	97.4	162.3	1.85 (0.93)	2
PU32-0.5	S390 GP	904.2 (286.0)	3130 (990.0)	3607	70770 (17062.9)	112	186.7	1.83 (0.92)	2

N.B. Values in brackets apply to a single pile/m, i.e. unclutched.

Sheet pile design based on permissible stress design should be based on the elastic section modulus.

* PU28-1 Sheet Pile also known as GU27N. ** 1 side, excluding inside of interlocks.



GU8N
Product ID: 3.11

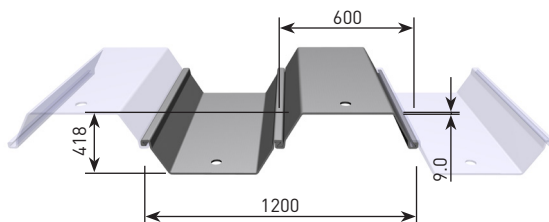
SALE ONLY

Recommended for easy driving conditions.

GU13N
Product ID: 3.12

Available minimum lengths: 4.5m

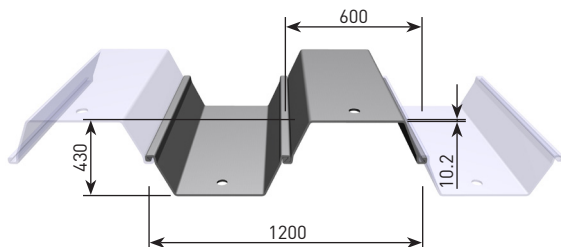
Recommended for easy to normal driving conditions.



GU16N
Product ID: 3.13

Available minimum lengths: 6.0m

Recommended for normal driving conditions.

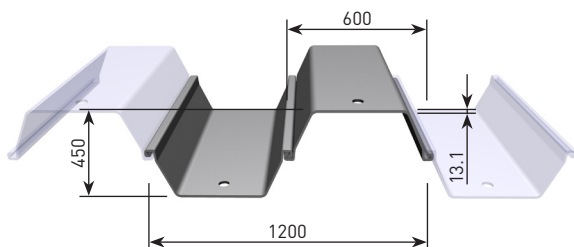
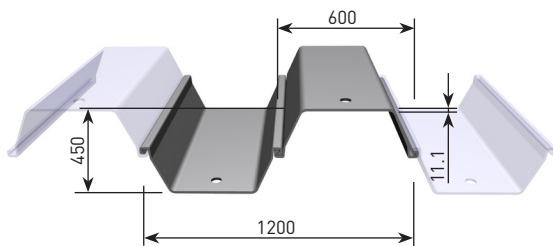


N.B. Choice of a sheet profile is normally governed by driveability considerations.

GU21N
Product ID: 3.14

**Available minimum
lengths: 7.0m**

Recommended for normal
to hard driving conditions.



GU23N
Product ID: 3.19

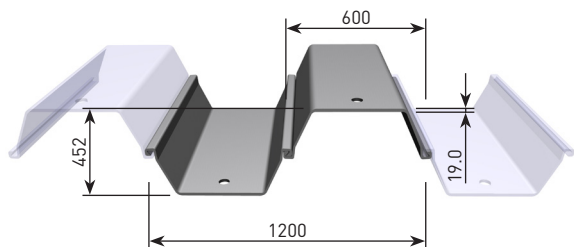
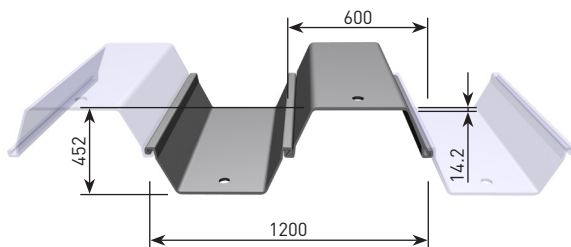
SALE ONLY

Recommended for hard
driving conditions.

PU28-1*
Product ID: 3.15

SALE ONLY

Recommended for hard
driving conditions.

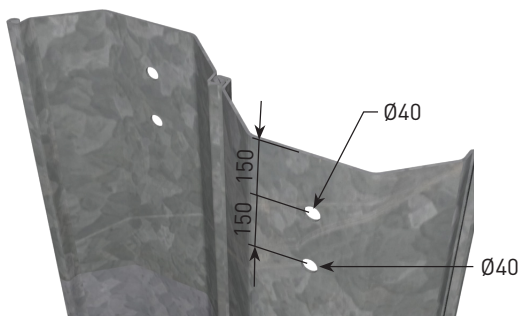


PU32-0.5
Product ID: 3.17

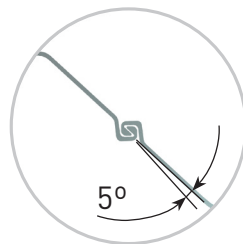
SALE ONLY

Recommended for hard
driving conditions.

Further sheet lengths can be supplied. Please contact MGF for details.



All MGF Sheet Piles are supplied with 2 40mm diameter handling holes at the top of the sheet, compatible with MGF 6t Pitching Shackles and Extractors.



INTERLOCK DETAIL

The interlock allows for up to 5° horizontal deviation between each successive sheet.

CORNER PILES

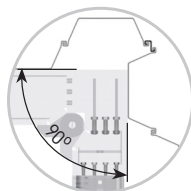


BS20 / C14

The BS20 Corner Pile is suitable for 90° internal corners and is compatible with all the MGF pile profiles.

Angle = 90°

Mass per Metre = 14.4kg/m

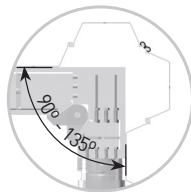


OMEGA

The Omega Corner Pile is suitable for 90° to 135° internal corners and is compatible with all the MGF pile profiles.

Angle = 90° - 135°

Mass per Metre = 18.0kg/m

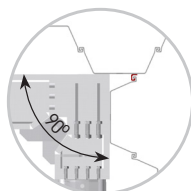


E22 / C9

The E22 / C9 Corner Pile is suitable for 90° internal corners and is compatible with all the MGF pile profiles. The Corner Pile is welded to the pan of an interlocked pile to give added flexibility for interlocking sheet frames.

Angle = 90°

Mass per Metre = 9.3kg/m

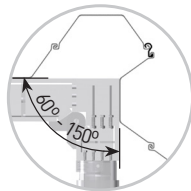


E20 XL

The E20 XL Corner Pile is suitable for 60° to 150° internal corners and is compatible with all the MGF pile profiles.

Angle = 60° - 150°

Mass per Metre = 11.7kg/m



MGF CAD blocks are available to assist with sizing of interlocked cofferdams utilising various combinations of corner piles.



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design@mgf.co.uk



08083 028 832

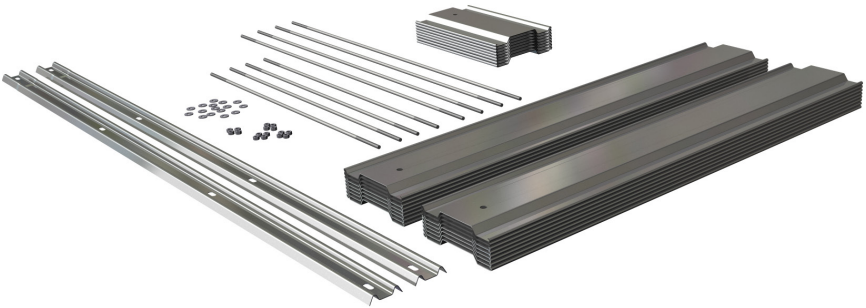


For technical information about our products and services
view our latest technical file: **mgf.co.uk/brochures**

AN ANCHORED RETAINING SYSTEM DESIGNED FOR THE BANKSIDE PROTECTION OF CANALS, RIVERS AND MARINAS. THE SYSTEM COMPRISES LIGHTWEIGHT STEEL WALER RAILS, STEEL TIE BACK RODS AND STEEL INTERLOCKING L8 TRENCH SHEETS.

The Tie Back Waler rail is manufactured out of 3mm thick S275 steel and available in lengths of 4.0m. The rails feature a swagged end section for overlapping and connecting rails together and to the interlocked L8 sheets. When Tie Back Walers are connected the effective width is 3.88m. The interlocking L8 sheets are available in lengths of up to 3.5m, while the anchor sheets are generally up to 1.0m long. The Tie Back Waler Rails are supplied fully galvanised to BS729, L8 sheets can be supplied galvanised on request. The 20mm tie back rods are supplied in either 1.8m or 2.4m lengths and come with threaded ends for connecting the Tie Back Waler Rail to anchored L8 sheets using M20 nuts and washers, all fittings are supplied zinc plated.

Each Tie Back Waler rail feature 4 25x60mm slotted holes for either connecting the rail to the retaining sheet using M20 bolts, nuts and washers, or for connecting the tie back rod between the waler rail and the anchored sheet. The centres between the tie back anchors will vary depending on load / ground conditions, usually every 2-3 slotted holes on the waler.



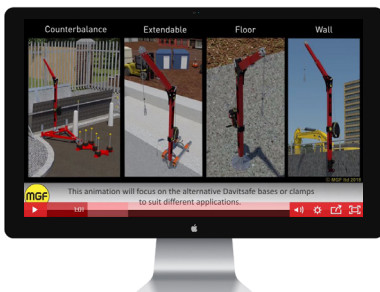
Item		Effective Width	Weight	Thickness	Moment of Inertia	Section Modulus	Sectional Area	Steel Grade
		(mm)	(kg/m)	(mm)	(cm ⁴)	(cm ³)	(cm ²)	
	Interlocking L8 Sheet	430	14.4	3.5	42.84	22.8	18.5	S275
	Tie Back Waler Rail	3888	5.4	3.0	8.4	4.3	6.8	S275



AWARD-WINNING DIGITALLY ANIMATED INSTALLATION GUIDES

Created specifically to assist our customers with the safe installation of our products, MGF's award-winning digitally animated guides are available to view online.

Visit:  mgf.co.uk



**ROBUST, STEEL STRUTS IDEAL FOR SMALL TRENCH APPLICATIONS
AVAILABLE IN SIZES RANGING FROM 0.3M TO 1.7M. TRENCH STRUTS ARE
DESIGNED FOR HORIZONTAL USE.**

Manufactured out of steel 60.3mm and 48.3mm tubes the struts are roughly adjusted using pins and fine adjustment is achieved with a screw thread. The 75mm x 75mm x 6mm thick strut end plates feature two nail holes and are spiked to support and grip the trench lining.

MGF Trench Struts are manufactured to BS4074:2000 Specification for Steel Trench Struts.

Product ID	Strut Type			
	Min. Length			
	Max. Length			
	Weight			
9.600	0	300	500	4.6
	1	500	700	6
	2	700	1100	8
	3	1000	1700	11





HEALTH AND SAFETY

MGF place health and safety at the forefront of everything we do and are committed to the promotion of best practice in the industry.

To help assist our customers in creating safe working environments we can provide equipment demonstrations, training sessions and toolbox talks.

FOR MORE INFORMATION CONTACT:

 enquiries@mgf.co.uk



ROBUST, STEEL PROPS FOR GENERAL APPLICATIONS AVAILABLE IN SIZES RANGING FROM 1.0M TO 4.9M. THEY ARE GENERALLY DESIGNED FOR VERTICAL USE.

Manufactured out of steel 60.3mm and 48.3mm tubes the props are roughly adjusted using pins and fine adjustment is achieved with a screw thread.

MGF Telescopic Acrow Props are manufactured to BS EN 1065:1999 Adjustable Telescopic steel props.

	Strut Type	Min. Length	Max. Length	Weight
		(mm)	(mm)	(kg)
Product ID	9.500	0	1000	11
	9.501	1	1800	16
	9.502	2	2000	18
	9.503	3	2600	20
	9.504	4	3200	24





Piling Hammer (EMV)

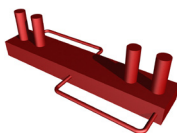
DRIVING CAPS



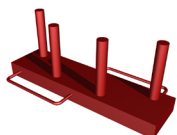
Component	Suitable Sheets	Standard
	Product ID	2.301
	Weight	11kg



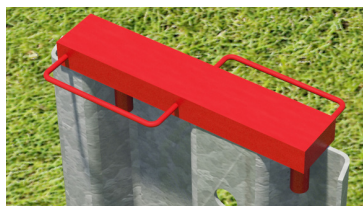
Component	Suitable Sheets	FKD 400/6
	Product ID	2.302
	Weight	14kg



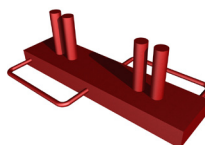
Component	Suitable Sheets	KKD 600/6 KKD 600/8
	Product ID	2.303
	Weight	23kg



Component	Suitable Sheets	FLP 600/3.5 FLP 600/6
	Product ID	2.304
	Weight	39kg



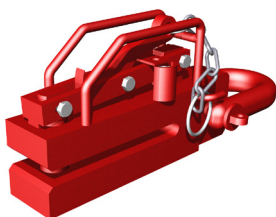
MGF have a complete range of driving caps to suit individual trench sheet profiles. Great care must be taken when locating the driving cap on top of a sheet to ensure that the operation is safe and the cap is fitted securely and cannot be dislodged / fall onto personnel.



Component	Suitable Sheets	L8
	Product ID	2.305
	Weight	15kg

QUICK RELEASE PITCHING SHACKLES

MGF manufacture and supply 2t, 3t and 6t Quick Release Pitching Shackles (QRSs) for the safe and efficient handling and pitching of MGF trench sheets and sheet piles. MGF QRSs are supplied with rope lines to allow the release of piles / sheets once pitched. All MGF pitching shackles feature a simple safety mechanism that prevents the accidental release of the shackle in the event the rope snags. A short length of chain is attached from the lever arm of the shackle to a metal ring, to which the nylon rope line is attached. When this is in use it ensures that the rope cannot snag and release the mechanism. QRSs should always be inspected for damage prior to each use - especially the spring mechanism, which can be easily damaged by use as an extractor (for which they are not designed). They must not be violently shaken or snatched prior to lifting piles always ensure pin is fully engaged.



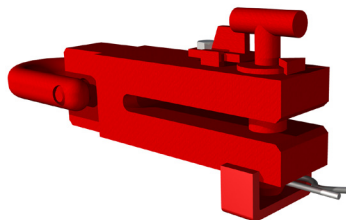
Component	Product ID	2.102	2.106
	SWL (t)	2	6
	Jaw Width (mm)	20	20
	Jaw Depth (mm)	220	220
	Pin Diameter (mm)	20	35
	Weight (kg)	22	26
	Suitable Sheets	BS / L8 / FKD	KKD / ER / FLP / PU / GU



EXTRACTORS

MGF manufacture and supply 2t and 6t SWL pile extractors for the safe removal of MGF trench sheets and sheet piles. Extractors should always be inspected for damage prior to each use. Prior to extraction ensure that the pin is located in the pile / sheet handling hole with an r-clip attached, and fully locked to prevent accidental release during extraction. Extractors are designed to cope with large extraction forces but must not be violently shaken or snatched.

Component	Product ID	2.403	2.406
	SWL (t)	2	6
	Jaw Width (mm)	20	20
	Jaw Depth (mm)	220	220
	Pin Diameter (mm)	20	38
	Weight (kg)	23	27
	Suitable Sheets	BS / L8 / FKD	KKD / ER / FLP / PU / GU



DRIVESAFE



MGF Drivesafe is an excavator attachment designed to be used for the safe and efficient driving of trench sheets using the push and dig method. Compatible with a range of excavators, ranging in capacity from 13t to 25t, the Drivesafe units can be quickly attached to the excavator boom using the quick hitch mechanism. The Drivesafe unit is an alternative to using a Driving Cap, and avoids the need for working at height. The sheets are pitched, as normal, using an MGF Quick Release Pitching Shackle. Once the sheet is pitched then the Drivesafe should apply slow, steady pressure to the top of the sheet to drive it into the ground. The guide plates on the underside of the unit are there to re-align the sheet if needed. Before use, ensure the Drivesafe is compatible with the quick hitch bracket on which it is to be used (see 6.6.3).



		Product ID	Weight (kg)	Geith Quick Coupler	Miller Quick Coupler	Hill TEFRA Quick Coupler
Drivesafe Type	65mm	2.500	100	QC65H, QH65M	Range 4	Tefra 13t
	80mm	2.501	126	QC80H, QH80M	Range 5, Range 6	Tefra 16t, Tefra 21t, Tefra 25t



FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF DRIVESAFE

mgf.co.uk/products/drivesafe



Piling Hammer (EMV)



MGF'S PILING HAMMERS ARE EXCAVATOR ATTACHMENTS THAT USE VIBRATIONS TO DRIVE TRENCH SHEETS AND SHEET PILES INTO THE GROUND BY CLAMPING DIRECTLY ONTO THE PAN OF THE SHEET AND ARE GENERALLY USED WITH THE PRE-DRIVE SHEET INSTALLATION METHOD. THE PRE-DRIVE METHOD IS THE SAFEST AND MOST ACCURATE METHOD OF INSTALLING SHEETS WITH LITTLE RISK OF THE SHEETS KICKING IN DURING EXCAVATION. PILING HAMMERS OPERATE BY REDUCING THE COHESION OF SOILS THROUGH VIBRATIONS, WHICH EFFECTIVELY LIQUIFIES THE SOIL, MAKING IT SAFER, EASIER AND QUICKER TO INSTALL TRENCH SHEETS OR SHEET PILES.

MGF piling hammers can connect to excavator quick hitches with the use of an MGF quick hitch connector. There are 7 different types of quick hitch connector. From 40mm pins to 100mm pins. Alternatively, the piling hammers can be manually connected to the excavator dipper arm. All clamps can be rotated 90 degrees to allow face working. The piling hammers connect to the excavator hydraulics using a simple mounting with 3 hoses.

MGF piling hammers are suitable for 6t to 50t excavators and sheet lengths between 3.0m and 7.0m. The hammers are recommended for use with dense granular or soft cohesive ground types. Please contact MGF for further details. A detailed user guide for MGF piling hammers is available on our website.



PRODUCT NOTES

1. Operators should familiarise themselves with the Safe System of Work guidance available on MGF's website [mgf.co.uk](https://www.mgf.co.uk).
2. The choice of sheet is usually dictated by the stresses imposed through driving the sheets, over those produced by the lateral earth pressure alone.
3. All bolt and connections should be checked before every use as the vibrations can cause them to become loose.
4. Due to the vibrations generated special care should be taken when using this installation method near any structures.
5. Ensure adequate PPE is worn at all times. Operatives must not work underneath any suspended loads and loads must never be lifted over operatives.
6. The piling hammer comes with a safety chain and chain clamp, that should the piling hammer clamp release, will stop the sheet from dropping.

7. The push / pull forces in the table on page 6.7.3 must not be exceeded as this will damage the elastomer / buffers.
8. Prior to use ensure a pre-hire checklist has been completed and a site / task specific Risk Assessment / Method Statement has been prepared.
9. Ensure that lifting operations have been appropriately planned prior to use.
10. Ensure that all associated equipment is of sound condition, rated appropriately and is tested in accordance with legislative requirements.
11. Ensure that Temporary Works Coordinators (TWC) and Temporary Works Supervisors (TWS) have been consulted prior to operations commencing.
12. If works are permanent, ensure a suitably qualified engineer has been consulted prior to operations commencing.
13. Ensure competent operatives are appointed to fit piling hammers to excavators prior to operations commencing.
14. Ensure competent operatives and supervisors are appointed to operate and assist in the operation of piling hammers prior to operations commencing.
15. Ensure control measures are in place for the protection of operatives, third parties, plant and structures in the proximity of operations prior to them commencing.
16. Piling hammers should only be operated on firm level ground.
17. Ensure any overhead cable hazards and associated risks are identified and controlled.
18. Ensure that regular checks are carried out to ensure that hazards are controlled and the equipment is in good working order.
19. Ground vibrations may lead to substantial nuisance or hazard to the adjoining areas.
20. Improper use of the vibrator can lead to dangerous situations.
21. Only operate the piling hammer if you are suitably qualified and competent to do so.
22. Complete all the required weekly, daily and pre-use checks – report any defects.
23. Ensure there is visual contact between the operator and the slinger / signaller (or banksman) at all times ensure that no operatives are within the fall radius of the sheet when it is in operation.
24. Monitor the piling operation constantly – interrupt the process immediately if there are operational issues or any danger occurs.
25. Follow the agreed (and briefed) safe system of work / RAMS.
26. Do not operate the piling hammer if anyone is in the exclusion zone do not enter the exclusion zone if the piling hammer is being operated.
27. Do not use the piling hammer if it is faulty in any way.
28. Do not touch the piling hammer during the operating process (even when the excavator is switched off) as it can become very hot.
29. It is advised that the piling hammer should be fitted by an MGF Service Engineer making the necessary hose connections and checking for full functionality. The piling hammer should only be operated by suitably trained personnel.
30. During operation it is essential that the piling hammer be kept vertical at all times.
31. MGF EMVs are only compatible with excavators that have bi-directional flow circuits and require minimum flow and pressure figures to operate. MGF EMVs require drain back to tank, if not present this can be fitted as an additional drain line by the fitter at the start of the hire.



MGF PILING HAMMER DATA

Type			MS-1 HFB	MS-3 HFB	MS-4 HFB
	Centrifugal Force	max. kN	90	296	374
	Eccentric Moment	max. kgm	0.7	3.0	4.2
	Frequency	max. Hz	56	50	47.5
	Speed	max. rpm	3360	3000	2850
	Pulling Force	max. kN	34	60	120
	Push Down	max. kN	34	40	80
	Max. Power at Vibrator	kW	60	70	100
	Total Weight* (Including clamping device)	kg	350	830	1230
	Dyn. Weight* (Including clamping device)	kg	230	585	940
	Amplitude	mm	6.1	10.3	8.9
	Oil Flow	max.l/min	102	120	171
	Length*	L mm	722	1153	1216
	Width*	B mm	472	623	725
	Height* (Including clamping device)	H mm	538	1175	1250
	Width at Throat	T mm	230	260	340
	Standard Clamping Device		MS-U 12	MS-U 40	MS-U 60
	Recommended Power Pack		N/A	MS-A 110V	MS-A 110V

**Does not include quick hitch connector, universal head connector or carry frame.*

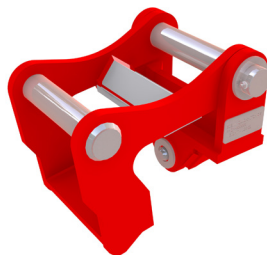
Ground vibration monitors are available to monitor vibration levels during use of MGF EMVs. Please contact MGF for further details.

**FOR SAFE SYSTEM OF WORKS GUIDANCE
FOR MGF PILING HAMMER (EMV)**

mgf.co.uk/products/piling-hammer-emv



QUICK HITCH CONNECTORS

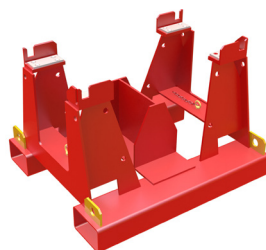


Piling Hammer Model	Piling Hammer Quick Hitch Connector Pin Size	Weight	Geith Quick Coupler	Miller Quick Coupler	Hill Tefra Quick Coupler
	(mm)	(kg)			
MS1	40-45	45	QC40H, QC40M, QC40MPL, QC45H, QC45M, QC45MPL	P Class, R Class, Range 1B, Range 2A	Tefra 3t, Tefra 4t, Tefra 5t, Tefra 6t, 3CX
	50-55	50	QC50H, QC50M, QC55H, QC55M	Range 3	Tefra 7t, Tefra 8t
	60-65	72	QC60H, QC60M, QC65H, QC65M	Range 4	Tefra 13t
MS3 / MS4	65	80.5	QC65H, QH65M	Range 4	Tefra 13t
	80	125.5	QC80H, QC80M	Range 5, Range 6	Tefra 16t, Tefra 21t, Tefra 25t
	90	247	QC90H, QC90M	Range 7, Range 8	Tefra 30t
	100	291	QC100H	Range 8, Range 9	Tefra 35t

MGF Quick Hitch Connectors are compatible with more quick hitches than detailed above. Please contact MGF to discuss further. Manual connectors are also available, should the excavator not have a quick hitch.

