



MP250 Hydraulic Strut



Important Notes

All excavation work must be thoroughly planned and a risk assessment completed before work commences on site.

These instructions form guidance for the MP250 Strut. All stages of assembly, installation, pressurisation and removal must be supervised by a Groundforce engineer.

The equipment used in this manual must not be modified in any way without the express permission of Groundforce

All contractor's personnel involved the use of this equipment must be fully briefed and adequately supervised by a competent person.

All hires for this equipment will be accompanied by a scheme specific general arrangement drawing. This must be read in conjunction with these instructions.

THIS USER GUIDE IS NOT CONTROLLED WHEN PRINTED



A 3D video animation showing hydraulic strut typical installation methodology is available to [watch now](#) on our YouTube channel.

**IF IN ANY DOUBT SEEK FURTHER ADVICE:
ON FREEPHONE - 0800 000 345**



Certification Number 14419
ISO 9001 • ISO 14001 • ISO 45001

Rev	Date	Comments	Initial
2.7	19-05-23	Lock-off Valve tightening comments added	DSW








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SAFETY

Common Symbols and Meanings

Safety Note: It is recommended that hand and eye protection is used when operating hydraulic equipment.

PERSONAL PROTECTIVE EQUIPMENT (PPE)	
	Use eye protection
	Use hearing protection
	Wear protective gloves
	Wear head protection
	Wear protective footwear

WARNING SYMBOLS	
	General warning
	Crushing of hands

Introduction

The MP250 is a modular format heavy-duty hydraulically activated strut consisting of a hydraulic ram unit with a 1050mm stroke for fine length adjustment. For higher load and/or longer span applications, it is possible to combine the hydraulic unit with extension pieces using appropriate adaptor pieces. Swivel end bearing units allow for various strutting alignments within an excavation with or without waling beams.

The MP250 has a practical operating range of 3.1m to 25.0m without intermediate support and can withstand working loads up to 250 tonnes at shorter spans.

The hydraulic extension and retraction of the ram is made using a hand operated or motorised pump with two hoses connected to the ram via quick release couplings located to one side of the hydraulic unit. **Note:** this equipment should only be in the temperature range -20°C to +40°C unless otherwise stated.

Equipment Identification

Important Note on Motorised Pumps

It is important to note that there are two types of motorised pump that may be delivered to operate with the MP250 system. One type of pump is operated using 'Shoring Fluid' and the other is operated using 'Hydraulic Oil'. **IT IS ESSENTIAL THAT THE CORRECT FLUID IS USED FOR EACH TYPE OF PUMP.** Using the wrong fluid may cause irreparable damage to the pump. Typically, the Hydraulic Oil version will be used in very cold environments such as found in Scandinavian countries etc. For identification of each pump, see the 'front view' images below:

Note: For details of how to use each type of Motorised Pump, see the relevant user guides which you can [download as a pdf](#) from the GF Technical Library.

Shoring Fluid Model



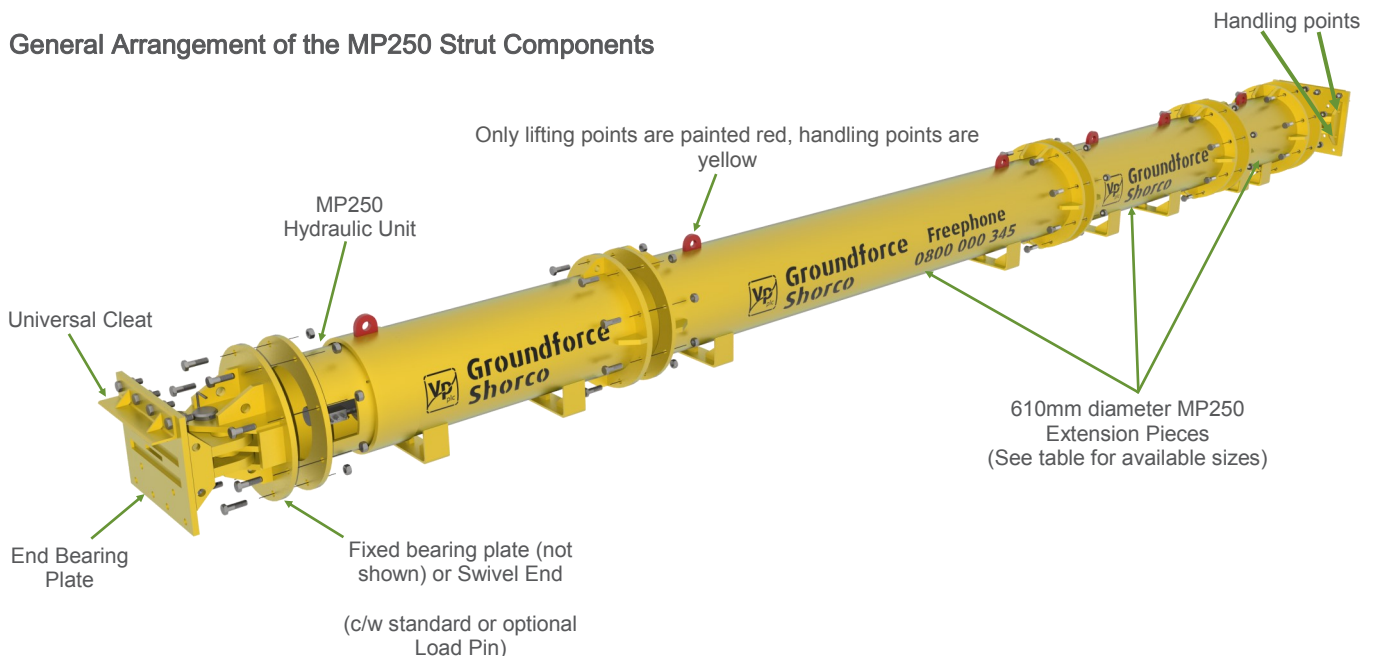
The Shoring Fluid Motorised Pump is housed in a **YELLOW CAGE**