CARRY FRAME DETAIL

The piling hammers will be delivered to site in a self-contained carry frame. The carry frame weighs between 120-300kg and features fork pockets and dedicated lift points for ease of handling.



MGF'S AUGERS ARE EXCAVATOR ATTACHMENTS USED TO DRILL HOLES INTO THE GROUND AND ARE OFTEN SPECIFIED WHEN HARD GROUND CONDITIONS ARE ENCOUNTERED TO ASSIST THE DRIVING OF STEEL SHEET PILES. THE MGF AUGER IS DESIGNED TO LOOSEN UP THE GROUND AHEAD OF INSTALLING SHEET PILES USING THE MGF EMV.

MGF Augers are supplied within a cradle, which is designed to safely handle the Auger and control it during use. The Auger cradle connects to excavator quick hitches via the user of quick hitch bolted head plates. There are 4 different types of quick hitch bolted head plates, ranging from 65mm to 100mm pins. MGF Augers are suitable for use with excavators ranging in capacity from 13t to 45t.

They are supplied with 3.2m long drills, either 400mm or 600mm in diameter. These drills are fully flighted to aid with removal of material from the ground. Telescopic extensions are available to allow for maximum drilling depths of up to 5.4m, further rigid extensions can be added on to these to achieve a maximum drilling depth of up to 9.0m (using the Ø400 drill) and up to 8.0m (using the Ø600 drill). The drills are suitable for hard ground conditions and rock. Please contact MGF for further details. A detailed user guide for MGF Augers is available on our website.

PRODUCT NOTES

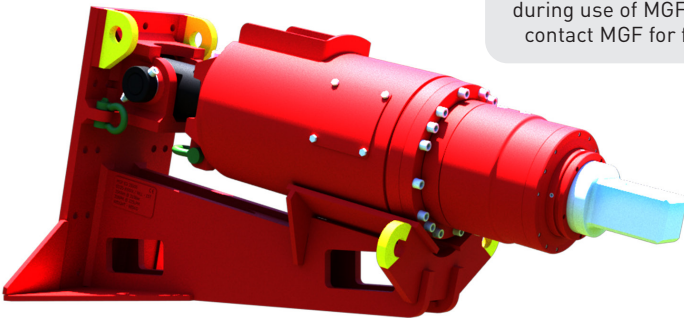
1. Operators should familiarise themselves with the Auger User Guide available on MGF's website **mgf.co.uk**.
2. Ensure a pre-hire checklist has been completed and a site/task specific Risk assessment/Method Statement has been prepared prior to use.
3. Ensure that Temporary Works Coordinators (TWC) and Temporary Works Supervisors (TWS) have been consulted prior to operations commencing.
4. Ensure that lifting operations have been appropriately planned prior to use.
5. Ensure that all associated equipment is of sound condition, rated appropriately and is tested in accordance with legislative requirements.
6. Adequate PPE must be worn at all times.
7. Operatives must not work underneath any suspended loads and loads must never be lifted over operatives. It is recommended that exclusion zones are maintained whilst the auger is operating.
8. All pinned / bolted connections should be checked before every use.
9. Ensure competent operatives are appointed to fit Augers / EMVs to excavators prior to operations commencing.
10. Ensure competent operatives and supervisors are appointed to operate and assist in the operation of Augers / EMVs prior to operations commencing.
11. Ensure control measures are in place for the protection of operatives, third parties, plant and structures in the proximity of operations prior to them commencing.
12. Augers / EMVs should only be operated on stable ground.
13. Ensure any overhead cable hazards and associated risks are identified and controlled.
14. Ensure that regular checks are carried out to ensure that hazards are controlled and the equipment is in good working order.
15. Ground vibrations may lead to substantial nuisance or hazard to the adjoining areas.



MGF AUGER DATA

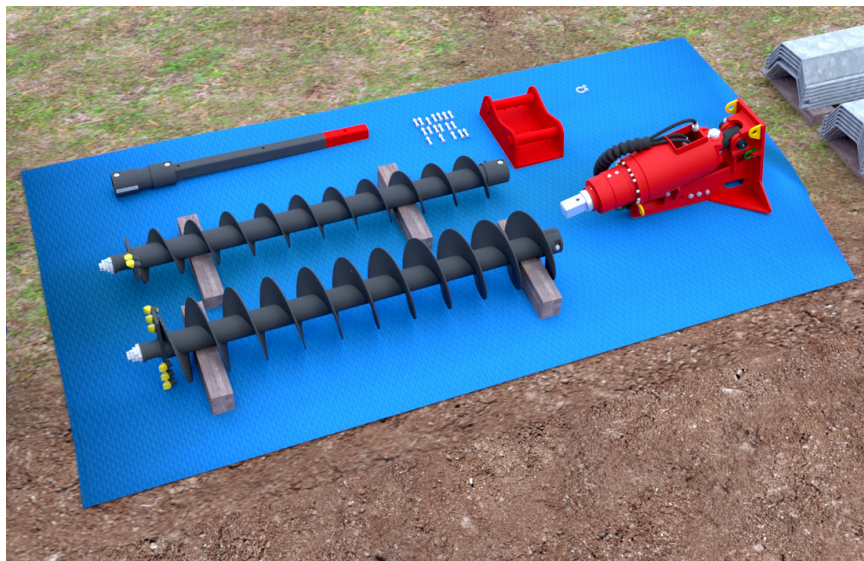
Type	35000 Max.	
	Oil Pressure Range	Bar
	Torque Range	Nm
	Oil Flow Range	lpm
	Speed Range	rpm
	Hub Options	mm
	Height	mm
	Width	mm
	Weight	kg
	Hitch Options	Single Pin Hitch Double Pin Cradle Hitch
	Auger Range	PA
	Rec. Drilling Diameter Range	mm

* Flow rates quoted are continuously, intermittent flow rates up to 225lpm allowed.

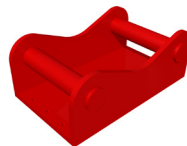
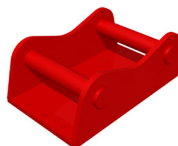
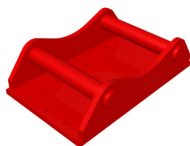


Ground vibration monitors are available to monitor vibration levels during use of MGF Augers. Please contact MGF for further details.

Product ID	Description		Weight
	(mm)		(kg)
	2.950	MGF Auger and Cradle	835
	2.951	Auger Drill - Ø400, 3.2m long	320
	2.952	Auger Drill - Ø600, 3.2m long	450
	2.953	Auger Drill - 1.5m Telescopic Extension	180
	2.954	Auger Drill - 2.0m Rigid Extension	160



MGF AUGER BOLTED HEAD – QUICK COUPLER COMPATIBILITY



MGF Auger Bolted Head Pin Size	Geith Quick Coupler	Miller Quick Coupler	Hill TEFRA Quick Coupler
(mm)			
65	QC65H, QH65M	Range 4	Tefra 13t
80	QC80H, QH80M	Range 5, Range 6	Tefra 16t, Tefra 21t, Tefra 25t
90	QC90H, QH90M	Range 7, Range 8	Tefra 30t
100	QC100H	Range 8, Range 9	Tefra 35t

For other quick coupler manufacturers please contact MGF for further details.

**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF AUGER**

mgf.co.uk/products/auger



Auger



SHORING SAFETY PRODUCTS



EDGESAFE	7.1
ENDSAFE PANELS	7.2
LADDERSAFE	7.3
STAIRSAFE	7.4
DAVITSAFE	7.5
GANGWAY RAMPS	7.6
ROAD PLATES	7.7



MGF ARE COMMITTED TO IMPROVING SITE SAFETY IN AND AROUND EXCAVATIONS THROUGH INNOVATION. OUR RANGE OF EXCAVATION SAFETY SYSTEMS BEAR TESTAMENT TO THIS COMMITMENT AND ARE AVAILABLE FOR USE WITH THE COMPLETE RANGE OF MGF EXCAVATION SUPPORT SYSTEMS.

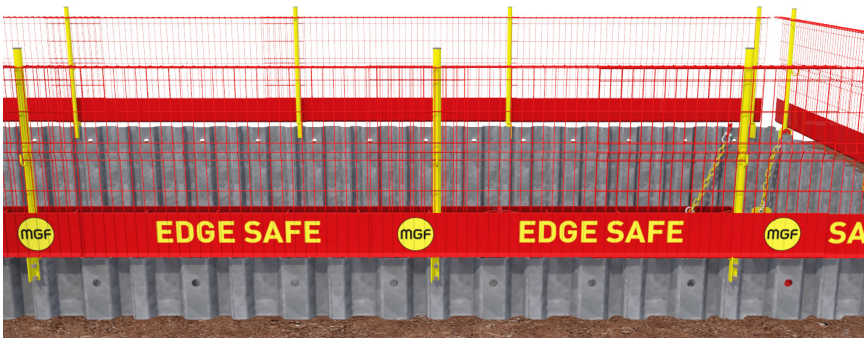
These systems are manufactured by MGF to meet the requirements of the Work at Height Regulations 2005, the Provision and Use of Work Equipment Regulations (PUWER) 1998 and BS EN 13374 (2013) Temporary Edge Protection Systems.

MGF EDGESAFE SYSTEMS ARE LIGHTWEIGHT STEEL EDGE PROTECTION SYSTEMS AVAILABLE IN A VARIETY OF SIZES WITH A RANGE OF FIXING CLAMPS ALLOWING IT TO BE USED TO PROVIDE PERIMETER EDGE PROTECTION TO ANY EXCAVATIONS EMPLOYING MGF EXCAVATION SUPPORT SYSTEMS. THERE ARE 2 TYPES OF EDGESAFE PANELS, EDGESAFE AND EDGESAFE-MESH.

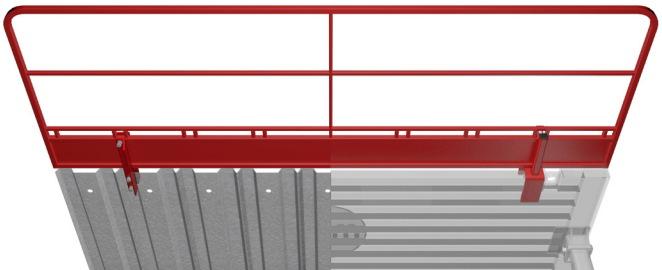
Edgesafe panels are manufactured from grade min. S235 hollow steelwork sections and plate. Edgesafe-Mesh panels are manufactured from 5mm steel mesh and plate. Both systems are designed to be installed by two persons directly onto MGF excavation support systems using solid steel clamps with clamping bolts. These systems satisfy the requirements of BS EN 13374 (2013) Class A Temporary Edge Protection Systems and are suitable for site use where the ground slopes up to a maximum of 10°. It is not suitable for use as a pedestrian barrier.

PRODUCT NOTES

1. Ensure that the panels are not damaged and that the correct clamps are provided prior to use.
2. Always install the system from a position of safety. If working from an unsupported edge a full risk assessment should be carried out for the installation.
3. When Edgesafe panels are clamped check each panel cannot be lifted, slide or rotate. N.B. Edgesafe panels can be flipped to allow tightening of clamping bolts from either side (subject to a risk assessment).
4. Prior to installing Edgesafe-Mesh panels ensure the connecting clamp is fully secure and cannot slide prior to installing the mesh panels.
5. Never lean over the panel or the edge of the excavation to adjust the clamps.
6. Always ensure that bolts are fully tightened and panels sit square and plumb with the upper rail at a minimum 1.0m above ground level.
7. Avoid gaps in-between the panels that are greater than 120mm.
8. Always replace damaged panels.
9. Edgesafe and Edgesafe-Mesh panels should only be fitted to MGF excavation support systems using the clamps specified. The customer must ensure that these support systems are installed in accordance with MGF guidelines and are sufficiently robust and stable to act as an effective edge protection support.
10. Take care when handling and storing on site as panels can be easily damaged. Always stack on timbers and lift either by hand or using a fork lift.
11. Do not use panels to support ladders, services, equipment or materials.
12. Edgesafe-Mesh panels can be simply overlapped to create a constant run of edge protection. Each connecting adaptor can be used with 2 overlapping Edgesafe-Mesh panels. Cable ties can be used to secure panels together if desired.



Edgesafe panels can be attached to all MGF box panels, trench sheets and sheet piles.



The sheet clamp can secure anywhere along the panel.

The box clamp pins through the connection points on the panel.

		Panel Type	Panel Length (mm)	Panel Height (mm)	Weight* (kg)
Product ID	4.319	Edgesafe	500	1603	7
	4.3195	Edgesafe	1000	1063	12
	4.320	Edgesafe	2000	1063	22
	4.325	Edgesafe	2500	1063	27
	4.330	Edgesafe	3000**	1063	31
	4.335	Edgesafe	3500**	1063	37
	4.346	Edgesafe-Mesh	2700	1120	26
	4.347	Edgesafe-Mesh	1300	1120	13

*Panel only - excludes clamps.
 ** On larger panels consideration should be given to providing a third central clamp to reduce deflection - particularly if there is a possibility of more than one person working immediately against the panel.

Edgesafe-Mesh panels can be attached to all MGF trench sheets and sheet piles.



The Edgesafe-Mesh sheet clamp can secure anywhere within the mesh panel.

EDGESAFE CONNECTING CLAMPS



60-110 THICK PANEL CONNECTOR CLAMP

Made from S275 steel and designed to be used on all 60-110mm thick MGF boxes. The pin is used to connect the clamp to the Edgesafe panel. The clamping screw and integrated spanner are used to fix the clamp to the box panel.

Product ID	Weight	Jaw Gap
	(kg)	(mm)
4.314	9	55-121



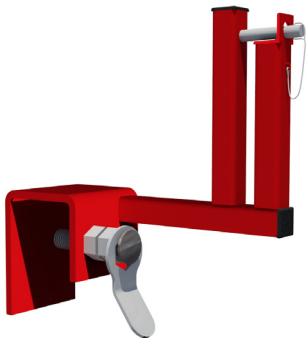
SHEET CONNECTOR CLAMP

Made from S275 steel and designed to be used on all MGF trench sheets and sheet piles. The top bolt is used to connect the clamp to the Edgesafe panel. The bottom 2 bolts are used to fix the clamp to the sheet.

Product ID	Weight	Jaw Gap
	(kg)	(mm)
4.318	5	0-35

60-110 THICK PANEL OFFSET CONNECTOR CLAMP

Made from S275 steel and designed to be used on all 60-110mm thick MGF trench and manhole boxes, the pin is used to connect the clamp to the Edgesafe panel. The clamping screw and integrated spanner are used to fix the clamp to the box panel. This bracket offsets the Edgesafe panel by 300mm - allowing Edgesafe to be installed whilst the box is being driven, ensure the brackets are located such that they will not be struck by the excavator bucket, as well as keeping operatives away from the edge of the excavation.

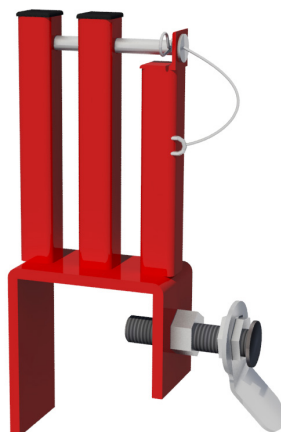


Product ID	Weight	Jaw Gap
	(kg)	(mm)
4.313	12	55-121

60-150 THICK PANEL OVERLAPPING CONNECTOR CLAMP

Made from S275 steel and designed to be used on all 60-150mm thick MGF trench boxes, manhole boxes and drag boxes. The pin is used to connect the clamp to the Edgesafe panel. The clamping screw and integrated spanner are used to fix the clamp to the box panel. The bracket allows Edgesafe panels to overlap when installed on the box panel and extend beyond the extents of the box by up to 1.0m (3.0m and 3.5m Edgesafe panels only).

Product ID	Weight	Jaw Gap
	(kg)	(mm)
4.311	10	55-155



EDGESAFE-MESH CONNECTING CLAMP

SHEET CONNECTOR CLAMP

Made from S275 steel and designed to be used on all MGF trench sheets and sheet piles. The 2 bolts are used to fix the clamp to the sheet. The Edgesafe-Mesh panels simply sleeve over the tube and sit on the hook. Edgesafe-Mesh panels can simply overlap by sharing sheet connector clamps.

Product ID	Weight	Jaw Gap
	(kg)	(mm)
4.3185	8	0-35



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF EDGESAFE**

mgf.co.uk/products/edgesafe

MGF ENDSAFE PANELS ARE A SIMPLE, ROBUST EXCAVATION PANEL SYSTEM DESIGNED TO SAFELY SUPPORT VERTICAL SOIL FACES AT THE OPEN ENDS OF BOXES OR TRENCH EXCAVATIONS WHERE IT IS NOT POSSIBLE TO BATTER THE SOIL BACK. THEY ARE DESIGNED TO BE INSTALLED BY AN EXCAVATOR.

System is generally suitable for trench depths of up to 4.8m and widths of up to 4.0m.

Fabricated from fully welded Grade S355 120x60mm and 200x100mm steel box sections.

Panels can be connected together and stacked up to 2 high using simple clamps with locking bolts and nuts.

MGF can supply the systems with a full range of suitable lifting chains and Edgesafe edge protection panels.

Manufactured and designed in accordance with BS EN 13331 : 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Panels should only be used in the configurations shown on page 7.2.3 by competent persons when specified for use with MGF excavation support systems.
2. Panels are heavy and great care must be taken in selecting a suitable excavator for handling, installing and extracting. If stacking panels on site, timber packers must be used to separate the panels.
3. Panels should not be left in-situ for extended periods within cohesive or very weak soils as earth pressures / adhesion on the panel surfaces may increase significantly with time requiring additional extraction forces to release them.
4. Always use MGF specified lifting chains when lifting and handling the boxes or components.
5. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
6. During lifting or extraction operations ensure personnel are well clear of the equipment.
7. Customer must ensure that prior to use checks are made confirming that the installed panels each bear a minimum 75mm onto the box panels either side of the trench. In addition the panels must be square and plumb with soil packed evenly against the back face to ensure the panels cannot shift during the proposed works.
8. When installing Utility Endsafes Panels the hatch should always be on the bottom face for service entry. If an increased depth is required then Utility Endsafe Panels should only ever be attached to a similar sized standard Endsafes Panel.

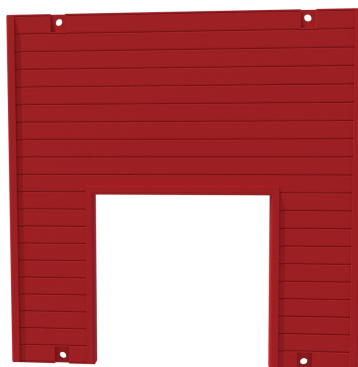


CONNECTING CLAMPS



Each Endsafe panel has 2 lifting / connecting points on each edge. Panels can be connected by attaching a connecting plate on each face of each connecting point and bolting through both plates using 2 No. M30 bolts and nuts. No more than 2 panels should be connected in this manner - using 4No connecting plates and 4No. M30 bolts and nuts.

		Description	Weight	Panel SWL	Panel Thickness
		(L x H)	(kg)	(kN/m ²)	(mm)
Product ID	4.191	1800 x 1200	225	45	60
	4.192	2400 x 1200	290	45	60
	4.193	2400 x 1800	410	45	60
	4.194	3000 x 2000	510	45	60
	4.196	2400 x 2400	380	45	60
	4.195	4000 x 2000	845	45	100
	4.1945	Utility Endsafe 3000 x 2000	512	45	60
	4.1965	Utility Endsafe 2400 x 2400	453	45	60
	4.1955	Utility Endsafe 4000 x 2000	840	45	100

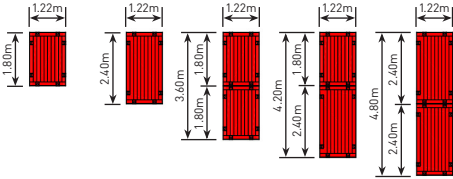
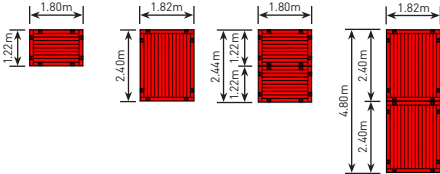
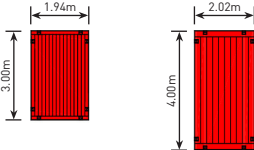
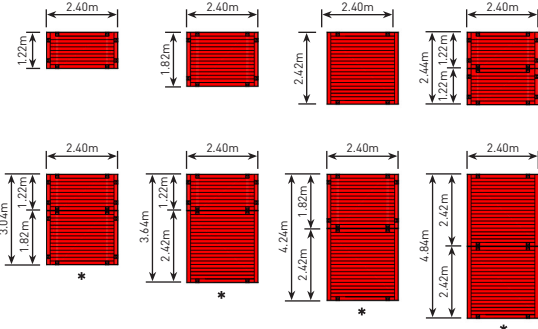
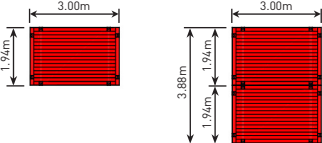
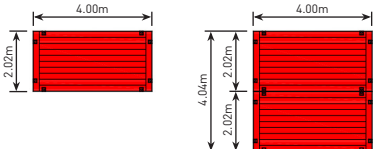


FOR SAFE SYSTEM OF
WORKS GUIDANCE FOR
MGF ENDSAFE PANELS

mgf.co.uk/products/endsafe



ENDSAFE PANEL ALLOWABLE CONFIGURATIONS

<p>1.2M WIDE CONFIGURATIONS</p>	
<p>1.8M WIDE CONFIGURATIONS</p>	
<p>2.0M WIDE CONFIGURATIONS</p>	
<p>2.4M WIDE CONFIGURATIONS</p>	
<p>3.0M WIDE CONFIGURATIONS*</p>	
<p>4.0M WIDE CONFIGURATIONS*</p>	

*The bottom panel in these assemblies can be substituted for a utility endsafe panel.

*Davitsafe part of the shoring
safety product range*



MGF

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MGF LADDERSAFE IS A SIMPLE, ROBUST LADDER ACCESS PLATFORM FOR USE WITH MGF EXCAVATION SUPPORT SYSTEMS. THE SYSTEM IS AVAILABLE IN A VARIETY OF FORMATS TO ALLOW IT TO QUICKLY AND EFFECTIVELY CLAMP TO EITHER STEEL SHEETS / PILES OR STEEL BOX SYSTEMS PROVIDING A SAFE ACCESS PLATFORM FOR ENTRY TO THE EXCAVATION VIA A GRP OR WOODEN POLE LADDER.

The platforms are manufactured from grade S275 steel. The platform is designed to be lifted into place by an excavator and solid steel clamps with clamping bolts are provided to lock the system in position. MGF can supply GRP ladders or epoxy coated steel ladders for hire, or timber one piece leaning rung ladders in a variety of lengths for sale only.