Hydraulic Oil Model

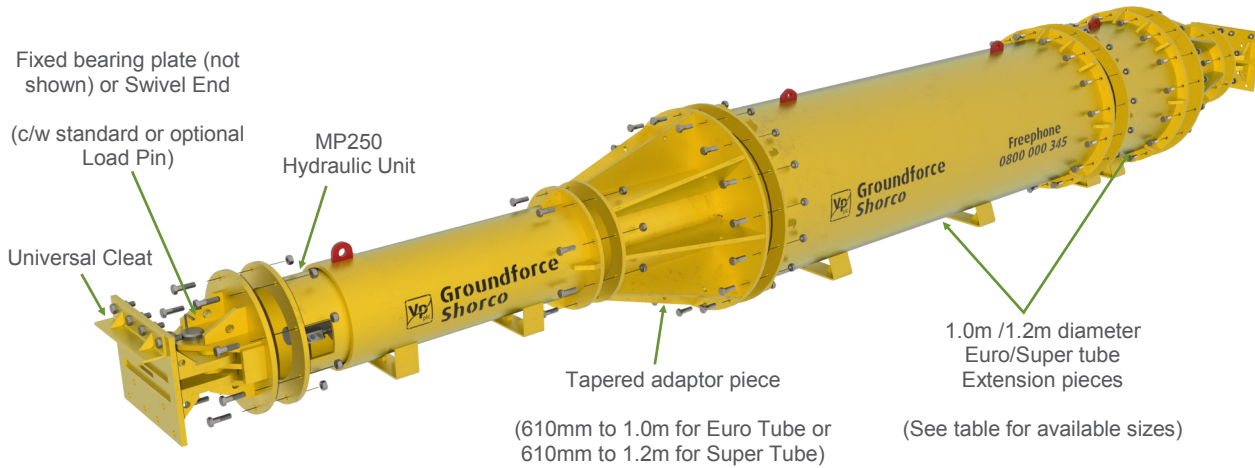


The Hydraulic Oil Motorised Pump is housed in a **BLUE CAGE**

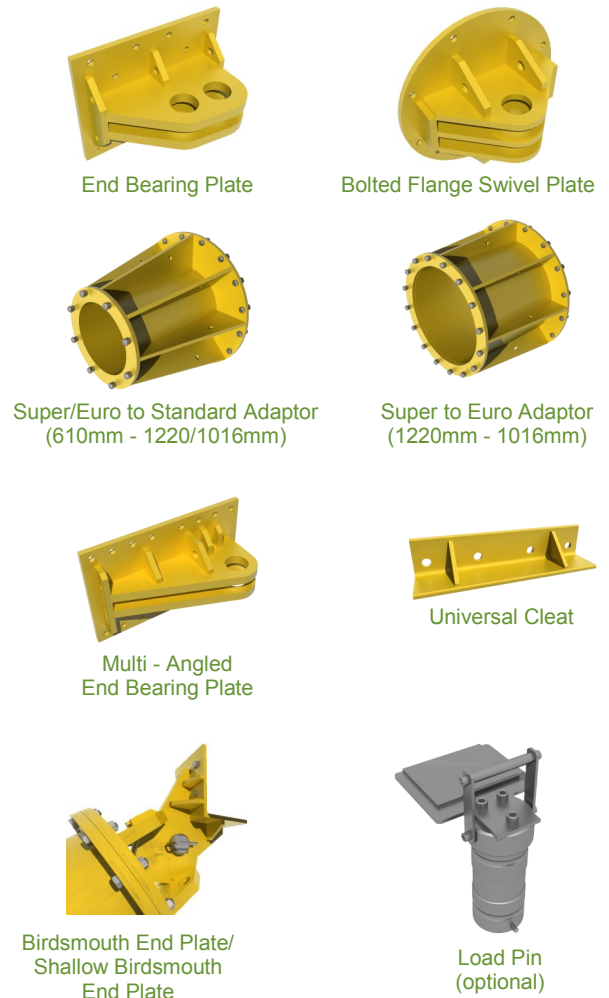
General Arrangement of the MP250 Strut Components



Equipment Identification Cont...



Item Code	Description	Weight (kg)
HS250.HUL	MP250 Hydraulic Strut Unit	2225
HS250.FPF	MP250 Hyd Strut Bolted Flange Swivel Plate	270
HS250.EBPF	MP250 Hyd Strut End Bearing Plate	255
HS250.EX03	MP250 Hyd Strut Extn 0.3m	200
HS250.EX05	MP250 Hyd Strut Extn 0.5m	250
HS250.EX05H	MP250 Hyd Strut Extn 0.5m (HD)	300
HS250.EX1	MP250 Hyd Strut Extn 1.0m	380
HS250.EX2	MP250 Hyd Strut Extn 2.0m	570
HS250.EX4	MP250 Hyd Strut Extn 4.0m	945
HS250.EX8	MP250 Hyd Strut Extn 8.0m	1720
HS250.EX12	MP250 Hyd Strut Extn 12.0m	2490
Ancillaries		
HS250.EEXESA	MP250 Euro to Std Adaptor	850
HS250.EEXSEA	MP250 Super to Euro Adaptor	1120
HS250.SSAH	MP250 Super to Std Adaptor (HD)	950
LM.250LP	MP250 Load Pin	38
HS250.MAEP	MP250 Multi Angle End Bearing Plate	305
HS250.UC	MP250 Universal Cleat	20
HS.250MBE	MP250 Hyd Strut Birdsmouth End Plate	186
HS.250SMBE	MP250 Shallow Birdsmouth End Plate	186



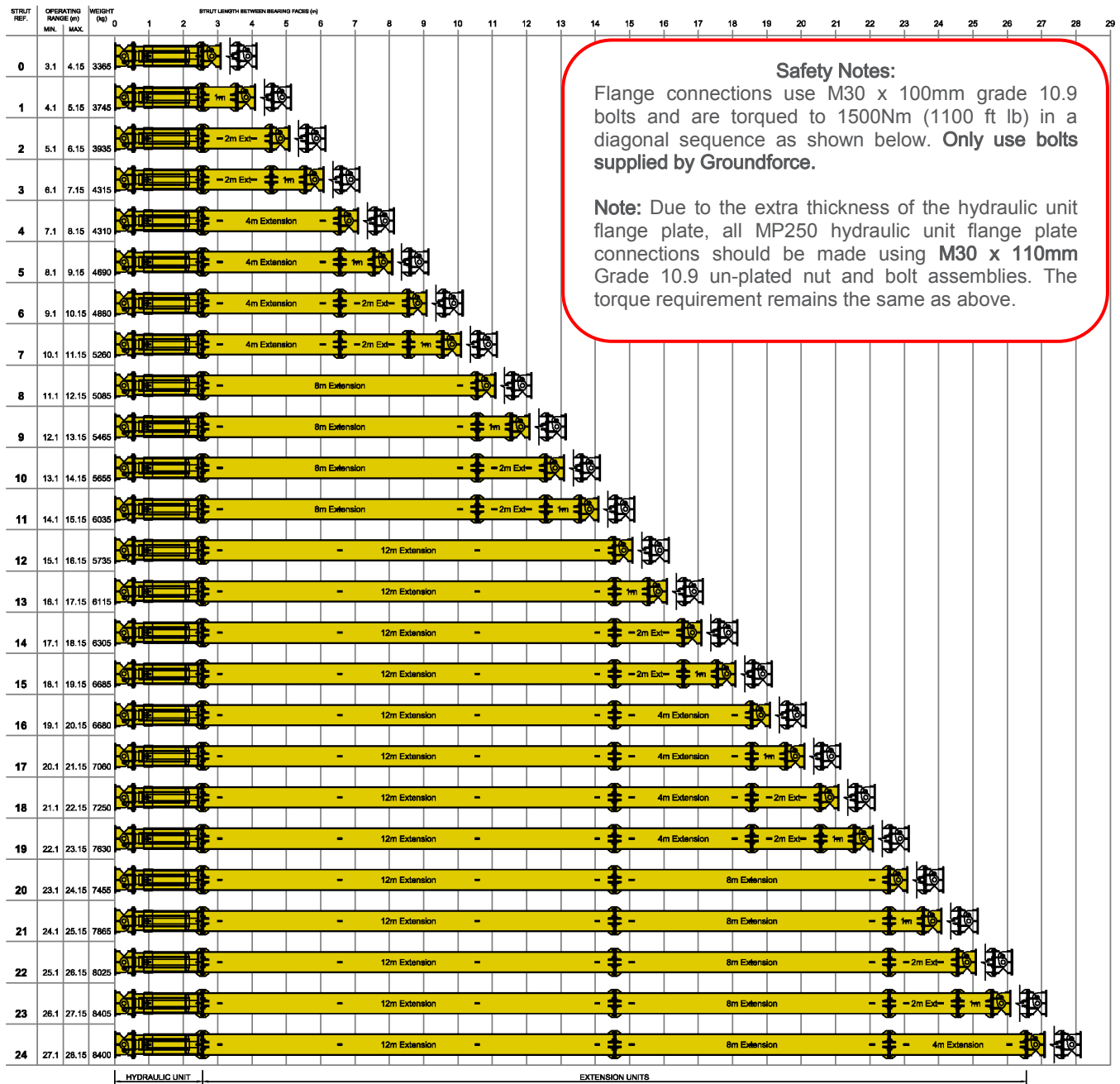
Optional Items

Item Code	Description	Length (m)	Weight (kg)
HS250.EEX1	MP250 Euro Strut Extn 1.0m	1.0	750
HS250.EEX2	MP250 Euro Strut Extn 2.0m	2.0	1260
HS250.EEX3	MP250 Euro Strut Extn 3.0m	3.0	1810
HS250.EEX5	MP250 Euro Strut Extn 5.0m	5.0	2800
HS250.EEX6	MP250 Euro Strut Extn 6.0m	6.0	3350
HS250.EEX10	MP250 Euro Strut Extn 10.0m	10.0	5340