PRODUCT NOTES

1. Ensure that the platforms and ladders are not damaged or distorted and that the correct clamps are provided prior to use.
2. Always install the system from a position of safety. If working from an unsupported edge a full risk assessment should be carried out for the installation. Once clamped check platform cannot be lifted, slide or rotate.
3. Always ensure that bolts are fully tightened and panels sit square and plumb with the upper rail at a minimum 1.0m above ground level.
4. Avoid gaps between the panels that are greater than 120mm.
5. Always replace damaged platforms.
6. Laddersafe should only be fitted to MGF excavation support systems using the clamps specified. The customer must ensure that these support systems are installed in accordance with MGF guidelines and are sufficiently robust and stable to act as an effective edge protection support.
7. Always consult with MGF for suitability of the system for any specific installation. MGF Laddersafe must not be clamped to trench sheets less than 6mm thick (Type 1, 2, 3 & Mini Laddersafe units) or piles in pure cantilever or cantilevering more than 1.5m above a waler rail / brace or 0.5m above ground level. In addition it is essential that the excavation support system (that the clamp is attached to) is installed robustly and fully supported by the ground (no voids / weak ground present).
8. Take care when handling and storing on site as the gate and rails can be easily damaged. Always stack on timbers and lift using the lifting shackles provided.
9. The platform and ladder are to be used by one person at a time and each Laddersafe unit has a max. SWL = 150kg.
10. Do not store plant and equipment on the platform, support services or attempt to carry equipment down the ladder.
11. Ensure the ladder is adequately footed, securely lashed to the pole rest and extends at least one rung above the pole rest.
12. Ladders must be installed at a safe angle of inclination between 65° and 75°.



TYPE 1 LADDERSAFE (TRENCH BOX / TRENCH SHEET)

The trench box / trench sheet laddersafe is designed to fit onto all 60mm - 110mm thk.

MGF trench boxes and manhole boxes. It can also be used on ER 750/8, FKD 400/6, KKD 600/6 and KKD 600/8 Trench Sheets. The overall width of the clamp is 1260mm.

This laddersafe unit also features slots for platform extension units when used with MGF bracing frames.



Product ID	Clamp Jaw Gap	Weight
	(mm)	(kg)
4.301	50 - 120	156



TYPE 2 LADDERSAFE (DRAG BOX)

The drag box laddersafe is designed to be installed on the back end of the drag box (i.e. not the cutting edge end). The cut out in the clamp fits around the rear strut pocket. The overall width of the clamp is 870mm.

Product ID	Clamp Jaw Gap	Weight
	(mm)	(kg)
4.302	50 - 120	166

TYPE 3 LADDERSAFE (INTERLOCKED SHEET PILES)

The Type 3 Laddersafe units are specifically designed for use on heavy duty interlocked sheet piles. The clamp uses 2 bolts to secure the Laddersafe onto 3 successive sheet pans. 4.303 is suitable for use on sheet piles up to GU18N while 4.3035 is suitable for the entire range of sheet piles that MGF offer. Both types are suitable for use with MGF Waler/Bracing frames up to 406 UC Brace. The overall width of the clamp is 1400mm.



Product ID	Clamp Jaw Gap	Weight
	(mm)	(kg)
4.303 / 4.3035	300 - 440 / 300 - 485	277 / 300



TYPE 3 LADDERSAFE (STAIRSAFE)



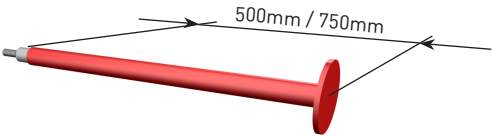
The Type 3 Laddersafe that is used with Stairsafe is suitable for use with all MGF GU and PU sheet piles and is suitable for use with MGF Waler/Bracing frames up to 406 UC Brace.

A 300x300mm SHS packing piece (product ID = 4.30391) can be used in conjunction with this Laddersafe to reduce the clamp jaw gap range to 0mm – 185mm. This packing piece simply bolts within the Laddersafe clamp using M16 nuts and bolts, allowing the platform to connect to 6mm+ thick MGF trench sheets, to allow Stairsafe to be used with steel trench sheets. In addition, the packing piece enables the Laddersafe to connect to MGF 150mm thick High Clearance Trench Box panels.

The system is also compatible with MGF Gangway Ramps (see section 7.6).

Product ID	Component	Clamp Jaw Gap	Weight
		(mm)	(kg)
4.3039	Type 3 Laddersafe for Stairsafe	300 - 485	330

POLE DETAILS

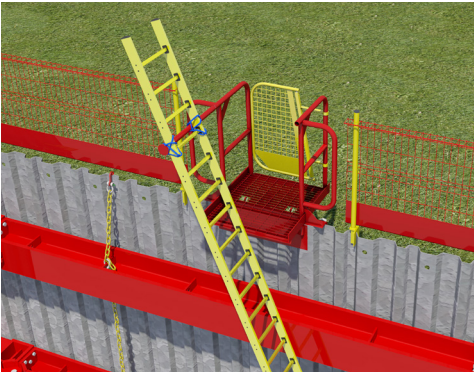


The pole is detachable to enable it to be used on either side of the Laddersafe platform, depending on orientation of ladder. Poles are available in 500mm and 750mm lengths.

PLATFORM EXTENSION DETAILS

For use on Type 1 Laddersafe platforms when installed on braced cofferdams. When using the platform extension the 750mm pole should always be supplied.

The 350mm platform extension (weight = 25kg) slots into pockets welded to the front of the clamps and is secured in place using 2 No. M16 set screws.



MINI LADDERSAFE



Smaller and lighter than Type 1, 2 & 3 Laddersafe units, MGF's Mini Laddersafe is suitable for smaller excavations. Features include back levelling jacks, for increased stability; integrated restraint bar for additional safety whilst installing / removing the ladder and a hinged flooring for ease of access to the clamping bolts. The overall width of the clamp is 760mm.

It is suitable for use with all steel trench sheets (MGF recommend doubling up the sheets local to the clamp when using BS sheets and FKD 400/6 sheets) and all 60mm-110mm thk. MGF box systems. It is suitable for use with walers / brace up to and including 203UC.

Product ID	Clamp Jaw Gap (mm)	Weight (kg)
4.365	0 - 125	100



**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF LADDERSAFE**

mgf.co.uk/products/laddersafe



Standard Trench Sheets



FKD 400/6 Trench Sheets



KKD 600/6 & 600/8 Trench Sheets



ER 750/8 Trench Sheets



L8 Trench Sheets



FLP 600/3.5 & 600/6 Trench Sheets

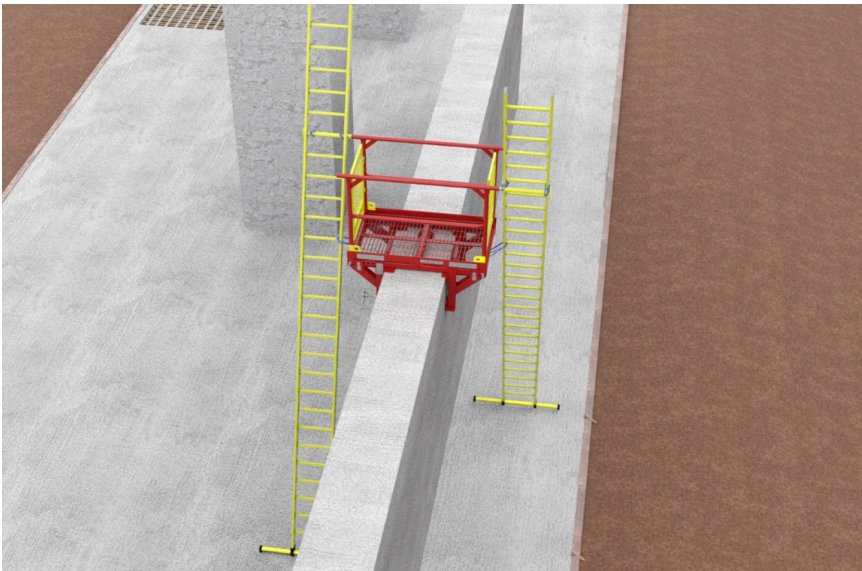


MGF WALL BRIDGES

MGF Wall Bridges are robust, double sided, steel ladder access platforms that have been specifically designed for access over tall concrete walls, in addition to interlocked sheet piles. They feature infinitely adjustable clamping mechanisms that allow them to clamp to any thickness between 80mm and 650mm. The system features removeable ladder poles, which can be installed to suit. The platform can be accessed by 1 person at a time and has a 150kg SWL. It is recommended for use in conjunction with an MGF Extendable Base Davit System (page 7.5.4).



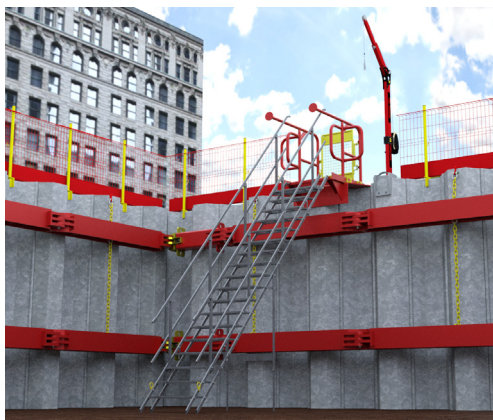
Product ID	Weight (kg)	Useages	Compatible with
4.390	355	Concrete Walls, Steel Box Panels (100mm+)	GRP/Epoxy Coated Steel/Wooden Leaning Rung Ladders, Gangway Ramps
4.391	400	Concrete Walls, Steel Box Panels (100mm+), All MGF Interlocked Sheet Piles	GRP/Epoxy Coated Steel/Wooden Leaning Rung Ladders, Gangway Ramps and Stairsafe



MGF STAIRSAFE IS A COMPACT, LIGHTWEIGHT, SINGLE PERSON TEMPORARY STAIR ACCESS SYSTEM FOR USE IN COFFERDAMS WHERE LADDER ACCESS IS NOT ACCEPTABLE. A VARIETY OF MODULAR STAIR LENGTHS ARE AVAILABLE WHICH CAN COMBINE AND ALLOW ANY HEIGHTS FROM 0.5M TO 7.7M TO BE ACHIEVED.

The system is available in 3 Step, 9 Step, 12 Step and 18 Step components, and connect to Trench Sheets or Sheet Piles using a Type 3 Laddersafe design. The top of the Stairsafe connects to the Laddersafe platform via the supplied connectors. Stairsafe can also directly connect to concrete using these connectors. If the Stairsafe is to connect to scaffolding then the supplied connectors must be replaced with scaffold connectors. The system is suitable for use by only 1 person at a time and has a 150kg SWL.

The weights of the fully assembled stairs varies from 45kg to 820kg (max. height including support beam sections). The assembled stairs have an angular range of between 30° and 50°, the treads are self-levelling. Individual stair lengths are simply connected together using nuts and bolts, no more than 2 stair units should be connected. The handrails simply slot within sockets on the stairs and connect together using nuts and bolts. Both the stairs and handrails can be separately flat packed for ease of storage and transport.



Additional support for the stairs are required over certain heights, the 18 step stair component comes with simple vertical support, while Stairsafe assemblies of 24 steps and above require additional support beams to be connected underneath the stairs. Stairsafe can be easily installed on embankments, when installed in this manner the minimum angle can be less than 30° and as long as the stairs are evenly supported then there is no maximum length, and no additional support is required.

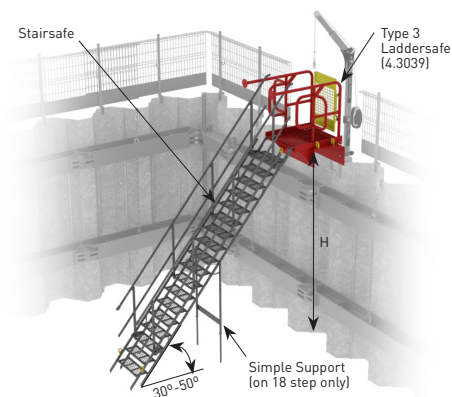
PRODUCT NOTES

1. A minimum of two operatives are required to install the components and great care must be taken to ensure that they carry out the work from a position of safety, avoiding the need to reach out or lean over the excavation or be dragged over a vertical drop by the components swinging outwards. At no point should any operatives be working adjacent to an unsupported edge (in case edge collapses) nor should the stairs be installed or removed whilst operatives are immediately below. It is recommended that a minimum 2.0m square, flat and stable area is provided at the base to allow for safe installation.
2. It is recommended that the Trench Sheets or Sheet Piles the Stairsafe is to be attached to are toed in at least 1.0m below formation level.
3. Installation is normally commenced by installing the MGF Laddersafe platform (refer to section 7.3). The location should be carefully checked for suitability in use and sufficient clear space for installation together with a secure and stable footing. Ensure that the



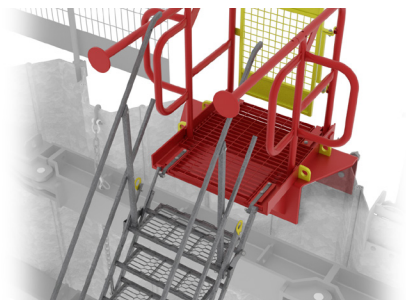
Laddersafe platform and clamp are not damaged and that the correct Laddersafe has been provided.

4. Mark the exact location where the Laddersafe will be installed and confirm the clamp will fit as intended. If the Laddersafe is to be connected to a Trench Sheet then ensure that a steel packing piece is provided to install within the Laddersafe clamp.
5. Once the platform is fully secure the stairs can be lifted into position (using suitable chains attached to the lifting points) with the hook detail at the top of the stairs hooking onto the Laddersafe flooring. The connectors provided at the top of the unit must line up with the connectors on the Laddersafe platform, before being secured using M14 set bolts.
6. Prior to use, visually inspect the stairs to ensure that the connectors are secured and that there are no gaps in the platform / edge protection / stair handrail system. Also ensure that there are no obstructions / trip hazards or other restrictions for the safe use of the stairs.
7. Prior to assembling and installing the Stairsafe ensure the mechanisms / threads are suitably lubricated.
8. The handrails can be installed within the Stairsafe prior to connecting to the Laddersafe. The handrails can scissor during handling, take care of finger trap hazards and always wear safety gloves when handling Stairsafe components.
9. Installation of the Stairsafe system should only take place after the excavation has been bottomed-out and the formation is blinded to provide a firm, level landing surface for the stairs and supporting components.
10. If the excavation depth requires 2 Stairsafe lengths to be connected this should be done when the stairs are flat packed, slotting them together and securing using nuts and bolts. The biggest Stairsafe should always be at the bottom of the assembly.
11. The Stairsafe assembly should be lifted flat using a 4-leg chain, to connect to the Laddersafe prior to lowering so the bottom bears evenly on the ground.
12. It is recommended to use a guide rope attached to the top step to assist with connecting the Stairsafe connectors to the Laddersafe connecting plates.
13. After the Stairsafe is installed the angle of the steps can be adjusted by pushing up on the bottom of the handrail while applying pressure to the bottom step.
14. Ensure that the relevant supports are installed, as per the table on 7.4.3 – when using the simple support ensure it is vertical, bearing on the ground and the wingnuts are sufficiently tightened. When using support beams ensure the correct fittings are used to connect together, and that they are fully tightened.
15. Ensure that only one person uses the stairs at a time and that the stairs do not sway, vibrate or deflect excessively during use.
16. The installation must be checked by a competent person prior to use, ensure the stair treads are horizontally aligned, and that all clamp/nuts and bolts are properly tightened.
17. At regular intervals ensure stairs are visually inspected for evidence of damage / distress, paying particular attention that the connection detail between the Stairsafe and Laddersafe is fully tightened and that there are no gaps in the edge protection.
18. Removal is a reverse of installation.



Total Steps	Assembled Weight (kg)	Product ID	Height Range (m)		Additional Support				
			Min.	Max.	Simple Support	End Section 4.387 132kg	Beam Support		End Section 4.387 132kg
							Middle Section 4.388 93kg	Middle Section 4.388 93kg	
3	45	4.380	0.5	0.75	X	X	X	X	X
6	90	4.380 & 4.380	1.0	1.5	X	X	X	X	X
9	95	4.382	1.5	1.9	X	X	X	X	X
12	112-140	4.383 OR 4.382 & 4.380	1.9	2.7	X	X	X	X	X
18	185	4.385	2.7	3.8	✓	X	X	X	X
21	230	4.385 & 4.380	3.8	4.6	✓	X	X	X	X
24	488	4.383 & 4.383	3.8	5.2	X	✓	X	X	✓
27	544	4.385 & 4.382	4.6	5.8	X	✓	X	X	✓
30	654	4.383 & 4.385	4.6	6.4	X	✓	✓	X	✓
36	820	4.385 & 4.385	5.8	7.7	X	✓	✓	✓	✓





STAIRSAFE CONNECTION DETAIL

MGF Stairsafe connects to a compatible MGF Laddersafe using M14x30 (min.) set bolts. Ensure the bolts are fully tightened prior to use. This connector detail allows the Stairsafe assembly to swivel to the desired angle.

Product ID	Component	Weight
		(kg)
4.380	3 Step Stairs	45
4.382	9 Step Stairs	95
4.383	12 Step Stairs	112
4.385	18 Step Stairs	185
4.387	Beam Support - End Section	132
4.388	Beam Support - Middle Section	93



The Type 3 Laddersafe that is used with Stairsafe is suitable for use with all MGF interlocked Sheet Piles. The Stairsafe units attach to connecting plates on the Laddersafe flooring. The overall width of the clamp is 1400mm. The platform can also be used with 6mm+ thick MGF Trench Sheets when used in conjunction with a steel packing piece.

Product ID	Component	Clamp Jaw Gap	Weight
		(mm)	(kg)
4.3039	Type 3 Laddersafe for Stairsafe	300 - 485	330

**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF STAIRSAFE**

mgf.ltd.uk/products/stairsafe



MGF'S DAVITSAFE RANGE ARE LIGHTWEIGHT ALUMINIUM DAVIT SYSTEMS IDEALLY SUITED FOR UTILITY WORKS, DESIGNED TO BE FITTED TO MGF STEEL BOX SYSTEMS AND KKD & ER TRENCH SHEETS AS WELL AS INTERLOCKED SHEET PILES. FULLY COMPLIANT WITH BS EN 795 CLASS B, THE LIGHTWEIGHT ALUMINIUM DAVIT IS SUITABLE FOR USE WITH THE MGF RGA4 FALL ARREST AND RECOVERY WINCH AND RGR7 RESCUE WINCH SYSTEMS. PORTX DAVIT IS ALSO SUITABLE FOR USE WITH THE RGA4 AND RGR7 IN ADDITION WITH MGF MATERIALS HANDLING WINCHES.

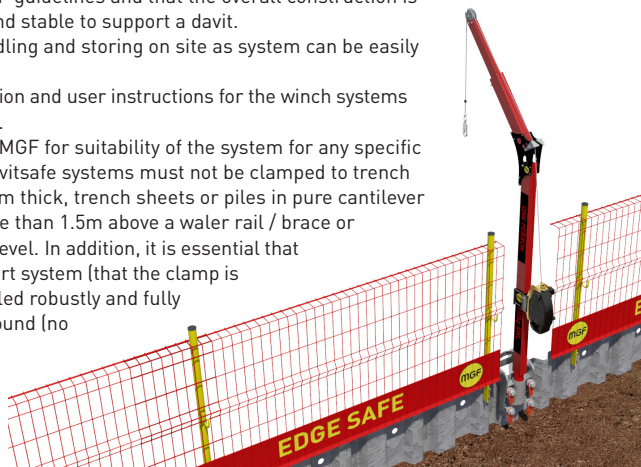
All MGF Davitsafe systems are provided as modular systems which can be broken down for ease of transport and installation. The extendable arm on the Lightweight Aluminium Davit provides a horizontal reach between 500mm – 735mm (19.5" – 29"), while the PortX Davit has a horizontal reach of 800mm. Both systems are 2.0m tall when assembled.

The Davitsafe systems satisfy the requirements of the Confined Spaces Regulations (1997) in providing a suitable means of rescue. In addition, it provides fall protection for personnel using pole ladders to enter an excavation.

The MGF RGA4 fall arrest and recovery winch is rated to 140kg max. WLL in accordance with BS EN 1496 and BS EN 360 and has a max. working length of 15m with a max. fall arrest load of 6kN. The MGF Lightweight Aluminium Davit system is rated to 135kg WLL under LOLER, and is suitable for use with people only. The PortX Davit is rated to 140kg WLL when being used in fall arrest and man-riding applications and rated to 315kg WLL when being used to handle materials using MGF's 30m materials handling winch.

PRODUCT NOTES

1. Ensure that the davit arm and pillar are not damaged and that the correct clamps are provided prior to use.
2. Always install the system from a position of safety. If working from an unsupported edge a full risk assessment should be carried out for the installation. Once the clamp is fully tightened check that the base cannot be lifted, slide or rotate.
3. Ensure that the pillar sits square and plumb with the winch at approx. 1.0m above ground level.
4. Always replace damaged davit arms, pillars, clamps, winches, pulleys and brackets.
5. MGF Davitsafe systems should only be fitted to MGF excavation support systems using the clamps specified. The customer must ensure that these support systems are installed in accordance with MGF guidelines and that the overall construction is sufficiently robust and stable to support a davit.
6. Take care when handling and storing on site as system can be easily damaged.
7. Always read installation and user instructions for the winch systems provided prior to use.
8. Always consult with MGF for suitability of the system for any specific installation. MGF Davitsafe systems must not be clamped to trench sheets less than 6mm thick, trench sheets or piles in pure cantilever or cantilevering more than 1.5m above a waler rail / brace or 0.5m above ground level. In addition, it is essential that the excavation support system (that the clamp is attached to) is installed robustly and fully supported by the ground (no voids / weak ground present).



9. MGF Davitsafe components and winches are inspected / tested at 6 monthly intervals as specified by LOLER and rated for the loads given when used with MGF approved support systems. However, the customer must thoroughly inspect the complete system as installed to ensure that it is suitable for the use intended. It may be appropriate in certain circumstances to load test the system in-situ for the WLL of the particular Davitsafe / application.
10. When using the fall arrest system always ensure that the davit arm pulley is located above the ladder. The pillar can be rotated to ensure that the winch cable is free to run out and the winch can be easily operated.
11. When MGF Davitsafe systems are used with a davit clamp in fall arrest applications the davit arm must be positioned perpendicular to what the clamp is affixed to (or within plus or minus 45°).
12. When using the rescue recovery winch locate the davit arm pulley directly above the lift location. Ensure that the pillar is rotated to a position so that the winch cable does not snag, and the winch can be easily operated. Lift the person to above ground level using the winch and lock the winch mechanism. Using a rope either attached to the harness / stretcher or to the top of the davit arm secure the person for swinging out of the excavation. Slowly swing the davit arm out of the excavation. Once safely located above ground, unlock the winch mechanism, and lower the person to ground level using the winch.
13. Always ensure that in the event of a recovery situation sufficient area and clearance is available around the davit for safe retrieval.
14. Always ensure davit operations are carried out from a point of safety and rescuers do not stand on unsupported edges or put themselves at risk from falling in to the excavation.
15. To avoid side pull, lowering and lifting should only be carried out when the load chain forms a straight and vertical line between the load and lifting attachment point.

MGF Lightweight Aluminium Davit system can be provided with alternative fixings to allow the system to be used in situations where affixing to MGF sheets or box panels is not possible.