Optional Items

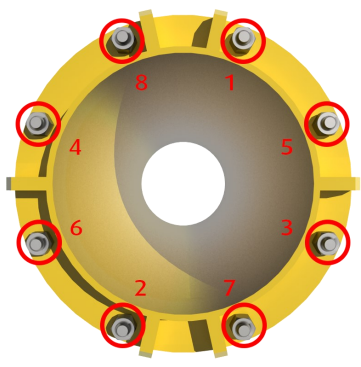
Item Code	Description	Length (m)	Weight (kg)
HS250.SEX1	MP250 Super Extn 1.0m	1.0	750
HS250.SEX2	MP250 Super Extn 2.0m	2.0	1100
HS250.SEX4	MP250 Super Extn 4.0m	4.0	2100
HS250.SEX8	MP250 Super Extn 8.0m	8.0	4100
HS250.SEX10	MP250 Super Extn 10.0m	10.0	5000
HS250.SEX12	MP250 Super Extn 12.0m	12.0	6000

Range and weight chart (standard configurations)

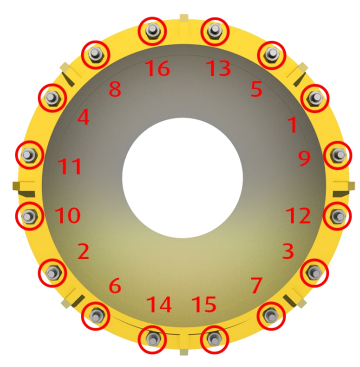


Safety Notes:
 Flange connections use M30 x 100mm grade 10.9 bolts and are torqued to 1500Nm (1100 ft lb) in a diagonal sequence as shown below. **Only use bolts supplied by Groundforce.**

Note: Due to the extra thickness of the hydraulic unit flange plate, all MP250 hydraulic unit flange plate connections should be made using **M30 x 110mm** Grade 10.9 un-plated nut and bolt assemblies. The torque requirement remains the same as above.



Diagonal tightening sequence for an eight hole flange or tube connection.



Diagonal tightening sequence for a sixteen hole flange or tube connection.



Note: On shorter spans, there may be difficulty accessing nuts 2 and 7 on an 8 hole flange or nuts 14 and 15 on a 16 hole flange when attempting to use a Torque Wrench and Multiplier. This is due to obstructions caused by the strut foot.

If access is difficult, it is permissible to use a 'Slogging Spanner' in conjunction with a lump hammer to tighten the above nuts.

Always follow the diagonal tightening sequence wherever possible.

Item No.	Description
SIA.SSW46	46mm Ring Slogging Spanner Wrench



Notes on Lifting and Handling

 **Safety Note:** No attempt must be made to lift assemblies or sub-assemblies greater than 30m long without a detailed lift plan being supplied by Groundforce, otherwise there is a risk of overloading individual lifting points or bolted connections. 

MP250 components are very heavy. It is essential to have a detailed lifting and installation/removal plan in place prior to commencing work. Components must be lifted from the correct lifting points provided. All lifting equipment must have current test certificates and appropriate working load limit values. **Note:** The weight of an assembled strut is concentrated towards the end incorporating the hydraulic unit. The slinging positions should be adjusted by trial lifts until a near horizontal lift is achieved.

Consideration must be given to the capacities of the individual red lifting points welded to the equipment when preparing the lifting plan. (see table below). **Note:** Lifting points painted red must only be used when the equipment is elevated clear of the ground: designated yellow points are limited to manoeuvring and positioning of equipment.