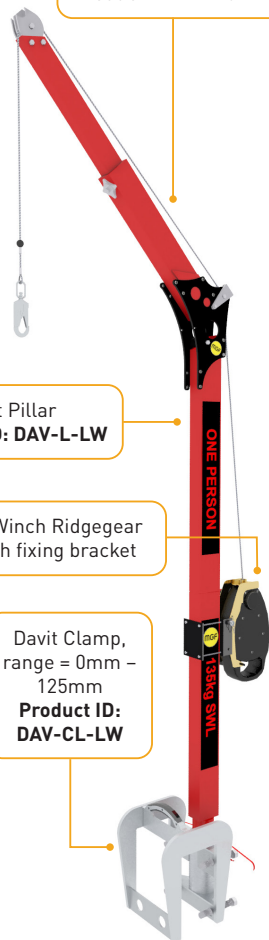
Lightweight Aluminium Davit	Weight
	(kg)
Davit Arm	12
Davit Pillar	8
Davit Clamp	18
Total	38

Davit Clamp,
range = 0mm – 125mm
Product ID: DAV-CL-LW

MGF Fall Arrest and Recovery Winch Ridgegear RGA4 (or similar approved) with fixing bracket

Davit Pillar
Product ID: DAV-L-LW

Davit Arm
Product ID: DAV-U-LW



FOR SAFE SYSTEM OF WORKS GUIDANCE FOR MGF LIGHTWEIGHT ALUMINIUM DAVIT SYSTEM

mgf.co.uk/products/lightweight-aluminium-davit-system

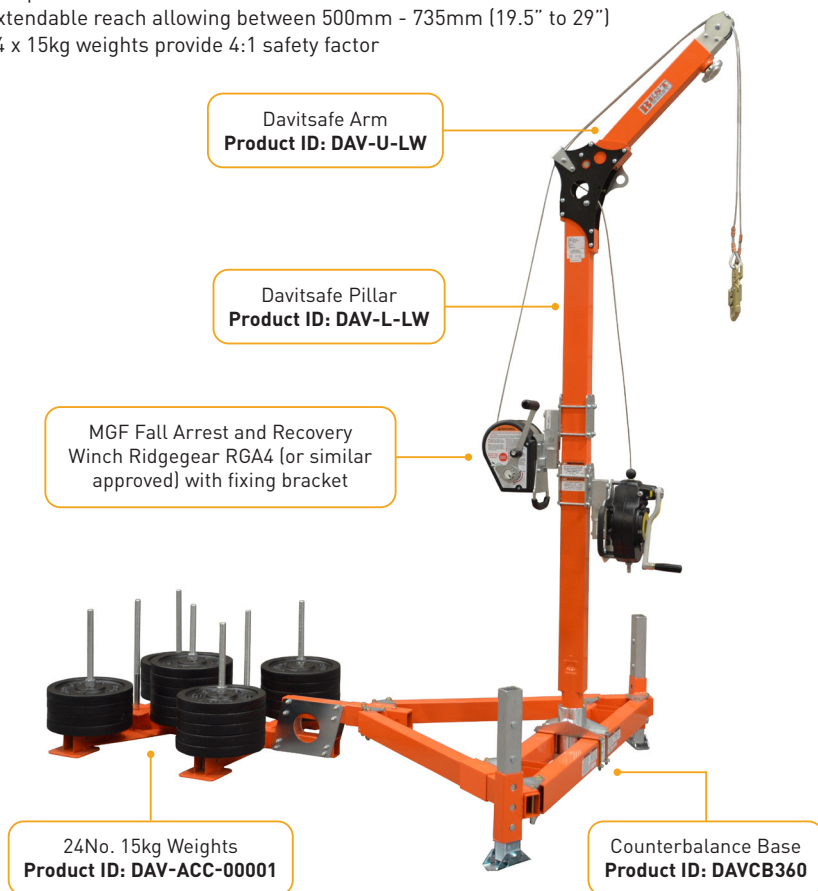
MGF COUNTER BALANCE DAVIT SYSTEM

The MGF counter balance davit system consists of five individual lightweight components to enable easy transportation and installation. The counter balance davit and RGA4 fall arrest / RGR 7 man-riding winches are connected to the free standing base.

The anchoring system includes a weight rack that uses counter balance / ballast weights to provide support for a davit arm.

No floor penetration is required and the complete system is modular and can be assembled in minutes providing a safe means of man-riding, fall arrest and rescue from height. The MGF counter balance davit system is the ideal system for multiple entry points to various confined spaces, or for when a permanent base plate cannot be mounted.

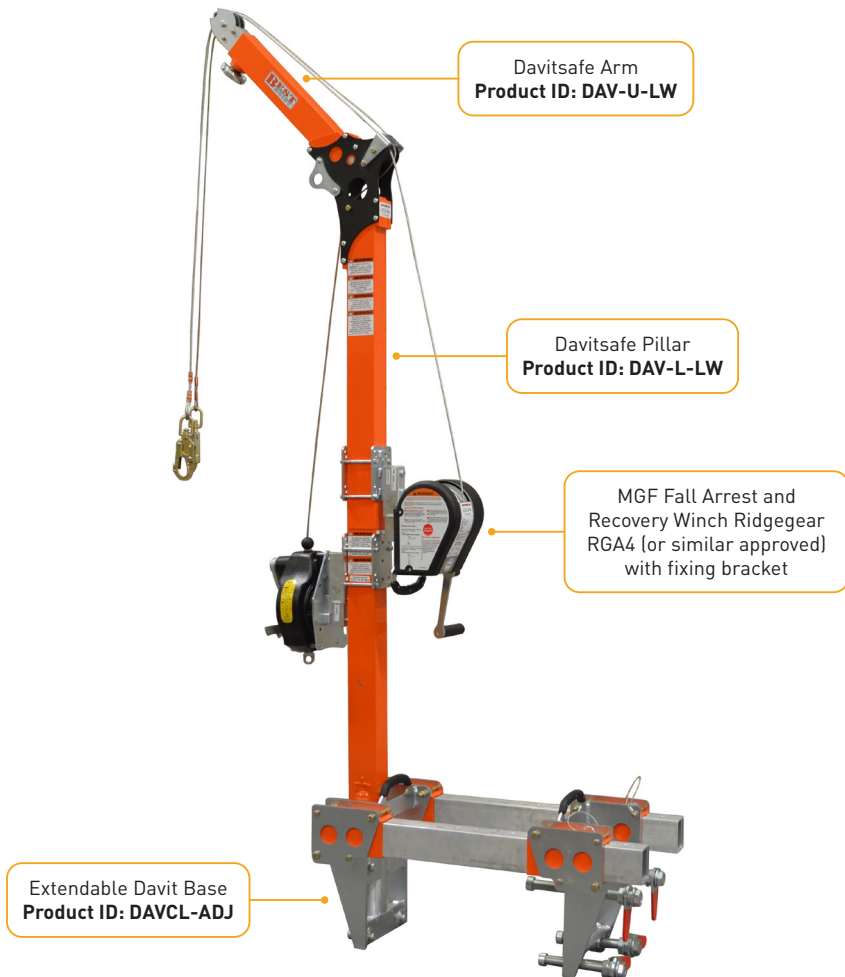
- MGF counter balance davit system is suited for work where connections to a modular system are not available
- Independently adjustable legs for level or uneven ground
- 5 piece modular system allowing manual installation
- Complies with BS EN 795 Class B
- Extendable reach allowing between 500mm - 735mm {19.5" to 29"}
- 24 x 15kg weights provide 4:1 safety factor



MGF EXTENDABLE BASE DAVIT SYSTEM

The MGF extendable base davit system is ideal for man-riding and retrieval in open excavations, where a cantilever system is required. The davit comes in a modular system which can be broken down for ease of transport and installation. The extra adjustable universal base clamp allows the davit to connect to most MGF shoring accessories and other suitable bases between 57mm - 635mm.

- For use with RGA4 fall arrest and RGR7 man-riding winch combinations
- 4 piece modular system allowing manual installation
- Complies with BS EN 795 Class B
- Adjustable base clamp allowing connection between 57mm - 635mm (2.25" - 25")



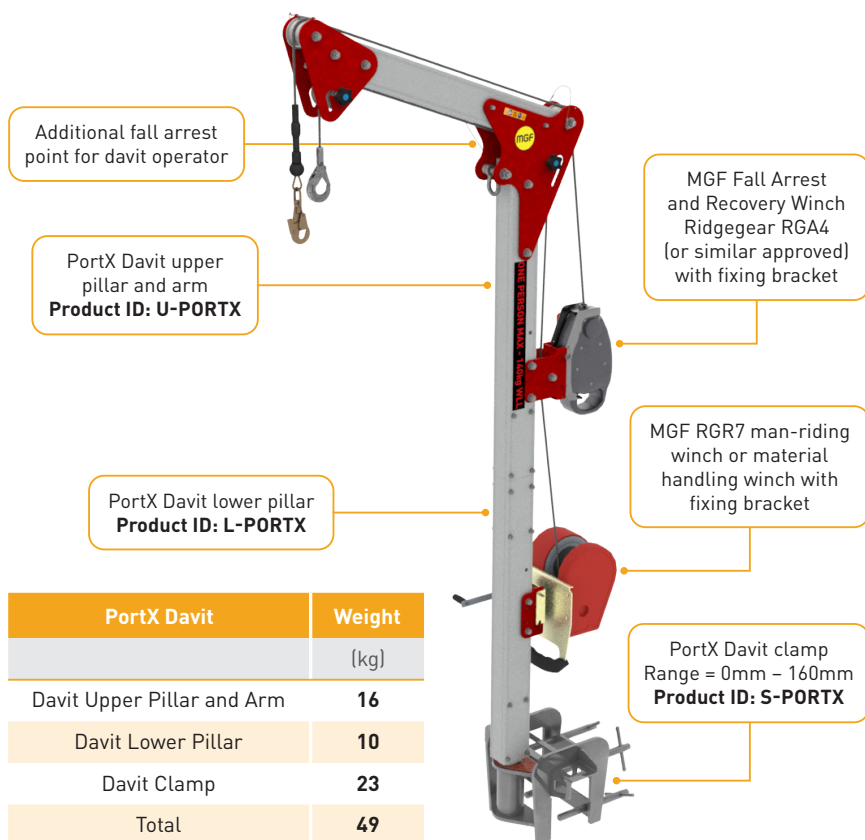
MGF PORTX DAVIT SYSTEM

MGF PortX Davit is a davit system that is suitable for fall arrest and retrieval in addition to man-riding and material handling use. It is provided as a modular system, which can be broken down into lightweight components. It is supplied with a universal trench shoring clamp, which is compatible with all MGF steel box systems up to 150mm thick, in addition to KKD and ER Trench Sheets and all MGF interlocked Sheet Piles.

The PortX Davit pillar can accept a fall arrest and recovery winch, as well as either a man-riding winch or material handling winch. In addition, another fall arrest block connection point is located on the davit pillar, for the davit operator to connect to.

The davit arm provides a horizontal reach of 800mm, making it suitable to be used with all MGF Bracing frames. The system has a vertical height of 2.0m.

- For use with RGA4 fall arrest and RGR7 man-riding winch combinations, in addition to MGF material handling winches
- 3 piece modular system allowing manual installation
- Complies with BS EN 795 Class B
- Adjustable base clamp allowing connection between 0mm – 160mm



MGF GANGWAY RAMPS ARE A ROBUST, MODULAR STEEL RAMP SYSTEM THAT CAN CONNECT TO MGF LADDERSAFE PLATFORMS AND WALL BRIDGE. THE SYSTEM CAN BE SUPPLIED WITH ADAPTORS TO ENABLE SAFE ACCESS TO EXISTING MGF LADDERSAFE SYSTEMS.

The platforms are manufactured from grade S275 steel and feature serrated open steel flooring for additional grip. The platform is designed to be lifted into place using an excavator. Each ramp is 1.5m long and can cater for a max. 0.5m vertical height and a max. angle of 17.5°. They are modular in design and up to 3 can be connected together to create a 4.5m long ramp that can cater for a max. 1.5m vertical height. The Gangway Ramps are designed for man access onto a Laddersafe platform or Wall Bridge, and should only be accessed by 1 person at a time, with the system being rated for a max. 150kg point load or a UDL of 1.5kN/m².

PRODUCT NOTES

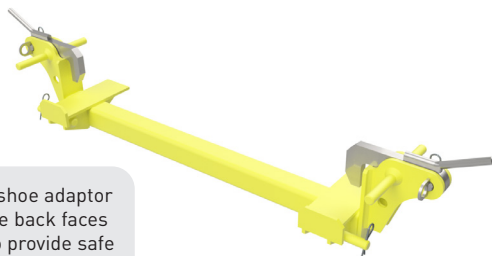
1. Ensure that Gangway Ramps, overshoe adaptors and Laddersafe platforms are not damaged or distorted and that the correct Laddersafe platform, connecting pins and nuts/bolts have been provided prior to use. Always replace damaged components.
2. Always install the Gangway Ramps and the Laddersafe platform from a position of safety. If working from an unsupported edge a full risk assessment should be carried out for installation. Once the Laddersafe is installed ensure the clamping bolts are fully clamped and it cannot be lifted, slide or rotate prior to securing the Gangway Ramp.
3. Ensure the Gangway Ramp is securely connected to the Laddersafe platform and that all 20mm diameter pins are secured using a r-clip and the supplied securing plate.
4. Ensure when connecting Gangway ramps together that the M16x50 bolts and nuts are sufficiently torqued and that retaining clips are provided for the integrated pins. Gangway Ramps should be connected together prior to securing to the Laddersafe platform.
5. MGF Gangway Ramps are modular and no more than 3 ramps should be connected together.
6. The maximum achievable angle of 17.5° must not be exceeded, which can cater for a maximum vertical height of 0.5m per ramp, up to a maximum of 1.5m for 3 connected ramps.
7. MGF Gangway Ramps are designed for man access to an MGF Laddersafe or Wall Bridge system and should only be used by a single person and should not be used to transport/store equipment.
8. Laddersafe platforms should only be fitted to MGF excavation support systems using the clamps specified. The customer must ensure that these support systems are installed in accordance with MGF guidelines and are sufficiently robust and stable to act as an effective edge protection support.
9. It is recommended that 2 operatives are used to install the Gangway Ramp overshoe adaptor when required, and that this is installed prior to installing the Laddersafe platform.
10. Gangway Ramps can connect directly to the back face (retained side) of MGF Type 3 Laddersafe for Stairsafe (4.3039) and both faces of MGF Wall Bridges (4.390) without the use of an overshoe adaptors.



11. Gangway Ramp overshoe adaptors must only be affixed to the back face (retained side) of MGF Type 1 and 2 Laddersafe platforms. Gangway Ramps are not designed for access within the excavation – and are only suitable for access to a Laddersafe platform should the upstand be restrictive otherwise, or the ground around the installed Laddersafe platform be sloping away from the sheets/box panels or be of a poor quality.
12. Be careful of finger trap hazards during the installation, ensure suitable PPE is worn throughout the installation and assembly.
13. Always consult with MGF for suitability of the system for any specific installation. MGF Laddersafe must not be clamped to trench sheets less than 6mm thick, or piles in pure cantilever or cantilevering more than 1.5m above a waler rail/brace. In addition, it is essential that the excavation support system (that the clamp is attached to) is installed robustly and fully supported by the ground (no voids/weak ground present).
14. Any gaps between the handrails on the Gangway Ramps and the platform it is being attached to should be closed off using the supplied safety chain and connectors.



MGF Gangway Ramps can natively connect to the back faces on the Type 3 Laddersafe for Stairsafe (4.3039) and both faces of the MGF Wall Bridges using the integrated 20mm pin and supplied r-clips and securing plate detail.

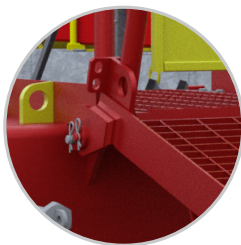


When used in conjunction with an overshoe adaptor the Gangway Ramps can connect to the back faces of type 1 and 2 Laddersafe platforms to provide safe access up to an MGF Laddersafe platform.

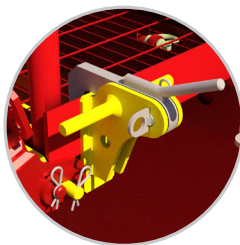


The 10mm thick securing plates are supplied with the Gangway Ramps and are used to connect ramps together or to a Laddersafe/ Wall Bridge by fitting over the integrated 20mm pins on connection detail. r-clips are used to constrain the securing plate.

Product ID	Component	Weight
		(kg)
4.366	Gangway Ramp	128
4.367	Overshoe Adaptor	24



Gangway Ramps connect to Type 3 Laddersafe for Stairsafe platforms and Wall Bridges by hooking one end of the ramp over the integrated 20mm pin on the Laddersafe and fitting the loose securing plate over both 20mm pins and securing using the supplied r-clips.



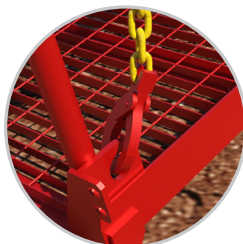
Gangway Ramps connect to Type 1 and Type 2 Laddersafe via the use of the overshoe adaptor which hooks over the back end of the Laddersafe. The Gangway Ramps hook over the 20mm pin on the overshoe adaptor, the securing plate must then be fitted over both 20mm pins and secured using r-clips.



Gaps between the handrails on the Gangway Ramps and Laddersafe units should be closed off using the supplied safety chains and connectors.



Gangway Ramps are connected by hooking one end over the other ramps connection point and constraining using the securing plate and r-clips as well as securing the 2 endplates together using 2No. M16x50 bolts and nuts (per connection).



Gangway Ramps are lifted and handled by attaching MGF Lifting chains to the handling points as shown.



MGF STEEL ROAD PLATES ARE DESIGNED TO TEMPORARILY COVER TRENCHES IN TRAFFICKED AREAS.

There are many factors to consider when deploying road plates, such as the duration of the works, the type, size and weight of the plates, the installation and removal methods, the type of installation (surface mounted or recessed) as well as the need for additional shoring. Available in two sizes, 1.2m x 1.2m or 2.4m x 1.2m, MGF standard road plates are supplied in 19mm thick Grade S235 steel with or without anti-skid coating. They are provided with 4 lifting points for use with a 4 leg chain.

MGF Safe Lift Road Plates are available in 2.4m x 1.2m size. They are supplied in 19mm thick Grade S275JR steel with anti-skid coating and feature a central lifting socket which allow them to be lifted centrally in conjunction with a Safe Lift Road Plate Lifting Adaptor and single leg chain. This addition simplifies the handling of road plates, improving both safety and efficiency onsite when handling using excavators or lorry mounted cranes.

Road plates are heavy and a suitable lifting plan must be in place prior to commencing works.

For further details on how to safely use road plates it is recommended to read "Traffic Advisory Leaflet 6/14: Using Road Plates at Road Works" produced by the Department for Transport.

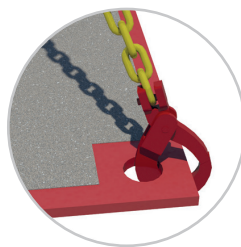
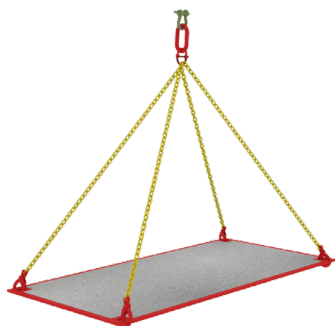
PRODUCT NOTE

1. Ensure that equipment is stored on flat level ground.
2. Avoid stacking / storing equipment close to pedestrian routes.
3. Ensure that all lifting equipment and accessories have a certificate of thorough examination and are visually inspected for damage prior to each use.
4. MGF recommend stacking heights of max. 5No. plates onsite, ensure timber packers separate the plates so they are not stacked directly on top of each other.
5. Standard road plates must be lifted using a 4-leg chain, each corner of the plate needs to be made accessible by chocking underneath to attach the chain hooks. Be aware of finger/limb trap hazards during this process. Safe lift road plates must only be lifted vertically, one at a time, using a single leg chain. At no point should any road plate be dragged on the ground or transported using the bucket and blade of the excavator.
6. It is essential that no one is in the immediate vicinity during the lifting operation. Road plates must never be lifted over anyone's heads, ensure safe lifting practices are adhered to during every lift.
7. Ensure that when plant are tracking whilst lifting road plates that the load is kept low at all times. Take care travelling over uneven ground, always ensure a plant exclusion zone is adhered to.
8. It is strongly recommended to fully restrain/secure the road plates to prevent any movement. Each road plate is provided with 4No. corner holes for use with ground anchors. Safe lift road plates feature 30mm diameter holes, while all other road plates feature 50mm diameter holes. It is the customer's responsibility to ensure that road plates are sufficiently anchored/restrained prior to use.
9. The fixings should not protrude above the surface of the plates to create a hazard to road users, they should ideally have countersunk heads or should not protrude by more than 10mm above the plate.

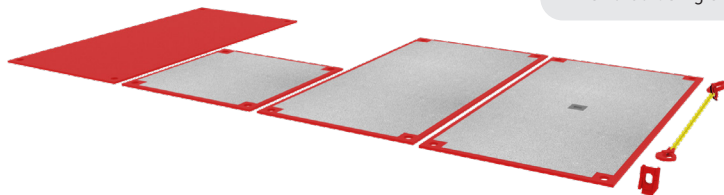


10. If the plates are recessed, it is recommended that any gaps between the road plates and the ground are suitably filled.
11. If the plates are raised then it is recommended to ensure that a suitable means of transition is implemented.
12. Prior to installation of road plates, it is essential that the ground is assessed for suitability, that the area into which the road plates are to be installed is clear with no trip hazards and capable of taking the weight of the road plates.
13. It is essential that the plates are visually monitored on site for signs of excessive deflection.
14. MGF recommend that the plates are supported by at least 500mm either side of the trench.
15. Road plates normally need to be placed on bedding material, whether they are surface mounted or recessed, it is recommended that the bedding does not extend fully to the sides of the trench, to avoid directly loading the top edge of the trench.
16. If multiplate road plates are used together it is important that the traffic passing over the road plate only passes in one direction at a time and only 1 vehicle has contact with the plates at once.
17. It is recommended to limit the vehicle speed travelling over the plates to no more than 30mph.
18. It is recommended to keep the plates low off the ground during handling operations and to control the lift using a tag line.
19. Take care when handling road plates, especially in windy conditions. In these circumstances it may be necessary to increase the size of the plant exclusion zone.
20. If road plates are to be used to bridge over an unshored trench then shoring should be considered, due to the additional loads induced by the traffic. If road plates are to be used to bridge over a shored trench then the additional loads must be taken into account within the shoring design.

	Product ID	Description	Material Grade	Anchor Hole Diameter	Weight	Anti-Skid Coated
				(mm)	(kg)	
	6.130	2.4m x 1.2m x 19mm Road Plate	S235JR	50 (min)	440	No
	6.134	1.2m x 1.2m x 19mm Road Plate	S235JR	50 (min)	220	Yes
	6.135	2.4m x 1.2m x 19mm Road Plate	S235JR	50 (min)	442	Yes
	6.136	2.4m x 1.2m x 19mm Safe Lift Road Plate	S275JR	30	442	Yes
	6.137	Safe Lift Road Plate Lifting Adaptor	-	-	2.1	-
	CSG8-10MM -1-SAH-1M	1.0m 3.15t Single Leg Chain	Grade 8	-	4.1	-

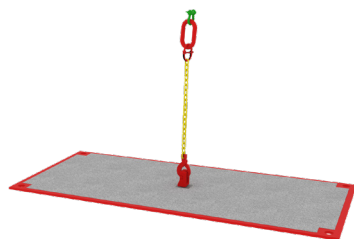


Traditional road plates are handled using a 4-leg chain.

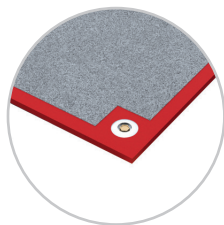
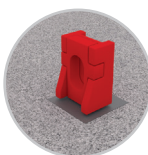
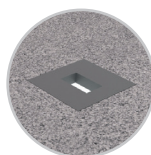


**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF ROAD PLATES**

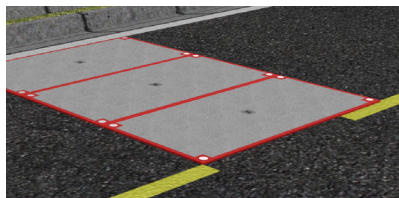
mgf.co.uk/products/road-plates



Safe Lift Road Plates are handled using a safe lift road plate lifting adaptor and single leg chain.



Road plates should be secured onsite using ground anchors.