Description	Individual Lifting Point Capacity (tonnes)
MP250 Hydraulic Strut Unit	8.5
Super Tube Extn	12
Euro Strut Extn	12
610mm Diameter Extn	8.5

 **Safety Note:** it is ultimately the responsibility of the user to provide a safe method of access to and egress from 

- Always work from a detailed lifting plan
- Ensure adequate capacity of the lifting equipment
- Know the weight of the load
- Adjust slings so that struts are lifted horizontally
- Ensure the lift angle of chains is not exceeded
- Do not exceed the capacity of individual lifting points

- Use clear and precise hand signals
- Be aware of personnel in the vicinity
- Use tag lines to control load
- Ensure all lifting equipment has valid certification
- Do not use damaged lifting points
- Report damaged lifting points and equipment

Installation

 **Safety Notes:** Extreme care and adequate precautions must be taken to prevent trapping fingers during all stages of work. 



Important Notes:

If struts are bearing against steel beams, it is essential that the connection details are designed by a qualified engineer. It is recommended that the seating area of the strut is clean and marked prior to installing the strut.

MP250 struts are generally used for strutting between concrete pile caps: these instructions have been written with this in mind. **Note:** MP250 struts will usually be supplied with a Motorised Shoring Pump to speed and simplify installation. (see separate Motorised Shoring Pump user guide which is available to [download as a pdf](#) from the GF Technical Library). It is recommended that the strut be fully assembled outside the excavation prior to lowering into place. Alternatively, should site restrictions dictate, then the strut can be assembled from within the excavation.

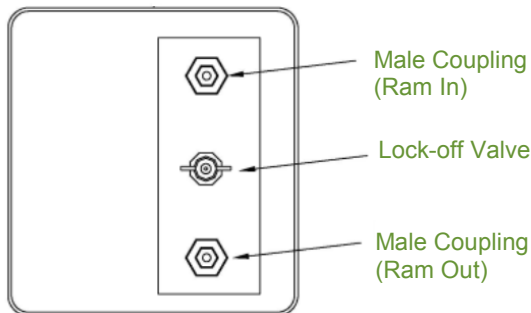
Steps 1 and 2 apply only to struts delivered to site in component form or part assembled:

1. Assemble the appropriate components in the correct order and orientation with the lifting points to the top. Ensure that the End Bearing Plate is assembled to the Bolted Flange Swivel Plate through the central swivel hole. Ensure that all mating flanges are clean and all bolts in every flange are fitted in a diagonally opposite sequence (see page 4). Do not attempt to lift the assembled strut until this is done. The bolts should be re-checked for tightness once the strut is off the ground.

 **Safety Note:** If strut assembly is to be carried out on site, use only bolts supplied by Groundforce (M30 x 100mm grade 10.9 c/w flat washer). Tightening torque is 1500Nm (1100ft lb) Spanner / socket size is 46mm. All MP250 hydraulic unit flange plate connections should be made using **M30 x 110mm** Grade 10.9 un-plated nut and bolt assemblies. 

Installation Cont...

2. Cleats are not required when the struts bear directly against a concrete beam or similar. The End Bearing Plate/Adaptor Plate must be bolted directly to the beam through pre-drilled holes in either plate. **Note:** The connection details must be designed by a qualified engineer.
3. Open the cover of the hydraulic coupling protective housing and identify the couplings. Ensure the Lock-off Valve is open by two full turns anti-clockwise using the tool provided. Wipe clean all coupling faces and connect both pump hoses to the strut cylinder block. Slide the retaining collar of the female coupling backwards whilst pushing the coupling onto the male coupling on the strut cylinder block; the retaining collar will snap forward to make the connection. It may be practical at this stage to disconnect the hoses from the pump until the strut is near to its intended location.



View of the hydraulic couplings through the strut housing

Note: It is important that the Lock-off Valve is not tightened in excess of 10Nm, therefore only use the Lock-off Tool provided to hand tighten.