**FOR SAFE SYSTEM OF WORKS GUIDANCE
FOR MGF SAFE LIFT ROAD PLATES**

mgf.co.uk/products/safe-lift-road-plates/



LATEST PRODUCTS AND DOWNLOADS mgf.co.uk

GRIPSHORE®



GRIPSHORE® OVERVIEW	8.1	EDGESAFE-MESH	8.14
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SIMPLE TO ASSEMBLE, MAN-HANDLEABLE, TWO SIDED HYDRAULIC BRACING SYSTEMS DESIGNED TO PROVIDE TEMPORARY SUPPORT TO SHALLOW TRENCHES FOR THE SAFE INSTALLATION OF UTILITIES.

The systems can support trench widths of 0.57m to 2.0m and can be installed by hand to depths of up to 2.2m. Fabricated from pultruded GRP (grade E17 / E23 to BS EN 13706 and fire retardant to ASTM E84 Class 1) the waler rails, sheets and boards are supported by aluminium trench-jacks using simple pin and retaining clip assemblies. The trench jacks contain hydraulic rams with either 350mm or 525mm of stroke. Connecting the rams (via hydraulic hoses) to an MGF hand operated single acting bucket pump containing hydraulic shoring fluid, allows the width of the bracing system to be quickly and easily adjusted to suit the trench dimensions. Once the systems are located at the correct line and level, the trench jacks are pre-loaded against the trench sides using the bucket pump. Pre-loading the faces of the trench imparts compressive stresses within the soil, which generate arched stress paths both vertically and horizontally between the trench jacks. The trench jacks are pre-loaded and provide rigid supports for the soil to arch to. Self-sealing quick release valves lock in the hydraulic ram pressure, hydraulic rams with lock-off valves can also be provided (see 8.15 for further details).

MGF can supply a full range of ancillaries including edge protection, aluminium strut extensions, lightweight bucket pumps, handling slings, valve release tool, restraining chains, GRP Endsafe struts and GRP ladders.

Manufactured and designed in general accordance with the principles of BS EN 14653 Part 1 (Manually operated hydraulic shoring systems), BS 5975 (Code of practice for temporary works) and the Federal OSHA Regulations.

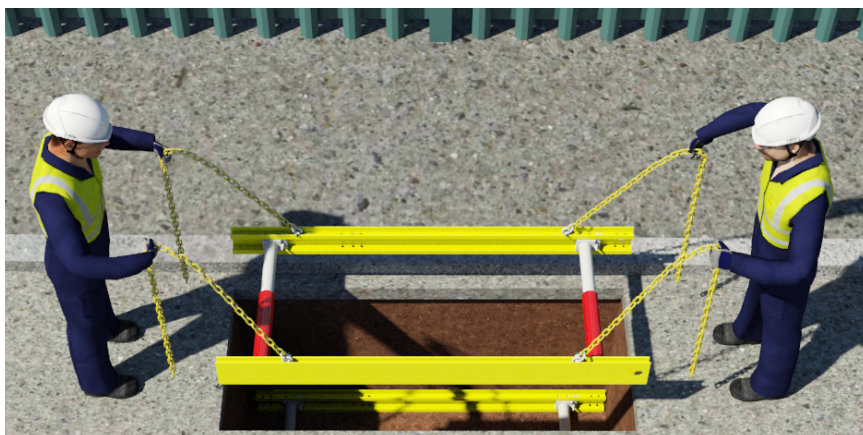
GRiPSHORE® is exclusive to MGF and is a fully registered design belonging to MGF. GRiPSHORE® systems are patent registered, design registered and trademarked.



PRODUCT NOTES

1. GRIPSHORE® systems should only be installed and removed by competent persons in strict accordance with an MGF design & installation sequence.
2. Installation is normally carried out using the dig and drop excavation method by lowering the assembled units to the correct installation level and pre-loading each jack from ground level in turn to ensure that the units are pressed firmly against the trench walls and cannot slip. Max. pre-load pressure of 40 bar (600 psi) must not be exceeded.
3. GRP products are not suitable for the dig and push excavation technique.
4. Ensure all quick release valves are functional and all strut pins in place and secured using the retaining clips provided prior to commencing works.
5. Individual waler rails and jacks should be visually inspected for damage, excessive deflection or loss of ram pressure prior to entering the excavation.
6. Units should always be installed square and plumb to the excavation walls ensuring the jacks bear directly onto firm soil. If this is not possible any gaps must be securely packed by using hardwood wedges or suitable compacted material to ensure pre-loading of the jacks imparts compressive forces into the soil.
7. Safe access / egress, edge protection (for personnel) and barrier protection (for plant) should always be considered. Always place ladders between loaded jacks.
8. Prior to removal of systems all hydraulic rams must be released and retracted and systems prised clear of the trench walls, to avoid the need for excessive extraction forces and to avoid damaging the jacks.
9. No matter how much care is taken during the installation and removal of GRIPSHORE® systems some ground movement will occur in the areas immediately surrounding the excavation. Great care must be taken when specifying these systems for use adjacent to existing structures and services.
10. It is recommended that ends of trench runs be battered back at a safe angle, or GRP Endsafe struts should be installed.
11. Avoid hot works in close proximity to GRP.
12. Ensure gloves and eye protection when handling GRP and using hydraulics.
13. If stacking GRP products ensure they are supported at max. 1.0m centres with timber skids to avoid bending, and that items are strapped down for stability especially in high winds.
14. Robustness - GRP components must not be roughly handled, struck, driven into the ground or extracted under load.
15. Suitable soils: made ground such as soft cohesive, loose sands and loose granular fill which is generally self-supporting in the short term and where no ground water is present / water is flowing.
16. Unsuitable soils: ground such as very soft clays, very loose gravels / sand and silt or peat or in excavations where the trench walls are collapsing or groundwater is present / water is flowing.
17. Vertishore rail systems: Vertishore systems rely solely upon soil arching theory to support trench walls. Therefore never enter a trench unless fully pre-loaded vertishore rails are securely installed either side of the point of entry.
18. Box systems: during installation and removal always ensure any operative in a trench is within fully assembled units extending vertically to the top of the trench.
19. Sheets and walers: during installation and removal always ensure any operative in a trench greater than 1.0m deep is within fully assembled frames.





20. GRiPSHORE® solutions are offered based on a competent person supervising the excavation and installation of the support systems. The competent person must be capable of confirming the soil conditions and local environment are suitable for the design, that the dimensions of the proposed excavation are suitable for the system deployed and that sufficient trench jacks are loading the soil prior to entry. If the proposed works deviate from the design and / or site conditions vary, immediately secure the excavation (back filling) and seek a re-design. If in doubt, please contact MGF Design Services Limited (**01942 402704**).
21. GRiPSHORE® systems are designed to rely on trench jacks for overall stability, walers, sheets and boards / panels are provided to spread the trench jack loads into the soil and prevent ravelling / local spalling of the trench walls between the jacks. The choice of system deployed will therefore depend upon a risk assessment of the proposed works. In general full sheeting / boarding would be advisable for longer duration works and / or where the trench wall stability for the duration of the proposed works is questionable (e.g. variable soils / extensive service crossings).
22. During installation and removal sequences assembled waler rails and boxes provide a short term safe working area for operatives when having to temporarily release individual jacks to lift or lower the systems. As a general rule it is safe to excavate up to 1000mm below a loaded jack during the installation sequence. Visit **mgf.co.uk** for examples of installation guides.
23. GRiPSHORE® systems are ideal for reactive type work which is short term in nature and has to cope with fast changing site constraints. It is therefore important that during this type of work the Temporary Works Supervisor is mindful of the trench jacking theory checks listed in this document and that the spacing rules in particular are obeyed.
24. Prior to loading a jack without a backing board it is essential that a min. 500mm long even bearing is provided against the waler rail to avoid localised overloading of the soil.
25. Loading jacks against highway pavement construction (generally presenting very hard and uneven surfaces) can make installing jacks difficult. It is recommended that either the jacks are located so as to load the soil immediately beneath the pavement construction (recommended to batter the pavement back slightly in this case) or that the pavement construction is trimmed back and smoothed out to provide an even bearing and that timber blocks / suitable fill is used to pack out where necessary to maintain an even loading of the trench walls.
26. Check trench service crossings for any soils or materials (including boulders, concrete or road construction) that could dislodge and fall / collapse onto operatives and if identified ensure that a jack is placed so as to prevent this or that an exclusion zone is established.
27. Do not work underneath service crossings unless an engineered support system is correctly installed or the service has been inspected and confirmed to be stable by a competent person.



GRP VERTISHORES



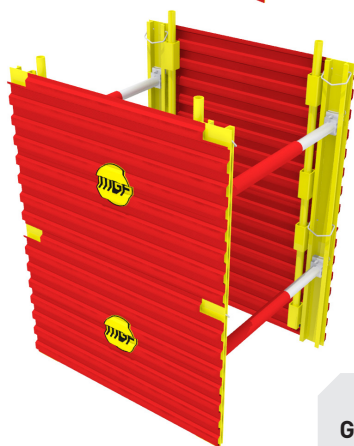
**GRP VERTISHORE
WITH BONDED
BACKING BOARD**



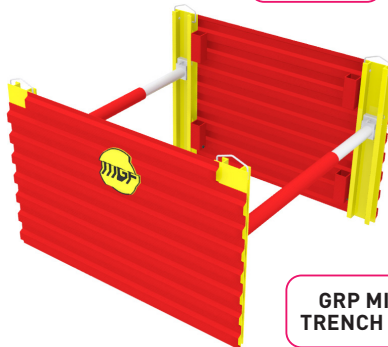
GRP TRENCH BOX



**GRP
SHEETS &
WALERS**



GRP MODULAR BOX



**GRP MINI
TRENCH BOX**

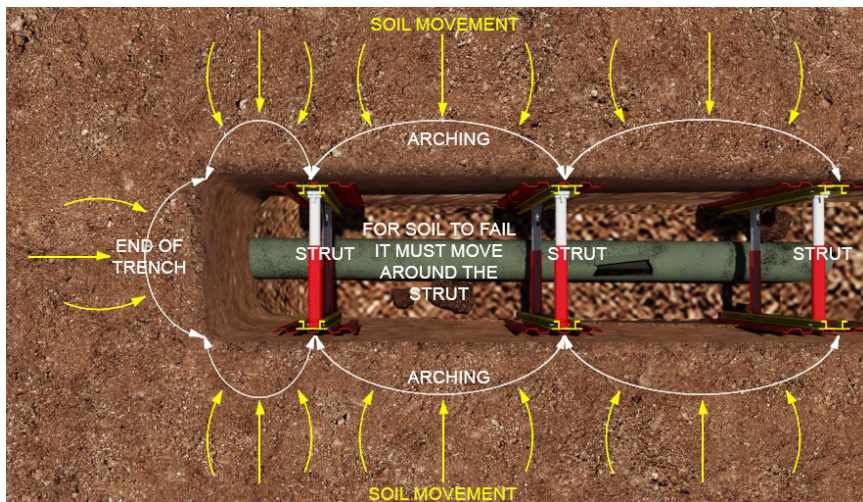
**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF GRIPSHORE®**

mgf.co.uk/gripshore

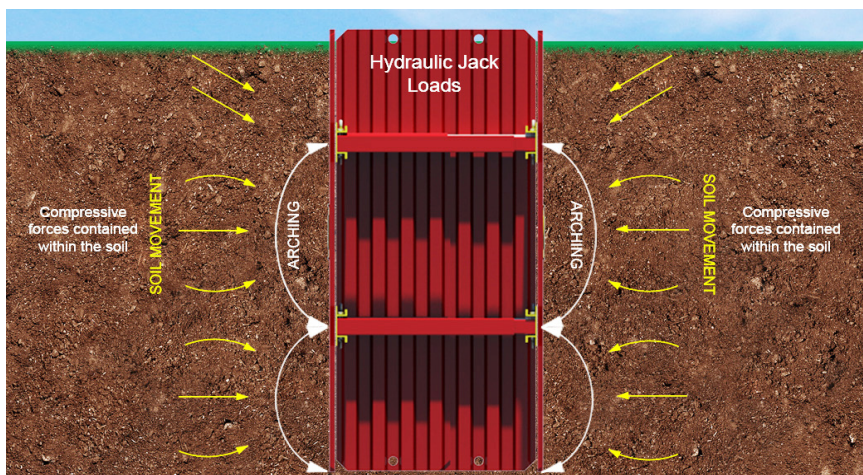


TRENCH JACK / SOIL ARCHING PRINCIPLES

Used in the United States for the last 50 years, soil arching or trench jack theory explains that when hydraulic struts pressurise the sides of an excavation that micro movements create compressive stresses into the soil that join together in an arch shape between hydraulic struts. This occurs in both the horizontal and vertical plane creating a protective area around the shoring system. Only small amounts of earth within the soil arch can enter the trench, referred to as ravelling. Trench walls must remain stable long enough for the trench jacks to be deployed and loaded.



Do not extend the trench more than 0.5m beyond the rail.



TRENCH JACKING THEORY CHECKS

EXCAVATION PROPORTIONS

- ☐ Trench width >570 and <2000mm
- ☐ Trench length >1.5 × width (*Trench lengths can be extended unsupported beyond jacks by up to 500mm*)
- ☐ Trench depth <2200mm (*This includes any reduced level dig or step / slope*)

TRENCH JACK SPACING

- ☐ Top jacks bearing onto soil >150mm and <600mm below surface
- ☐ Horizontal jack spacing >500mm <2000mm
- ☐ Vertical jack spacing >500mm <1200mm
- ☐ Bottom jacks max. 600mm above dig depth*







**This may be extended to 1000mm during installation and removal of box systems or subject to design checks.*



SURCHARGING

- ☐ Max. 12t excavator, max. 5kN/m² parallel to trench

TRENCH JACK RECOMMENDED PRE-LOADS

✓ PERMITTED

ROAD CONSTRUCTION / MADE GROUND (max. 400 psi) (min. 150 psi)	
Compacted / Well Graded SAND* (max. 500 psi) (min. 250 psi)	
Hard GROUND/ROCK (max. 400 psi) (min. 150 psi)	
CHALK (max. 400 psi) (min. 150 psi)	
Compacted / Well Graded GRAVEL (max. 500 psi) (min. 200 psi)	
Soft CLAY* (max. 600 psi) (min. 200 psi)	







Firm CLAY (max. 500 psi) (min. 250 psi)	
Stiff CLAY (max. 450 psi) (min. 250 psi)	



Jacking pressures shown in red

*Customer may wish to consider utilising backing boards

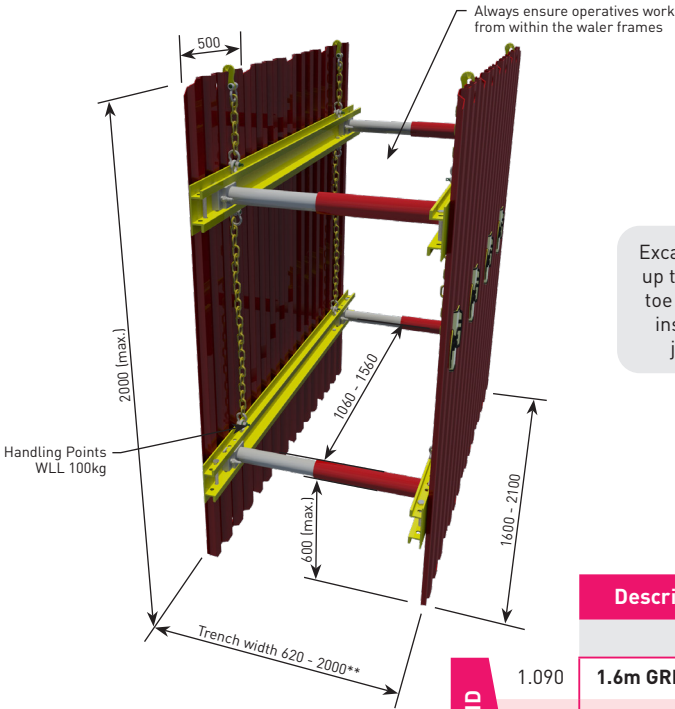
✗ NOT PERMITTED

PEAT / SILT	
Uncompacted / Poorly Graded SAND / GRAVEL (Blown/Running Sands)	
RIVER MUD / V. Soft CLAY	
LARGE NUMBER OF VOIDS	
CONTAMINATED SOILS	
GROUND WATER NOT PERMITTED ABOVE DIG LEVEL	



GRP SHEETS AND WALERS

The lightweight system can be rapidly assembled and installed by hand where access is limited, without the need for an excavator and without the requirement for operatives to enter an unsupported trench. GRP Endsafe struts are available to close off the ends of a trench providing extra protection from loose materials falling into the excavation (see page 8.17 for further details). With a SWL of 16.5kN/m² the system is suitable for use in most trenches up to a depth of 2.0m (2.2m subject to design checks).



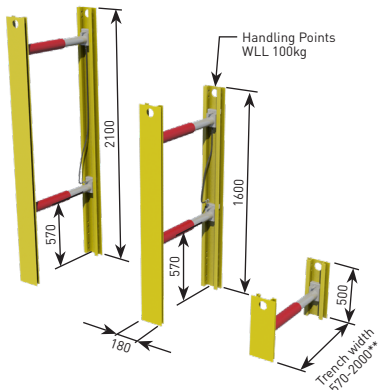
Excavating can continue up to 400mm below the toe of the sheet during installation provided jacks are loaded.

Description		Weight
		(kg)
Product ID	1.090	1.6m GRP Waler 6.2
	1.100	2.1m GRP Waler 8.1
	3.006	1.5m GRP Sheet 5.0
	3.007	2.0m GRP Sheet 6.7

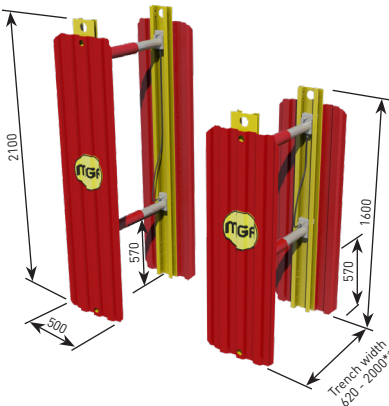
[1] 1600mm GRP Waler.
 [2] 2100mm GRP Waler.
 * Max. 2200mm subject to design checks.
 ** Max. trench width achieved by using Type A struts with cylinder extensions.
 Assembled weight based on Type A Struts.

Component	System SWL	16.5kN/m ²
	Max. Trench Depth	2000mm*
	Trench Width	620mm - 2000mm**
	Max. Understrut Clearance	600mm
	Clearance between struts	1060mm ^[1] / 1560mm ^[2]
	Assembled Frame Weight	24kg ^[1] / 28kg ^[2]

GRP VERTISHORE RAIL WITH OR WITHOUT BONDED BACKING BOARD



Max. spacing between installed Vertishores (without backing board) is 1.5m centre to centre.



[1] Without backing board.

[2] With backing board.

* Max. 2200mm subject to design checks.

** Max. trench width achieved by using Type A struts with cylinder extensions.

Assembled weight based on Type A Struts.

The lightweight system can be rapidly assembled and installed by hand where access is limited, without the need for an excavator and without the requirement for operatives to enter an unsupported trench. MGF recommend a minimum of 3 units be installed at once and that operatives only work between loaded Vertishores. The system provides a minimum 570mm of clearance below the bottom strut.

MGF recommend that any unsupported trench ends do not extend greater than 0.5m beyond the systems. With a trench jack SWL of 30 / 60kN suitable for use in most trenches up to a depth of 2.0m (2.2m subject to design checks). The trench jacks are linked by hydraulic hoses allowing safe install and removal from outside the trench. If there is any evidence of trench wall instability, or the trench is to be open for more than 5 days then boards must be provided between Vertishores.

		Description	Weight
			(kg)
Product ID	1.060	0.5m Vertishore Rail	1.9
	1.070	1.6m Vertishore Rail	6.2
	1.075	1.6m Vertishore Rail w/ Bonded Board	12.5
	1.080	2.1m Vertishore Rail	8.1
	1.085	2.1m Vertishore Rail w/ Bonded Board	16.1

Max. spacing between installed Vertishores (with bonded backing board) is 2.0m centre to centre, subject to design checks.

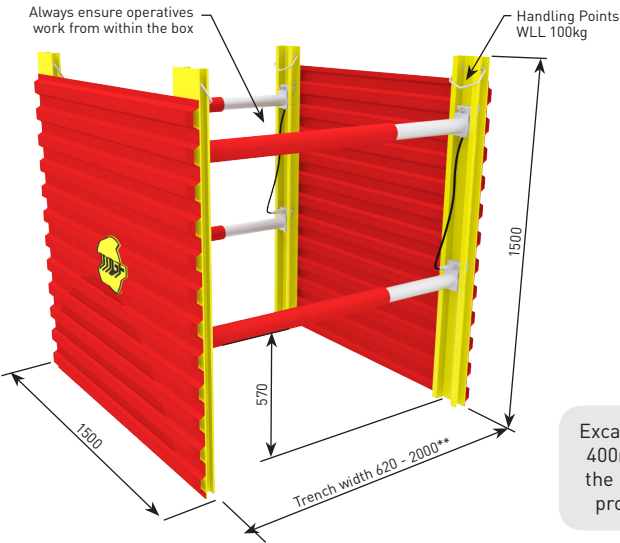
Component	Backing Board Width	500mm
	Max. Trench Depth	2000mm*
	Trench Width	570mm - 2000mm**
	Max. Understrut Clearance	570mm
	Strut SWL	30kN ^[1] / 60kN ^[2]
	Assembled Weights	9.5 - 27.6kg ^[1] / 36.4 - 44kg ^[2]

GRP TRENCH BOX

The lightweight system can be rapidly assembled by hand. MGF recommend that any unsupported trench ends do not extend greater than 0.5m beyond the systems. With a trench jack SWL of 60kN suitable for use in most trenches up to a depth of 1.5m (1.7m subject to design checks). The trench jacks are linked by hydraulic hoses allowing safe install and removal from outside the trench. Designed to withstand a maximum safe working load of 16.5kN/m², for use in made ground such as soft cohesive and loose granular fill which is generally self-supporting in the short term and where no ground water is present. Boxes are generally not suitable for use in trenches with numerous service crossings.

Product ID	Description	Weight
		(kg)
4.002	GRP Trench Box Panel	27.3

On trench runs the boxes can be placed hit and miss (max. 1.5m gap between boxes).



Excavating can continue up to 400mm below the bottom of the panel during installation provided jacks are loaded.

* Max. 1700mm subject to design checks.
 ** Max. trench width achieved by using Type A struts with cylinder extensions.
 Assembled weight based on Type A Struts.

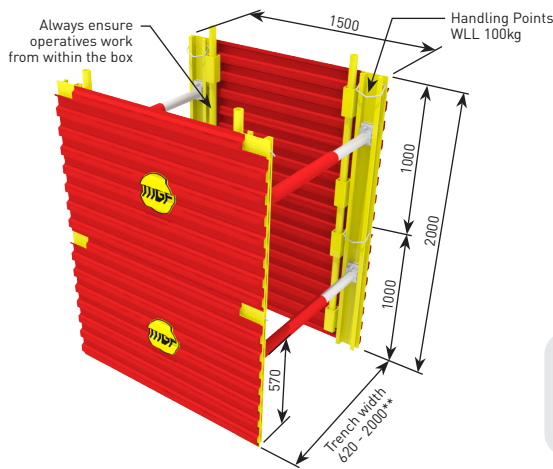
Component	Panel L x H	1500mm x 1500mm
	System SWL	16.5kN/m²
	Max. Trench Depth	1500mm*
	Trench Width	620mm - 2000mm**
	Max. Understrut Clearance	570mm
	Strut SWL	60kN
	Clearance between struts	1244mm
	Assembled Weight	78kg

GRP MODULAR BOX

A lightweight, modular shoring solution for excavations up to 2.0m deep (2.2m subject to design checks) with widths from 620mm to 2000mm**. GRP Modular Box panels create a working area 1.5m wide and a minimum under strut clearance of 570mm to allow services to pass. Due to the soil arch created by the hydraulic struts, GRP Modular Boxes can be set out with a clear space of up to 1.5m between boxes making an efficient solution for longer trench runs. Designed to withstand a maximum safe working load of 16.5kN/m², for use in made ground such as soft cohesive and loose granular fill which is generally self-supporting in the short term and where no ground water is present. Boxes are generally not suitable for use in trenches with numerous service crossings. To assist with installation tubular GRP connecting poles can be provided upon request.

Product ID	Description	Weight
		(kg)
4.001	GRP Modular Box Panel	19
4.003	GRP Modular Box Connecting Pole	2

On trench runs the boxes can be placed hit and miss (max. 1.5m gap between boxes).



Excavating can continue up to 400mm below the bottom of the panel during installation provided jacks are loaded.

* Max. 2200mm subject to design checks.
** Max. trench width achieved by using Type A struts with cylinder extensions.
Assembled weight based on Type A Struts.

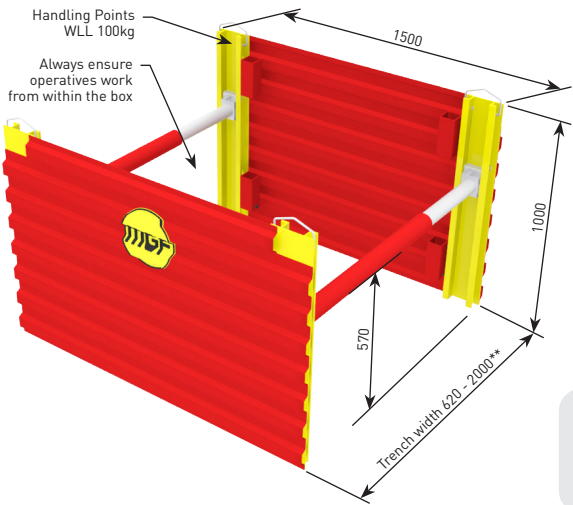
Component	Panel L x H	1500mm x 1000mm
	System SWL	16.5kN/m ²
	Max. Trench Depth	2000mm*
	Trench Width	620mm - 2000mm**
	Max. Understrut Clearance	570mm
	Strut SWL	60kN
	Clearance between struts	1244mm
	Assembled Weight	50kg per unit

GRP MINI TRENCH BOX

A lightweight shoring solution for excavations up to 1.0m deep (1.2m subject to design checks) with widths from 620mm to 2000mm**. GRP Mini Trench Box panels create a working area 1.5m wide and a minimum under strut clearance of 570mm to allow services to pass. Due to the soil arch created by the hydraulic struts, GRP Mini Trench Boxes can be set out with a clear space of up to 1.5m between boxes making an efficient solution for longer trench runs. Designed to withstand a maximum safe working load of 16.5kN/m², for use in made ground such as soft cohesive and loose granular fill which is generally self-supporting in the short term and where no ground water is present. Boxes are generally not suitable for use in trenches with numerous service crossings.

Product ID	Description	Weight
		(kg)
4.001	GRP Mini Trench Box Panel	19

On trench runs the boxes can be placed hit and miss (max. 1.5m gap between boxes).



Excavating can continue up to 400mm below the bottom of the panel during installation provided jacks are loaded.

* Max. 1200mm subject to design checks.
 ** Max. trench width achieved by using Type A struts with cylinder extensions.
 Assembled weight based on Type A Struts.

Component	Panel L x H	1500mm x 1000mm
	System SWL	16.5kN/m²
	Max. Trench Depth	1000mm*
	Trench Width	620mm - 2000mm**
	Max. Understrut Clearance	570mm
	Strut SWL	60kN
	Clearance between struts	1244mm
	Assembled Weight	50kg

GRiPSHORE SHEETS & WALERS

Offers full protection against ravelling.

Can be installed easily by hand using the Dig and Drop method.

Endsafe struts are available to close off the ends of a trench providing extra protection from loose materials falling into the excavation.

System Safe Working Load	16.5kN/m ²
Assembled Weight (Frame)	24 - 28kg
Available Depths	1.30m - 2.00m
Protection Against Ravelling	★★★★
Hand Excavation	★★★★
Manual Handling	★★★★
Use Around Services	★★★★
Speed of Installation	★★★★

GRiPSHORE MODULAR TRENCH BOX

Creates a safe working area 1.50m wide and a minimum under strut clearance of 570mm to allow services to pass.

Can be set out with a clear space of up to 1.50m between boxes making an efficient solution for longer trench runs.

Modular system makes system man-handlable and can therefore be installed by hand excavation.

Panel Safe Working Load	16.5kN/m ²
Assembled Weight (Per Unit)	50kg
Available Depths	
Mini GRP Trench Box (Base)	0.7m - 1.00m
GRP Modular Box (Base & Top)	1.70m - 2.00m
Protection Against Ravelling	★★★★
Hand Excavation	★★★★
Manual Handling	★★★★
Use Around Services	★★★★
Speed of Installation	★★★★

GRiPSHORE TRENCH BOX

Creates a safe working area 1.50m wide and a minimum under strut clearance of 570mm to allow services to pass.

Can be set out with a clear space of up to 1.50m between boxes making an efficient solution for longer trench runs.

Generally not suitable for use in trenches with numerous service crossings.

Panel Safe Working Load	16.5kN/m ²
Assembled Weight	78kg
Available Depths	1.30m - 1.50m
Protection Against Ravelling	★★★★
Hand Excavation	★★★★
Manual Handling	★★★★
Use Around Services	★★★★
Speed of Installation	★★★★



GRiPSHORE VERTISHORE

Can be rapidly assembled and installed without the need for an excavator and without operatives entering the trench.

The trench jacks are linked by hydraulic hoses allowing safe install and removal from outside the trench.

Loose GRP sheets can be installed behind Vertishores to prevent ravelling.

Strut Safe Working Load	30kN
Assembled Weight	24 - 28kg
Available Depths	1.30m - 2.00m

Protection Against Ravelling	★★
Hand Excavation	★
Manual Handling	★★★
Use Around Services	★★★★
Speed of Installation	★★★★

GRiPSHORE VERTISHORE WITH BACKING BOARDS

Can be rapidly assembled and installed without the need for an excavator and without operatives entering the trench.

Offers more support against ravelling than standard vertishore rails.

Strengthened backing board allows product to be used in higher load applications than standard vertishore.

Strut Safe Working Load	60kN
Assembled Weight	36 - 48kg
Available Depths	1.30m - 2.00m

Protection Against Ravelling	★★
Hand Excavation	★
Manual Handling	★★
Use Around Services	★★★★
Speed of Installation	★★★★

GRiPSHORE BABYSHORE

Intended to be used in shallow trenches where the layout of the excavation or obstructions such as services precludes the use of larger products.

Can also be used to provide additional shoring support to the battered ends of trenches.

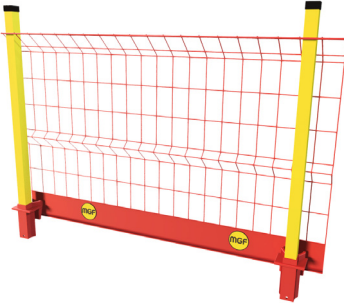
Strut Safe Working Load	30kN
Assembled Weight	9.5kg
Available Depths	1.00m - 2.00m

Protection Against Ravelling	★
Hand Excavation	★★★★
Manual Handling	★★★★
Use Around Services	★★★★
Speed of Installation	★★★★



EDGESAFE-MESH & EDGESAFE-GRP

MGF Edgesafe-Mesh and Edgesafe-GRP are lightweight edge protection systems suitable for use with MGF GRiPSHORE® products. Connected to the GRP rails or GRP panel / sheet using a GRP connecting adaptor and GRP vertical box sections the system satisfies the requirements of BS EN 13374 (2013) Class A Temporary Edge Protection Systems, and is suitable for site use where the ground slopes up to a maximum of 10°. The systems are not suitable for use as pedestrian barriers.



MGF Edgesafe-GRP is a lightweight GRP edge protection system suitable for use with MGF GRiPSHORE® GRP Trench Boxes, GRP Modular Boxes and GRP Mini Trench Boxes. The panels connect to the GRP rails using GRP connecting adaptors.

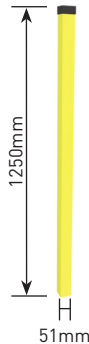
The panels are 1370mm long, 1280mm high and can be simply connected together using cable ties to create a constant run of edge protection.

Edgesafe-GRP panels can be installed by a single operative, no mechanical fixings are required for installation.

MGF Edgesafe-Mesh is a lightweight steel mesh edge protection system suitable for use with all MGF GRiPSHORE® products. The panels connect to the GRP rails or GRP panel / sheet using GRP connecting adaptors and GRP vertical box sections.

The panels are 1665mm long, 1060mm high and can simply overlap to create a constant run of edge protection, cable ties can be used to secure panels together for added rigidity. The maximum allowable centres for the vertical GRP box sections / GRP connecting adaptors are 1.5m. When used on GRP Sheets and Walers the GRP connecting adaptor must be installed centrally on the 500mm wide sheet with maximum 1.0m centres. The centreline of the top waler frame must not be greater than 265mm from the top of the sheet.

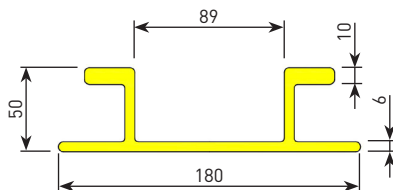
Edgesafe-Mesh panels can be installed by a single operative, from a position of safety away from the edge of the trench. No mechanical fixings are required for installation.



		Description	Weight
			(kg)
Product ID	4.341	Edgesafe-Mesh	10
	4.342	Edgesafe-GRP	10
	4.343	GRP Connecting Adaptor	2
	4.344	GRP Vertical Box Sections	3

GRP RAIL PROFILE

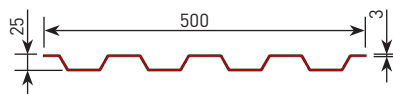
Component	Type	GRP Rail
	GRP Material Grade	E23
	Weight	3.85kg/m
	Section Modulus	23.5cm ³
	SWL Moment Capacity	3.42kNm*



* Subject to max. 1.7m simply supported span or 0.6m cantilever.

GRP PANEL / SHEET PROFILE

Component	Type	GRP Panel/Sheet
	GRP Material Grade	E17
	Weight	3.34kg/m
	Section Modulus	27.4cm ³ /m
	SWL Moment Capacity	3.14kNm/m**



**Subject to max. 1.5m simply supported span or 0.6m cantilever.

GRiPSHORE® HYDRAULIC TRENCH JACKS



The GRiPSHORE® range utilise 2 different types of hydraulic trench jacks:

Type A: 550 - 900mm (5.7kg)
Product ID: 1.011

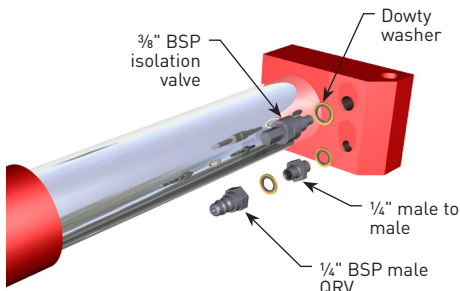
Type B1: 850 - 1375mm (8kg)
Product ID: 1.012

Hydraulic Trench Jack

	Single Acting
Material	Aluminium
Bore	50.8mm
Weight	5.7kg ^[1] / 8kg ^[2]
Axial SWL	60kN / 30kN***
Approx. Stroke	350mm ^[1] / 525mm ^[2]
Working Temp Range	-20°C to +50°C

[1] Type A Trench Jack. [2] Type B1 Trench Jack.

*** 30kN for Vertishore rail without bonded backing board.
The above weights are based on an aluminium outer sleeve.
Plastic sleeves can be provided.



GRiPSHORE® hydraulic trench jacks can be provided with lock-off valves. Shoring fluid is pumped into the full bore side of the piston through the male QRV. Single acting cylinders cannot be retracted using a pump unit and have to be physically closed whilst releasing the male QRV. Ensure isolation valve is closed to maintain pre-load pressure and before release / connection of QRVs.



GRIPSHORE® ALUMINIUM STRUT EXTENSIONS

	Range																
	500mm	550mm	600mm	650mm	700mm	750mm	800mm	850mm	900mm	950mm	1000mm	1050mm	1100mm	1150mm	1200mm	1250mm	1300mm
Type A		550-900mm															
Type B1							850-1375mm										
Type A + 800mm Extension																1379-1729mm	
Type A + 1100mm Extension																	1679-2029mm

The GRIPSHORE® Aluminium Strut extensions are designed to be used with GRIPSHORE® Type A Trench Jacks only. There are 2 extension sizes, one that increases the Type A range by 800mm (product ID = 1.0111) and one that increases it by 1100mm (product ID = 1.0112). These extensions allow a max. trench width of 2.0m (as long as the Trench Jacking Theory Checks are satisfied - see page 8.6).

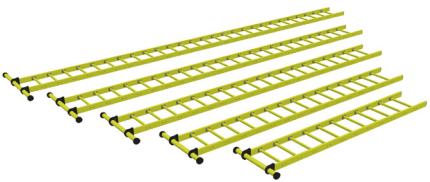
GRIPSHORE® HYDRAULIC PUMP

Hydraulic Bucket Pump	Single Acting	
	Product ID	1.604
	Capacity	10 litres
	Weight	22kg
	Shoring Fluid	Houghto Safe SF25
	Installation Pressure	150-600 psi
	Weight	12kg (empty)



The pump is used to extend the single acting hydraulic rams. The pumps contain bio-degradable Houghto Safe SF25 shoring fluid. During the Summer months the shoring fluid is diluted with water at a ratio of 3 parts water to 1 part Houghto Safe SF25. In the Winter the mix ratio is 1:1. Maximum recommended installation pressure 600psi (40 Bar). These pumps can be provided with pressure relief valves to prevent over-pressurising the systems.

GRP LADDERS

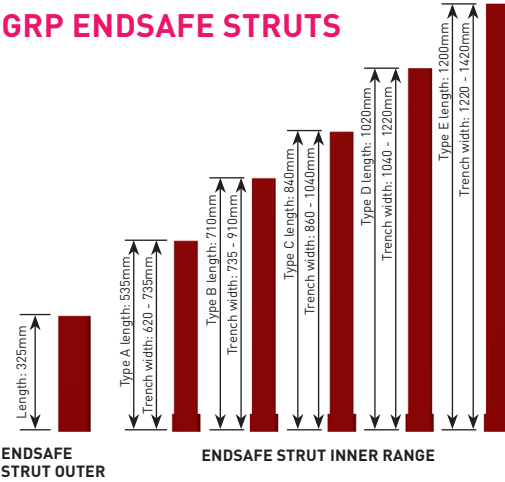


	GRP Ladder	Weight
		(kg)
Product ID	4.3093	3.0m 11
	4.3094	4.0m 14
	4.3095	5.0m 18
	4.3096	6.0m 22
	4.3097	7.0m 25

Our incredibly lightweight one piece leaning rung ladders are manufactured from E17 Structural Grade Pultruded GRP (glass reinforced plastic) to BS EN 13706. They are available in lengths ranging from 3.0m to 7.0m and comply with BS EN 131 - 150kg SWL. The ladders are supplied with 400mm wide, square anti-slip rungs and rubber anti-slip end caps on the ends of the stiles as standard. Epoxy Coated Steel Ladders are also available.



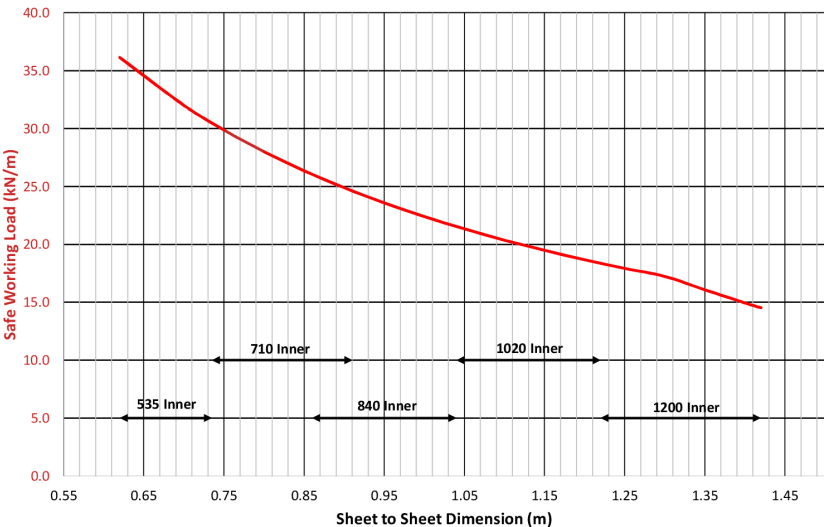
GRP ENDSAFE STRUTS



Product ID	Component		Weight
			(kg)
1.706	325 Outer		1.7
1.707	535 Inner		1.6
1.708	710 Inner		2.1
1.709	840 Inner		2.5
1.710	1020 Inner		3.0
1.711	1200 Inner		3.5
Inner Material		64x64x6.4 GRP SHS (E23)	
Outer Material		84x84x9 GRP profiled section	
Overall Weight		3.3kg - 5.2kg	

GRP Endsafes are designed to be quickly and easily installed by hand to support the open end of a trench run created using GRP Sheets and Walers. When the Endsafes are installed the GRP trench sheets can be installed against the face of the GRP Endsafes by carefully lowering down vertically. The struts are telescopic and include one outer section and a range of inner sections to give a working range of between 620mm and 1420mm. The minimum overlap between the inner and outer sections must not be less than 125mm. GRP Endsafes cannot be used with aluminium extensions.

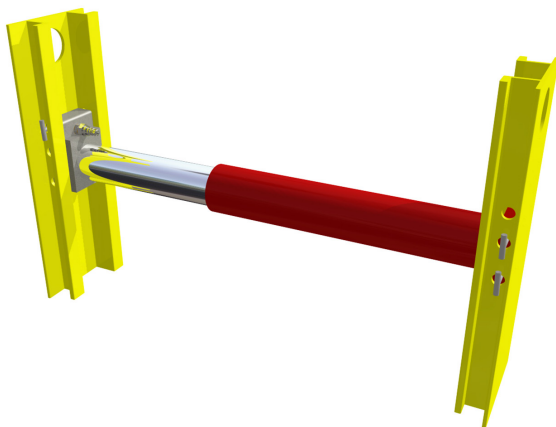
SAFE WORKING LOAD FOR MGF GRP ENDSAFE STRUTS (kN/m)



GRP VERTISHORE - 0.5M VERTISHORE / BABYSHORE

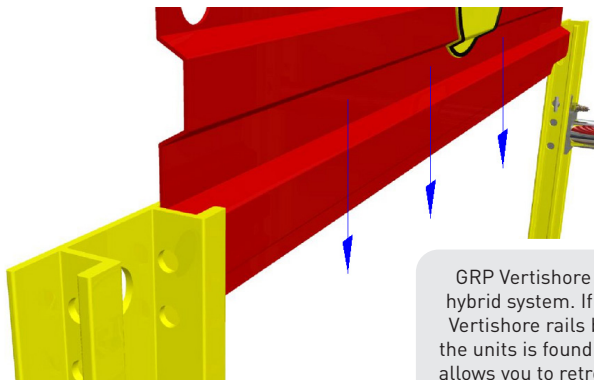
The 0.5m long GRP Vertishore is intended to be used in shallow trenches up to 2.0m deep where the layout of the excavation or obstructions such as services precludes the use of larger products. It can also be used to provide additional shoring support to the battered ends of trenches, avoiding the need for Endsafe struts or in conjunction with trench sheets and panels.

In trenches of 1.3m deep and beyond ensure that a minimum of 4 No. loaded jacks are in place, 2 either side of the point of entry. Setting out for 0.5m Vertishores must be done in strict accordance with Trench Jack Spacing Rules (see page 8.6).



Max. horizontal spacing between installed units is 1.5m centre to centre.
Max. vertical spacing between installed units is 1.2m centre to centre.

GRP VERTISHORE - ALTERNATE CONFIGURATIONS



GRP Vertishore can also be installed as a hybrid system. If the trench is shored using Vertishore rails but the ground in-between the units is found to be unstable, the product allows you to retrospectively slot GRP panels into the side grooves of the walers to protect the operative from loose materials whilst carrying out a repair. Alternatively GRP panels can be placed behind Vertishore rails.

GRIPSHORE® LIFTING / HANDLING ACCESSORIES

UTILITY CHAINS



Description	WLL	Length	Weight
	(t)	(m)	(kg)
4 Leg Utility Handling Chain	3.0	1.2	8.3
Utility Restraining Chain (hook)	0.47	1.2	2.0
Utility Restraining Chain (shackle)	0.47	1.2	1.75

SLINGS

MGF can provide 1t endless round slings to assist with the installation and removal of GRIPSHORE®.

The slings are simply looped through the handling holes / lifting points on the GRIPSHORE® units.





GRP Vertishore, sheets and Edgesafe mesh



OUR **RAIL** AND **HS2** CAPABILITIES

At MGF, we have a dedicated Rail and HS2 team who offer assistance and expertise for HS2 enquiries and associated Rail infrastructure sector temporary works.

With major investments in fleet availability and stock our national network of depots across the UK, technical sales team and design engineers are available to discuss solutions.

FIND OUT MORE ABOUT OUR CAPABILITIES:

 **08083 028 832**

 **mgf.co.uk/hs2**



GRIPSHORE+



GRIPSHORE+ TRENCH BOX	9.1
GRP STACKSHORE	9.2



SIMPLE TO ASSEMBLE, TWO-SIDED EXCAVATION SUPPORT SYSTEM MADE UP OF LIGHTWEIGHT COMPONENTS DESIGNED TO BE INSTALLED BY AN EXCAVATOR UTILISING THE EXCAVATE AND LOWER TECHNIQUE.

Normally selected for installing small to medium utilities where ground movement is not critical. The size of the systems specified is dependent upon max. depth requirements and plan dimensions of structure including allowances for backfilling / formwork etc. The system is generally suitable for depths of up to 2800mm, with an internal working space between struts up to 2840mm and internal trench widths ranging from 880mm to 2080mm.

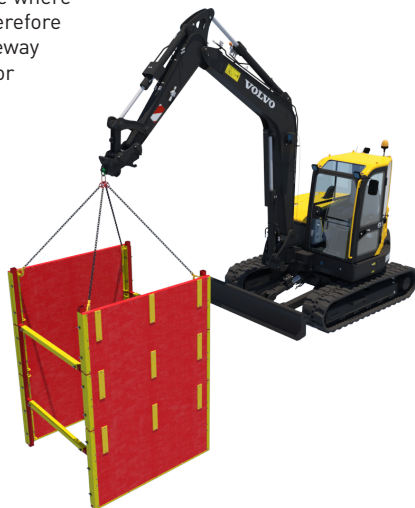
Fabricated from a blend of pultruded GRP (grade E17 to BS EN 13706) and S700 steel to form 58mm thick panels, the system comprises of 0.8m and 1.2m high panels which can be stacked to achieve depths of 1200mm, 2000mm, 2400mm or 2800mm (applications for excavation depths over 2.4m must be accompanied by a design issued through MGF's Design Department). The panels are propped off each other by robust, lightweight, telescopic steel struts which can achieve muck-to-muck trench widths from 1000mm to 2200mm in increments of 100mm. All components in the system are connected together via simple pin and r-clip assemblies.

MGF can supply the systems with a full range of suitable lifting chains, Edgesafe edge protection panels and GRP or epoxy coated steel ladders, Counterbalance Davitsafe retrieval / fall arrest system and confined spaces regime equipment.

Manufactured and designed in accordance with BS EN 13331: 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

1. Boxes should only be used in the configurations shown by competent persons following MGF installation guidelines.
2. Boxes should be used in ground which is self-supporting in the short-term to allow for the dig and drop technique.
3. Over dig the trench dimensions by 100mm so that the box can be positioned without resistance. Ensure that any gaps between the outer face of the panels and the sides of the excavation are sufficiently backfilled to avoid injury.
4. Do not push down on the box with a machine during installation.
5. Boxes are not normally suitable for usage where ground movement is an issue and are therefore not recommended for use in live carriageway situations or adjacent existing buildings or structures.
6. Flying of the box above the base of the excavation is not recommended.
7. It is possible to man-handle individual components, but only undertake this if comfortable to do so with good manual handling techniques.
8. Assembled box systems range from 183kg to 522kg, ensure a suitable excavator for handling, installing and extracting these systems.
9. If stacking panels on site, timber packers must be used to separate the panels.



10. Boxes should not be left in-situ for extended periods within cohesive or very weak soils as earth pressures / adhesion on the panel surfaces may increase significantly with time requiring additional extraction forces to release the panels.
11. Always use MGF specified chains to handle and extract boxes, it is recommended that each corner is lifted approximately 50mm to break any initial cohesion before attempting to lift out with 4-leg chain. N.B. If a box becomes stuck very high extraction forces can be required to release each corner. In this instance MGF recommend either a ground reduction or to install sheets around the perimeter to break the stiction.
12. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
13. Always enter trench box via a ladder located within the box and never from an unsupported edge.
14. During lifting or extraction operations ensure personnel are well clear of the equipment.
15. Ends of trench runs should always be battered back at a safe angle.



**FOR SAFE SYSTEM OF WORKS GUIDANCE
FOR MGF GRiPSHORE+ TRENCH BOXES**

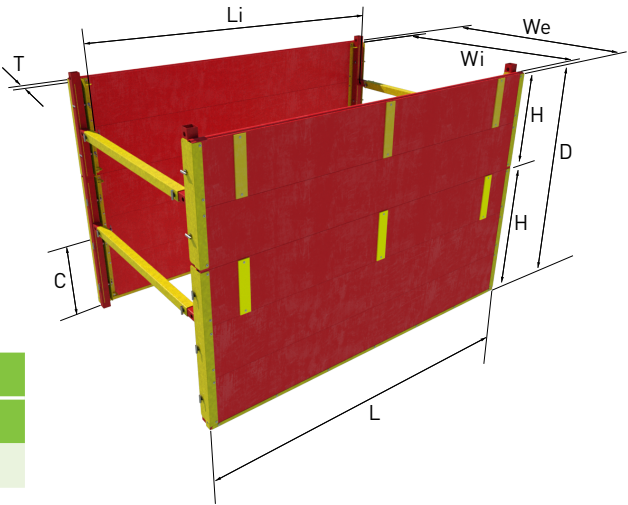
mgf.co.uk/products/gripshore-plus-trench-box



SIZE OPTIONS



GRiPSHORE+ boxes are available in 8 configurations. Use the kit codes below to specify the required size, Part A covers the length and height of the box, Part B covers the trench width.



Kit Code GS-xx-x-Sx	
Part A	Part B
GS-xx-x	-Sx

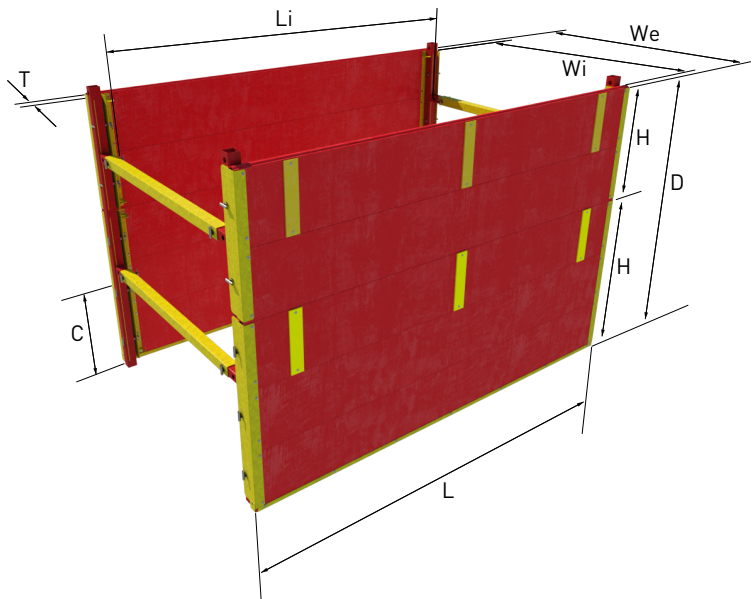
		Full Box Description	Assembled Weight			
		(L x D)	(kg)			
Kit Code (Part A)	GS-12-2	2.0m x 1.2m	183 - 193			
	GS-12-3	3.0m x 1.2m	224 - 233			
	GS-20-2	2.0m x 2.0m	308 - 328			
	GS-20-3	3.0m x 2.0m	373 - 393	Trench Width		
	GS-24-2	2.0m x 2.4m	367 - 386	(We)		
	GS-24-3	3.0m x 2.4m	448 - 468	Kit Code (Part B)	S1	1000 - 1400
	GS-28-2	2.0m x 2.8m*	413 - 433		S2	1400 - 1800
	GS-28-3	3.0m x 2.8m*	503 - 522		S3	1800 - 2200

*Depths of 2.8m must be accompanied by a design issued through MGF's Design Department.



CONTACT US design@mgf.co.uk

GRiPSHORE+ TRENCH BOX COMPONENT SPECIFICATIONS



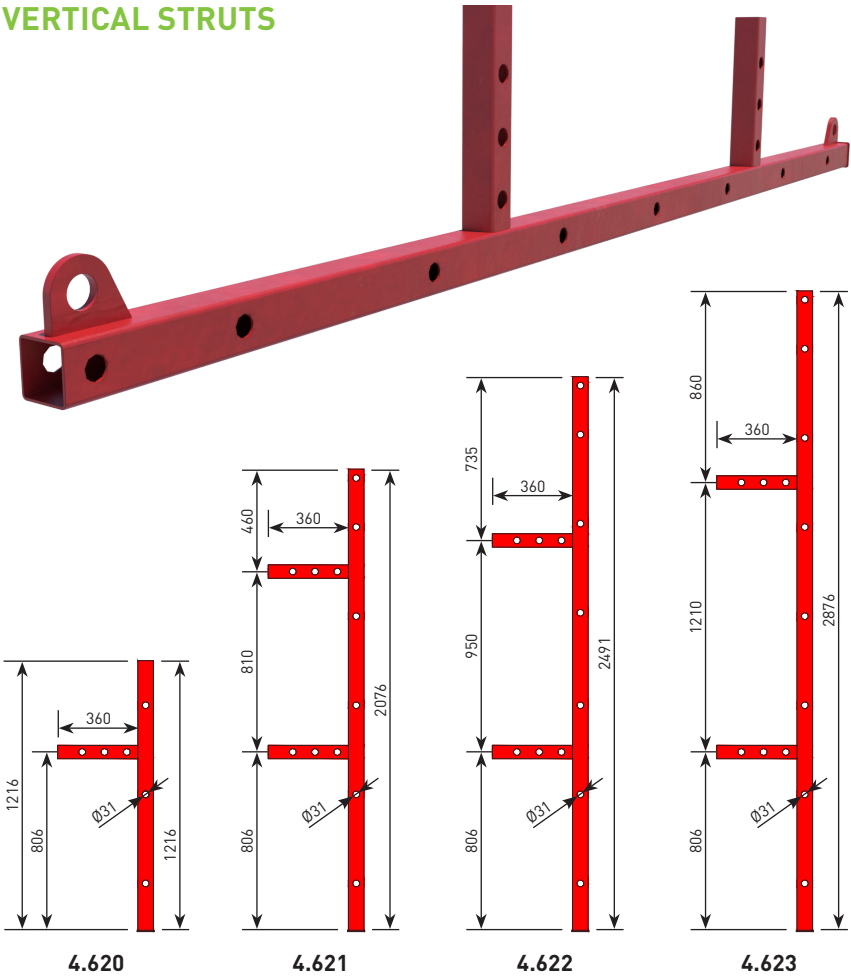
	Product ID			
	4.007	4.008	4.009	4.010
Description L × H (mm)	2000x1200 Base	2000x800 Top	3000x1200 Base	3000x800 Top
Panel Resistance (kN/m ²)	30	30	20	20
Panel Thick / Weight T(mm)/(kg)	58 / 65	58 / 42	58 / 85	58 / 54
Internal Trench Width Wi(mm)	880 - 2080	880 - 2080	880 - 2080	880 - 2080
External Trench Width We(mm)	1000 - 2200	1000 - 2200	1000 - 2200	1000 - 2200
Clearance Below Bottom Strut C(mm)	770	N/A	770	N/A
Clearance Between Struts Li(mm)	1840	1840	2840	2840



TRENCH DEPTH / PANEL CONFIGURATION

Depth	Configuration
D (m)	
1.2	1 Base
2	1 Base, 1 Top
2.4	2 Bases
2.8	1 Base, 2 Tops

VERTICAL STRUTS



Vertical Strut Type	Trench Depth		Weight Each	
	(mm)		(kg)	
	4.620	0 - 1200	10	
	4.621	1200 - 2000	17	
	4.622	2000 - 2400	19	
	4.623	2400 - 2800	22	

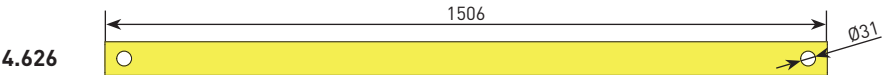
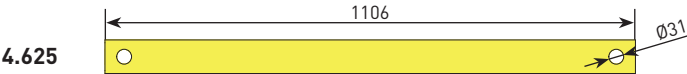
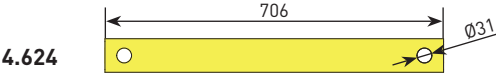
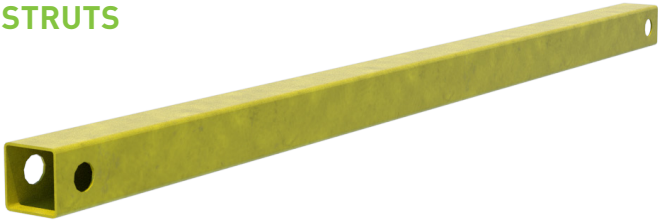
VERTICAL STRUTS TECHNICAL SPECIFICATION

	Product ID			
	4.620	4.621	4.622	4.623
Specification	70x70x3 SHS (vert) 60x60x3 SHS (horiz)	70x70x3 SHS (vert) 60x60x3 SHS (horiz)	70x70x3 SHS (vert) 60x60x3 SHS (horiz)	70x70x3 SHS (vert) 60x60x3 SHS (horiz)
Material Grade	S700	S700	S700	S700
Height (mm)	1200	2000	2400	2800
Axial SWL (kN)	80	80	80	80
Moment SWL* (kNm)	15	15	15	15
Extraction SWL (kN)	30	30	30	30
Weight (kg)	10	17	19	22

*This figure is the moment resistance in combination with the panel soldier.



HORIZONTAL STRUTS



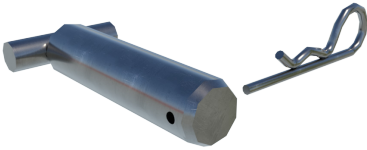
Horizontal Strut Type		Internal Trench Width	Weight Each
		(mm)	(kg)
	4.624	1000 - 1400	4
	4.625	1400 - 1800	7
	4.626	1800 - 2200	9

HORIZONTAL STRUTS TECHNICAL SPECIFICATION

	Product ID		
	4.624	4.625	4.626
Specification	70x70x3 SHS	70x70x3 SHS	70x70x3 SHS
Material Grade	S700	S700	S700
Length (mm)	706	1106	1506
Axial SWL (kN)	80	80	80
Moment SWL (kNm)	7	7	7
Weight (kg)	4	7	9



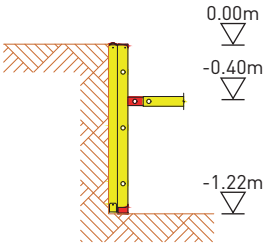
PINS AND RETAINING CLIPS



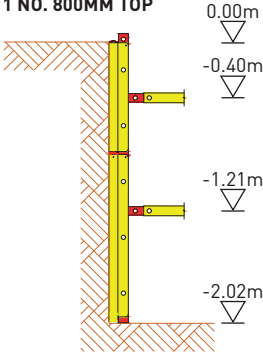
Component	Product ID	4.109
	Specification	Ø28mm round bar 110mm long
	Material Grade	605M36 (EN16T)
	Shear SWL (kN)	80
	Weight (kg)	1

MAXIMUM RECOMMENDED DEPTHS / CONFIGURATIONS

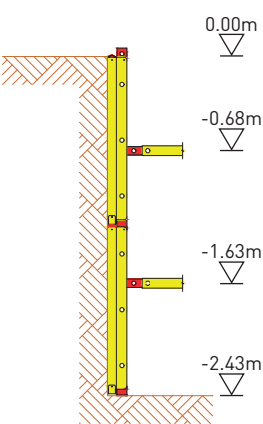
1200MM BASE



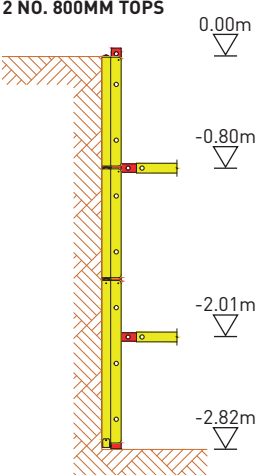
1200MM BASE &
1 NO. 800MM TOP



2NO. 1200MM BASES



1200MM BASE &
2 NO. 800MM TOPS



SIMPLE TO ASSEMBLE, FOUR-SIDED EXCAVATION SUPPORT SYSTEM DESIGNED TO BE BUILT BY HAND AND INSTALLED BY AN EXCAVATOR UTILISING THE DIG AND DROP TECHNIQUES.

Normally selected for end chambers on rail projects or installing small to medium utilities where ground movement is not critical. The boxes provide support for excavations 2m wide x 2m long x 2m deep and can be supplied with various openings to allow utilities to branch off. The box has an internal working space of 1.85 x 1.85m and the struts have an understrut clearance of 0.77m.

Fabricated from a blend of pultruded GRP (grade E17 to BS EN 13706) and S700 steel to form 58mm thick panels, the system comprises of 0.4m high panels which can be stacked into the channels of GRIPSHORE+ panels.

MGF can supply the systems with a full range of suitable lifting chains, Edgesafe edge protection panels and GRP or epoxy coated steel ladders, Counterbalance Davitsafe retrieval / fall arrest system and confined spaces regime equipment. Manufactured and designed in accordance with BS EN 13331 : 2002 Parts 1 and 2 Trench lining systems and BS 5975 (2019) Code of practice for temporary works procedures and the permissible stress design of falsework.

PRODUCT NOTES

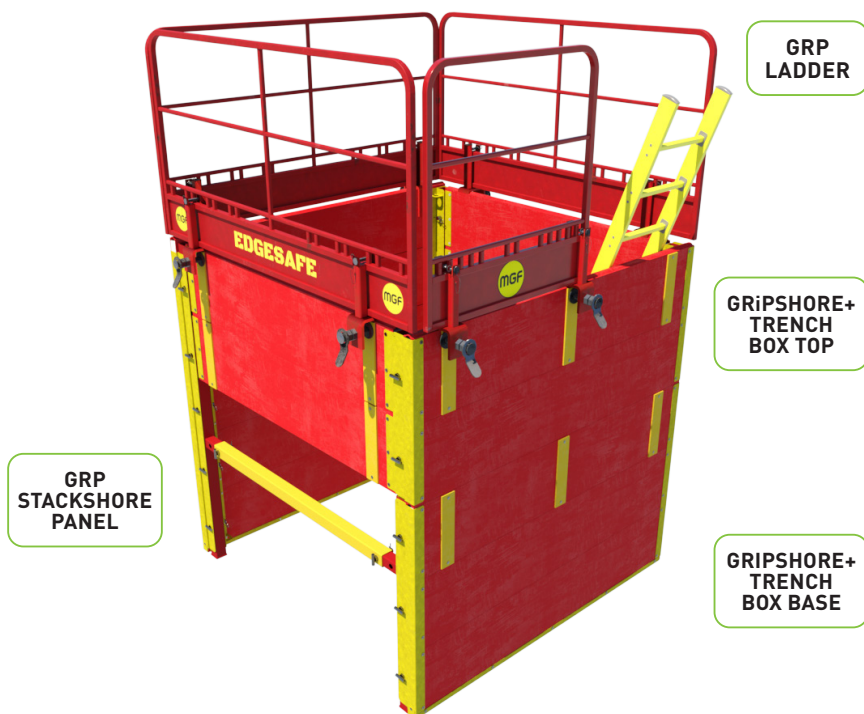
1. Boxes should only be used in the configurations shown by competent persons following MGF installation guidelines.
2. Boxes should be used in ground which is self-supporting in the short-term to allow for the dig and drop technique. Never push panels into the ground using the excavator bucket.
3. Over dig the trench dimensions by 100mm so that the box can be positioned without resistance. Ensure that any gaps between the outer face of the panels and the sides of the excavation are sufficiently backfilled to avoid injury.
4. Do not push down on the box with a machine during installation.
5. Boxes are not normally suitable for usage where ground movement is an issue and are therefore not recommended for use in live carriageway situations or adjacent existing buildings or structures.
6. Flying of the box above the base of the excavation is not recommended.
7. It is possible to man-handle individual components, but only undertake this if comfortable to do so with good manual handling techniques.
8. Assembled box systems range from 365kg to 416kg, ensure a suitable excavator for handling, installing and extracting these systems.
9. If stacking panels on site, timber packers must be used to separate the panels.
10. Boxes should not be left in-situ for extended periods within cohesive or very weak soils as earth pressures / adhesion on the panel surfaces may increase significantly with time requiring additional extraction forces to release the panels.
11. Always use MGF specified chains to handle and extract boxes, it is recommended that each corner is lifted approximately 50mm to break any initial cohesion before attempting to lift out with 4-leg chain. N.B. If a box becomes stuck very high extraction forces can be required to release each corner. In this instance MGF recommend either a ground reduction or to install sheets around the perimeter to break the stiction.



12. Prior to every lifting operation all lifting points must be carefully inspected by a competent person for evidence of damage.
13. Always enter the box via a ladder located within the box and never from an unsupported edge.
14. During lifting or extraction operations ensure personnel are well clear of the equipment.

EDGESAFE

See Section 7

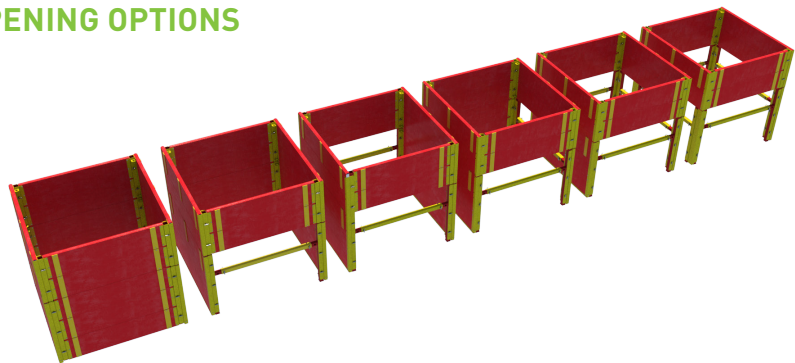


**FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF GRP STACKSHORE**

mgf.co.uk/products/grp-stackshore



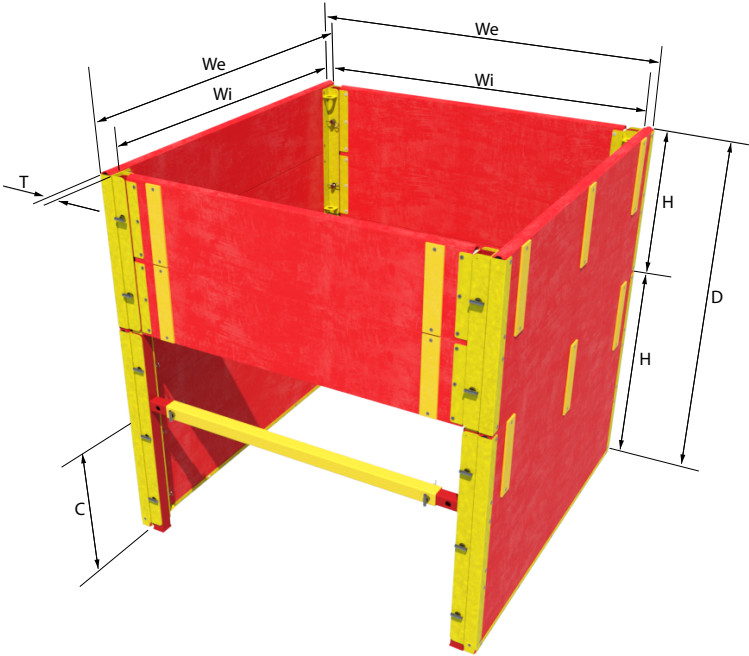
OPENING OPTIONS



All GRP STACKSHORE boxes provide support for excavations 2m wide x 2m long x 2m deep, however there are 6 options for openings, please see below the KIT CODE required for different options.

Kit Code	Full Box Description		Weight
	Openings (L x D)		(KG)
	SS-20-0	No opening - 2x2m GRP GRP STACKSHORE box	416
	SS-20-1	1 opening - 2x2m GRP GRP STACKSHORE box	391
	SS-20-2	2 opening (straight) - 2x2m GRP STACKSHORE box	365
	SS-20-2-90	2 openings (90°) - 2x2m GRP STACKSHORE box	406
	SS-20-3	3 openings - 2x2m GRP STACKSHORE box	417
	SS-20-4	4 openings - 2x2m GRP STACKSHORE box	396

GRP STACKSHORE COMPONENT SPECIFICATIONS



	Product ID		
	4.007	4.008	4.011
Description L x H (mm)	2000x1200 GRiPSHORE+ Trench Box Base	2000x800 GRiPSHORE+ Trench Box Top	2000x400 STACKSHORE
Panel Resistance (kN/m ²)	20*	20*	20
Panel Thick / Weight T(mm)/(kg)	58 / 65	58 / 42	58/18
Internal Trench Width Wi(mm)	1850	1850	1850
External Trench Width We(mm)	2000	2000	2000
Clearance Below Bottom Strut C(mm)	770	n/a	n/a

**Reduced capacity when GRiPSHORE+ Trench Box panels are used with STACKSHORE.*

VERTICAL STRUT



Component	Product ID	4.620
	Specification	70x70x3 SHS (vert) 60x60x3 SHS (horiz)
	Material Grade	S700
	Height (mm)	1200
	Protruding Arm Length (mm)	360
	Axial SWL (kN)	80
	Moment SWL (kNm)	15*
	Hole Diameter (mm)	31
	Weight (kg)	10

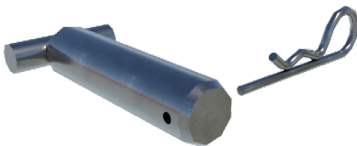
**This figure is the moment resistance in combination with the panel soldier.*

HORIZONTAL STRUT



Component	Product ID	4.626
	Specification	70x70x3 SHS
	Material Grade	S700
	Length (mm)	1506
	Axial SWL (kN)	80
	Moment SWL (kNm)	7
	Hole Diameter (mm)	31
	Weight (kg)	9

PINS AND RETAINING CLIPS



Component	Product ID	4.109
	Specification	Ø28mm round bar 110mm long
	Material Grade	605M36 (EN16)
	Shear SWL (kN)	80
	Weight (kg)	1

90° CORNER BRACKET



Component	Product ID	4.111
	Material Grade	COMPOUND SECTION 120x60x3.6 RHS, grade S355 c/w S700 channels
	Safe Working Moment Capacity (kNm)	11.5
	Shear SWL (kNm)	60
	Weight (kg)	23

TOP TO BASE CONNECTOR



Component	Product ID	4.110
	Section	60x60x3 SHS
	Material Grade	S700
	Safe Working Moment Capacity (kNm)	5
	Horizontal Shear SWL (kN)	80
	Extraction SWL (kN)	30
	Weight (kg)	3.5

EXTRACTION BRACKET



Component	Product ID	4.112
	Section	60x60x3 SHS
	Material Grade	S700
	Extraction SWL (kN)	30
	Weight (kg)	2



CONCRETE PIPE AND CULVERT EQUIPMENT



PIPE LIFTER	10.1
CULVERT PULLERS	10.2
MANHOLE RING LIFTER	10.3
MANHOLE SHUTTERS	10.4



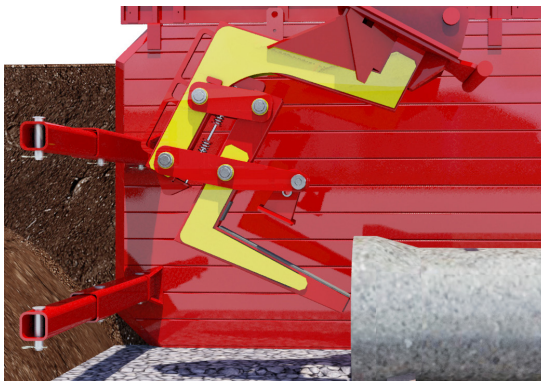
Pipe Lifter

THE MGF PIPE LIFTER HAS BEEN DESIGNED SOLELY TO ALLOW AN EXCAVATOR TO PICK UP AND LAY DOWN DN300 – DN1200 CONCRETE PIPES WITHOUT THE NEED FOR AN OPERATIVE TO CONTACT EITHER THE PIPE OR THE PIPE LIFTER. THERE ARE 4 DIFFERENT BOLTED HEAD PLATES THAT ALLOW THE PIPE LIFTER TO BE USED WITH A WIDE RANGE OF EXCAVATOR QUICK COUPLERS.

The Pipe Lifter is CE marked in accordance with the Machinery Directive 2006/42/EC.

PRODUCT NOTES

1. Please read MGF Pipe Lifter user manual and Safe System of Work Guide before use.
2. Ensure that a valid LOLER test certificate is available to site prior to use.
3. The Pipe Lifter must only be used for lifting and laying concrete pipes.
4. Always ensure that the operation has been risk assessed.
5. Ensure all personnel are stood well clear and turned to face the operation.
6. During operations always ensure that should the pipe rotate, slip or slide in the clamp that no personnel can come into contact with the pipe.
7. Ensure correct bolted head plate is fitted and bolts are fully tightened (recommended minimum torque 300Nm).
8. The Pipe Lifter should be off-loaded and stored in the safety carry frame.
9. Customers are to ensure that a suitable lifting plan is in place prior to commencing work and that any plant being used is appropriate for the intended operation. Never lift over personnel.
10. The clamping plate has two available settings, an upper hole for clamping DN300 – DN450 diameter pipes and a lower hole for use with DN525 – DN 1200mm diameter pipes.
11. Insert the full length of the lifting arm into the collared end of the concrete pipe. Ensure that the pipe surfaces in contact with the clamp are free from any lubricants or dirt.
12. The excavator operator must have a clear view of the Pipe Lifter at all stages of the operation.
13. The pipe may now be lifted and transferred to a suitable storage location or placed into the prepared trench.
14. Depending on the weight of pipe, depth of installation and lifting capacity of site plant, the pipe may be tilted up to 30 degrees from horizontal and manoeuvred between struts on the trench support system.
15. The Pipe Lifter can also be used to push the pipe into position.
16. When the pipe is in its final position and the ground has taken the full weight of the pipe, the Pipe Lifter should be slowly lowered to release the clamp plate after which the Pipe Lifter can be carefully retracted.
17. The excavator should never be left whilst a pipe is suspended in the Pipe Lifter.



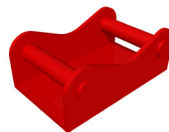
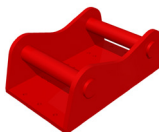
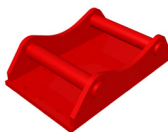
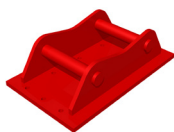
Pipe Lifter 680kg

Bolted
Head
Plate
220kg
(max.)

Safety carry
frame 200kg

Component	Pipe Lifter SWL	3700kg
	Allowable concrete pipe sizes	DN300-DN1200, Max. Length = 2625mm
	Pipe Lifter Weight	680kg
	Bolted Head Weight	220kg max.
	Safety Carry Frame	200kg
	Max. tilt when carrying pipes	30°
	Bolted head - bolting details	M20 x 100 bolts and nuts

PIPE LIFTER BOLTED HEAD - QUICK COUPLER COMPATIBILITY



MGF Pipe Lifter Bolted Head Pin Size	Geith Quick Coupler	Miller Quick Coupler	Hill TEFRA Quick Coupler
(mm)			
65	QC65H, QH65M	Range 4	Tefra 13t
80	QC80H, QH80M	Range 5, Range 6	Tefra 16t, Tefra 21t, Tefra 25t
90	QC90H, QH90M	Range 7, Range 8	Tefra 30t
100	QC100H	Range 8, Range 9	Tefra 35t

For other quick coupler manufacturers, please contact MGF for further details.

FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF PIPE LIFTERS

mgf.co.uk/products/pipe-lifter



LATEST PRODUCTS AND DOWNLOADS mgf.co.uk

MGF CULVERT PULLERS ARE MECHANICAL DEVICES DESIGNED FOR THE FAST AND SAFE METHOD OF INSTALLING PRE-CAST CONCRETE CULVERTS AND PIPES WITH THE ACCURACY NEEDED TO ACHIEVE SPECIFIED JOINT TOLERANCES.

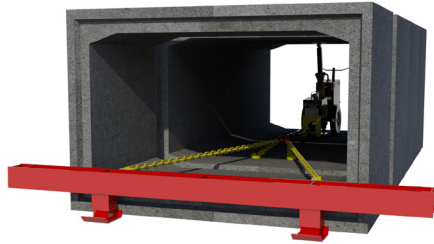
The MGF Culvert Puller has a hydraulic pulling capacity of 14t. Powered by either battery or electrical generators, the Culvert Pullers incorporate a robust steel frame and hydraulic cylinder that when used in conjunction with steel 203UC/254UC pulling beams or steel pulling hooks can pull a range of pre-cast concrete culverts or pipes.

The units lock into position by clamping directly to the culvert ceilings using an integrated hydraulic cylinder. The pulling beams are connected to the culvert puller using a combination of rigid steel pulling links and a 2-leg chain, the pulling hooks simply connect to the unit using pulling links.

Various adaptors are available to expand the range or to suit specific culvert / pipe specifications and bespoke beams and fittings are available upon request. Please contact MGF for further details.

PRODUCT NOTES

1. Operators should familiarise themselves with the relevant user guides or Safe System of Work guidance available on MGF's website mgf.co.uk.
2. Proper shoring and safety precautions must be in place when working below ground level.
3. Ensure appropriate PPE is used when operating the equipment.
4. If any damage to the puller unit occurs, please stop work immediately and contact MGF.
5. Never attempt to fix or modify the machine, upon observing any damage, leaking oil or the machine is not working correctly, contact MGF immediately.
6. Write a lifting plan, risk assessment and method statement identifying safety procedures as deemed necessary by an experienced operator.
7. Function check all controls prior to starting works.
8. Ensure all bolts, pins and r-clips are securely fitted.
9. Inspect all components before the start of every shift.
10. Always provide suitable exclusion zones around the units during assembly and installation.
11. Always be aware of individual component weights and final assembly weights using adequate lifting equipment and good manual handling practices where appropriate.
12. Always relieve pressure before re-entering the culvert to inspect the joint.
13. All operators of this equipment should actively practice the following:
 - Be familiar with operating the controls while running the machine.
 - Be familiar with emergency shutdown procedures.
 - Always provide new operators with appropriate training.
 - **NEVER** allow an inexperienced person to operate the machine without proper training.
 - **ALWAYS** take necessary precautions to protect yourself from pressurised hydraulic fluid. If damage or an oil leak is found contact MGF immediately, **NEVER** attempt to make personal checks or repairs.
14. Culvert Pullers can be used in pairs for heavier culverts, each pulling beam is suitable for double pulls. For further details please contact MGF.



	Product ID	
	CPP-ELEC	CPP-BATT
Description	MGF Culvert Puller	
Pulling Capacity (t)	14	
Culvert Inside Height (mm)	1220-3050*	
Pulling Options	Pulling Beam or Pulling Hooks	
Power Options	6kVA 32A Generator	12V Battery
Puller Weight (kg)	350	
Remote Operation	Corded	Wireless or Corded

Culvert Pullers can be used in pairs for heavier culverts, each pulling beam is suitable for double pulls. For further details please contact MGF. *Adaptors available to allow smaller, or bigger culverts / pipes to be pulled, see page 10.2.5 for further details.

For full details on how to setup and operate the MGF Culvert Pullers, please refer to the Culvert Puller User Guide available on the MGF website mgf.co.uk.



FOR SAFE SYSTEM OF WORKS
GUIDANCE FOR MGF CULVERT PULLERS

mgf.co.uk/products/culvert-puller

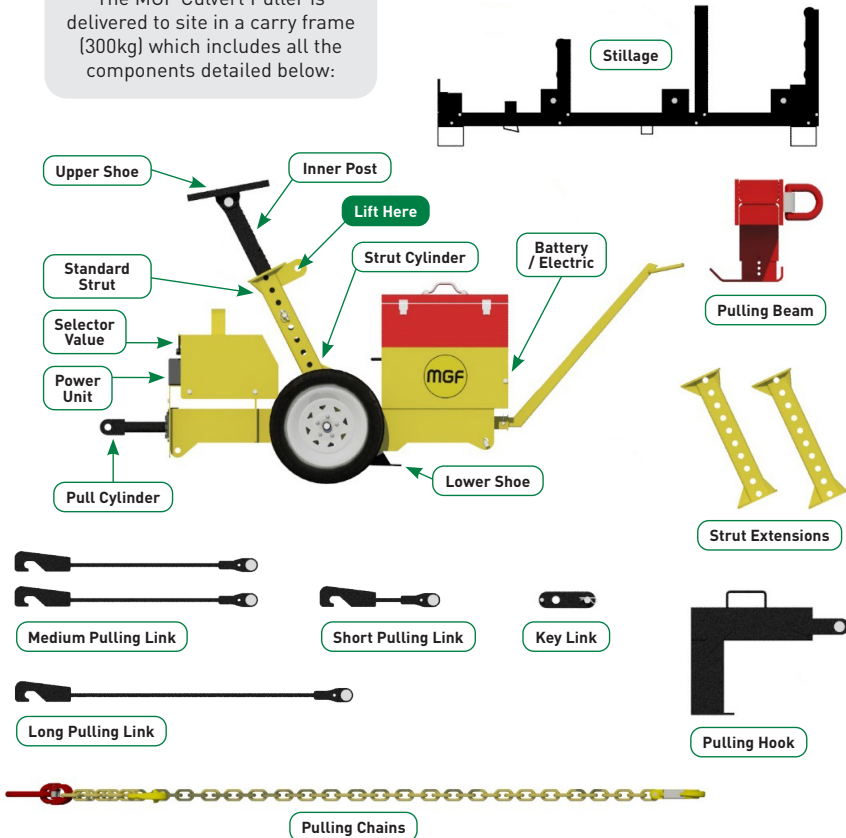


MGF CULVERT PULLER



The MGF Culvert Puller has a pulling capacity of 14t. There are 2 types of machines, battery powered and generator powered. The unit features a self-releasing hydraulically operated vertical strut which can be used with pre-cast concrete pipes and culverts between 1.2m and 3.0m internal height. There are 2 pulling options, pulling hooks or pulling beams. The pulling beams are available in lengths from 2.0m to 6.0m. Each pulling beam features telescopically adjustable feet which are adjusted to suit the thickness of pipe or culvert being pulled. A range of pulling hooks are available to suit culvert thicknesses of 220mm to 320mm.

The MGF Culvert Puller is delivered to site in a carry frame (300kg) which includes all the components detailed below:



MGF CULVERT PULLER PULLING BEAMS



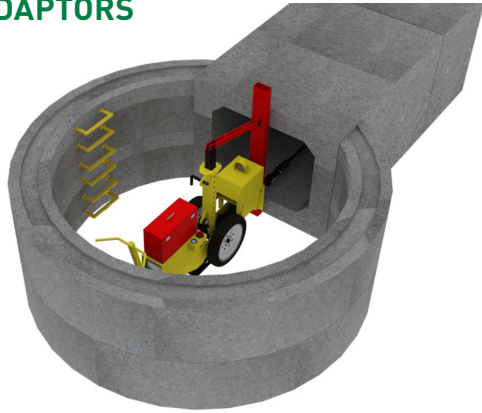
		Description	Weight
			(kg)
Product ID	6.412	2.0m Pulling Beam	275
	6.413	3.0m Pulling Beam	360
	6.414	4.0m Pulling Beam	450
	6.415	5.0m Pulling Beam	535
	6.416	6.0m Pulling Beam	775



MGF CULVERT PULLER ADAPTORS

FRONT MOUNT TUBE

The Front Mount Tube is compatible with both MGF Culvert Pullers and simply bolts to the front of the unit to allow the Puller to sit outside the culvert or pipe. This enables the unit to pull pipes and culverts with less than 1.2m internal height.



Component	Product ID	Weight
		(kg)
Battery Powered Culvert Puller Front Mount Tube	6.420	60
Generator Powered Culvert Puller Front Mount Tube	6.422	77

HEAVY-DUTY STRUT & HEAVY-DUTY STRUT EXTENSIONS

The Heavy-Duty Struts and Extensions are compatible with both MGF Culvert Pullers and enable Culverts with internal heights between 3.0m and 4.26m to be pulled.



Product ID	Description	Weight
		(kg)
6.430	HD Strut	40
6.431	HD Strut Extension	25



Manhole Ring Lifter

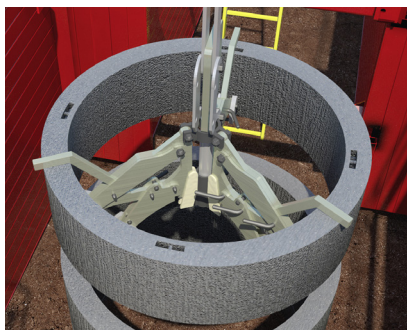
THE MGF MANHOLE RING LIFTER HAS BEEN DESIGNED TO QUICKLY ADJUST AND GRAB PRE-CAST CONCRETE MANHOLE RINGS, MAKING IT EASY FOR ONE PERSON TO USE FOR BOTH LIFTING AND LOWERING. IT ATTACHES QUICKLY TO TRACKED EXCAVATORS AND WHEELED LOADERS BY THE USE OF THE LIFTING EYE. WEIGHING ONLY 95KG THE UNIT CAN BE ADJUSTED TO SUIT DIFFERENT RING SIZES IN A MATTER OF SECONDS.

With a WLL of 2500kg the base unit is capable of lifting concrete manhole rings from 900mm nominal diameter to 1500mm, with the use of an adaptor, manhole rings of up to 1800mm nominal diameter can be handled.

The Manhole Ring Lifter can be used for offloading and installing uncoated manhole rings in accordance with BS 5911:2002 Concrete pipes and ancillary concrete products and BS EN 1917:2002 Concrete manholes and inspection chambers. No operatives are required to enter the bed of the vehicle for offloading, while the rings can be handled and installed solely by the excavator driver.

PRODUCT NOTES

1. Prior to every lifting operation the user must ensure that the Manhole Ring Lifter is suited for the intended operation, that it is fully functioning, has been suitably inspected and that the loads are not damaged and suitable to be handled. Never exceed the lifting capacity.
2. The excavator must have a sufficient lifting capacity to handle the Manhole Ring Lifter and the load at the anticipated levels / reach required for installation.
3. Only skilled operatives should be allowed to carry out the installation, maintenance and repair work of the Manhole Ring Lifters.
4. When handling manhole rings using the Manhole Ring Lifter it is essential that the lift be in close proximity to the ground, under no circumstance should the units be lifted over operatives. When in use there should be no operatives in the working area.
5. Ensure that the Manhole Ring Lifter is installed level prior to lifting the manhole ring, if the lifting grips hang diagonally then it must be released and re-installed so it is level.
6. It is essential that the load being lifted is always in the range of the vision of the operator.
7. Ensure care is taken when using the Manhole Ring Lifter whilst tracking over uneven ground, track slowly and do not use jerky motions.
8. The Manhole Ring Lifter must never be subjected to a force acting in a lateral direction due to diagonal pulling.
9. When using the Manhole Ring Lifter to install manhole rings with step irons the lifting brackets should not be positioned too close to the step irons. It is recommended to mark on the external of the manhole rings to ensure the step irons are all in-line with each other when installed.
10. The Manhole Ring Lifter has numerous moving parts, be aware of pinch points and finger trap hazards.
11. Maintenance to the Manhole Ring Lifter is only permitted when the device is shut down, if any cracks, splits or damaged parts are identified during an inspection or during use, then use of the Manhole Ring Lifter must be stopped immediately.
12. It is recommended to regularly check the screws and nuts are sufficiently tightened.





SAFETY PRODUCTS

MGF's wide range of safety products offer efficient and cost saving solutions.

All safety products are available for hire and sale including: working at height, confined space entry, personal protecting, pipe stoppers, manhole handling and flood defence.

FOR MORE INFORMATION CONTACT:

 **08083 028 832**

 **enquiries@mgf.co.uk**



MGF MANHOLE SHUTTER PANELS ARE PRE-FORMED STEEL SHUTTERS THAT COMBINE QUICKLY AND EASILY TO CREATE TEMPORARY FORMWORK FOR POURING A NOMINAL 150MM THICK CONCRETE SURROUND TO PRE-CAST CONCRETE MANHOLE RINGS. THE RANGE COMPRISES 3 DIFFERENT ROLLED PANEL LENGTHS, AVAILABLE IN A HEIGHT OF 1800MM AND ARE SUITABLE FOR MANHOLE RING NOMINAL DIAMETERS FROM 675MM TO 2700MM. THIS RANGE CAN BE EXTENDED UPON REQUEST USING SUITABLE STRAPPING OR SUPPORT. PLEASE CONTACT MGF DESIGN FOR FURTHER DETAILS.

The panels are manufactured out of 3mm thick rolled S355 steel and 5mm thick S355 steel angles, they are assembled to the correct size as detailed below and connect together using a simple pin and wedge connecting detail. Once assembled the system should be installed immediately around the concrete ring by attaching a 4-leg chain to the panel lift points and lowering in place. Ensure the panels are fully founded on level, stable ground and that all connecting pins and wedges are in place and secure prior to pouring in the concrete. Timber packers may be required to centralise the panels around the manhole rings. MGF can supply Manhole Ring Safety Platforms to assist with this process.

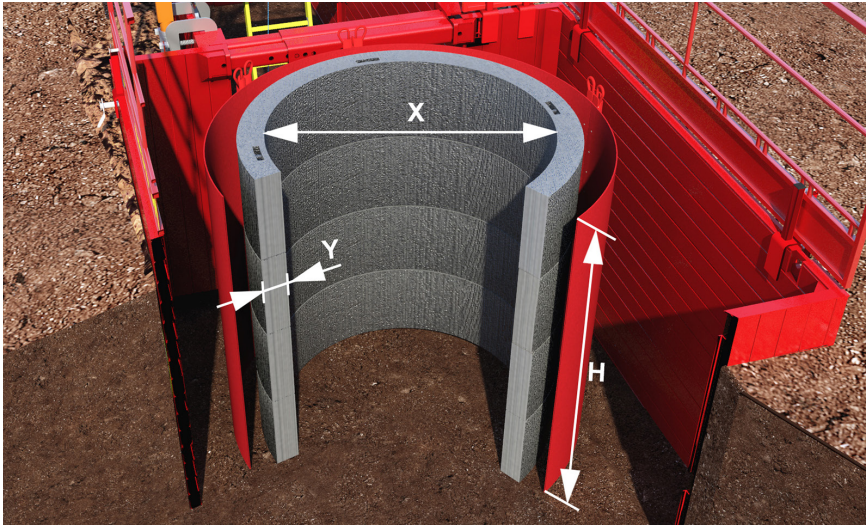
Once the concrete has adequately set, the connecting pins and wedges should be disconnected by striking with a hammer to allow the panels to be lifted out of the excavation.

PRODUCT NOTES

1. Prior to use:
 - Inspect all lifting and connection points for damage.
 - Ensure that wedges and pins are present and clean from concrete and debris.
 - Ensure that faces of connecting angles are clean of debris, fully clamped and flush along their full length.
 - Consider the use of a concrete release agent to help prevent the concrete from sticking.
2. Before pouring concrete, ensure all pins and wedges are secure and in place.
3. The shutters are for single height pours only. Do not stack for extra height.
4. During use, visually check panels and joints for any signs of movement or cracking from a safe distance.
5. Each shutter has two lifting points. Use only lifting points for attaching chains. Do not snatch the chain during removal.
6. Always use a banksman and ensure that panels are not lifted over personnel.
7. During use it is advised to periodically check that the panel does not develop any splits or holes and that the connector holes are intact, there is no damage to the lifting points and that the pins and wedges are kept clean from concrete.
8. After the concrete has adequately set, strike to release the wedges and remove pins before releasing the panels from the concrete and lifting each panel individually out of the excavation.
9. It is advised to limit the pour heights of the concrete to no more than 300mm increments and that the rate of rise is limited to 1m per hour.



Component	Height of Panel (mm)	1800		
	H	A	B	C
	Length of Panel (mm)	1520	640	300
	Weight (kg)	81	43	29
	Product ID	7.102	7.104	7.106



'X' Manhole ring internal diameter	'Y' Thickness of manhole ring	Panel combination for approx. 150mm concrete surround			'Z' External diameter of concrete	Theoretical thickness of concrete	Approx. concrete volume
(mm)	(mm)	A	B	C	(mm)	(mm)	(m³)
		A	B	C			1800 H
675	65	1	3	0	1095	145	0.78
900	75	2	1	2	1362	156	1.06
1050	85	3	0	1	1547	164	1.28
1200	100	3	1	1	1751	176	1.56
1350	112	3	2	0	1859	143	1.38
1500	115	4	0	1	2031	151	1.60
1800	115	4	2	0	2343	157	1.94
2100	120	4	3	1	2661	161	2.26
2400	135	6	0	1	2998	163	2.63
2700	162	6	2	0	3310	143	2.56



HANDLING POINT DETAIL

Each Manhole Shutter panel should be handled by attaching MGF lifting chains to the handling point as shown.



PIN AND WEDGE DETAIL

Manhole Shutter panels are connected to each other via a simple pin and wedge detail as shown. Secure wedges into the pin using a single hammer blow.





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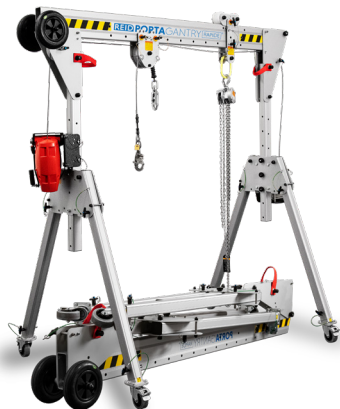
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