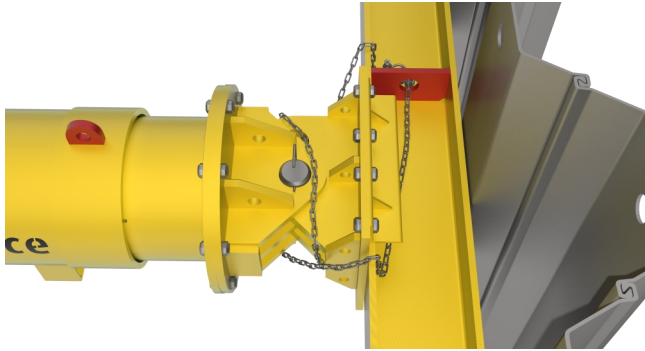
4. If not already done, connect both pump hoses to the pump block and move the lever on the pump to the 'Ram Out' position to expand the strut.
5. Adjust the overall length of the strut to suit the required span between the capping beams (or to within approximately 150mm of this dimension).
6. Attach the lifting chain to the appropriate strut lifting eyes, maintaining a maximum angle of 45 degrees between the chain legs and offer the strut into position. **Note:** The centre of gravity of the strut is towards the hydraulic end.
7. Gradually lower the strut into position against the capping beam. With the strut still suspended by chains, align the holes in one end bearing plate with the pre-drilled holes in the capping beam and fix the strut into position. Using fine adjustment, further extend the strut so that the opposite end bearing plate can also be attached to the capping beam.
8. Once positive contact is made between the concrete beam and strut, use the pump to expand the strut to the specified pre-load, typically 1000 to 1500psi (~70 to ~100bar[#]) as indicated on the pump pressure gauge. Do not exceed 1500psi (~100bar). Close the Lock-off valve using the tool provided by turning clockwise. **DO NOT OVERTIGHTEN THE LOCK OFF VALVE** (see note above). Note: the valve is fully closed when lock nut is seated on the body of valve. **Note:** Pre-load is not a critical part of the structural capacity and governed by the limitations of the pumping equipment.
9. Release the pressure in the hoses by moving the lever on the pump block to the central neutral position and the pressure gauge drops to zero. Remove the hoses from the strut cylinder block by sliding the retaining collars on the female couplings backwards. Close the protective housing cover.
10. It is strongly recommended that Restraining Chains are used as a secondary support measure. These should be attached to the End Swivel Plate and an appropriate support point on or above the capping beam. (see below)
11. Remove the lifting chains.

1 bar = 100 kPa

Restraining Chains



Safety Note: Restraining chains act as a back up means of support in the unlikely event of hydraulic failure. It is essential that certified lifting chains are used to take the weight of equipment before depressurising the hydraulic rams.



Connection must be made by securing to the capping beam or other suitable point. Struts must be securely supported by means other than the restraining chains before installation or during removal.

Restraining Chain Assembly	
Item Code	Weight (kg)
MG.REST	7.0

Restraining chains are not certified and must not be used for any lifting operations.

Removal (Strut Retraction)

Important Note:

Do not open the Lock-off Valve until the hoses are reconnected.

- 1 Upon completion of the permanent works, ensure the excavation is back-filled to the underside of the strut and the surround material is fully compacted and a competent person has given authorisation to remove the strut.
2. Make provision for adequate support to the strut before attempting removal, preferably slung by the lifting chains.
3. Working from a safe area, open the hydraulic coupling protective cover and reconnect both hoses to the strut cylinder block by sliding the retaining collars as previously described in point 3 of 'Installation'.

Note: If the hoses are difficult to connect, it is likely that the Lock-off valve has been opened prematurely. Proceed as follows: ensure that the Lock-off Valve is closed using the tool provided. Position the hollow end of the tool over the end of the male coupling and gently tap the other end of the tool to release the residual pressure; the hoses should then connect easily.

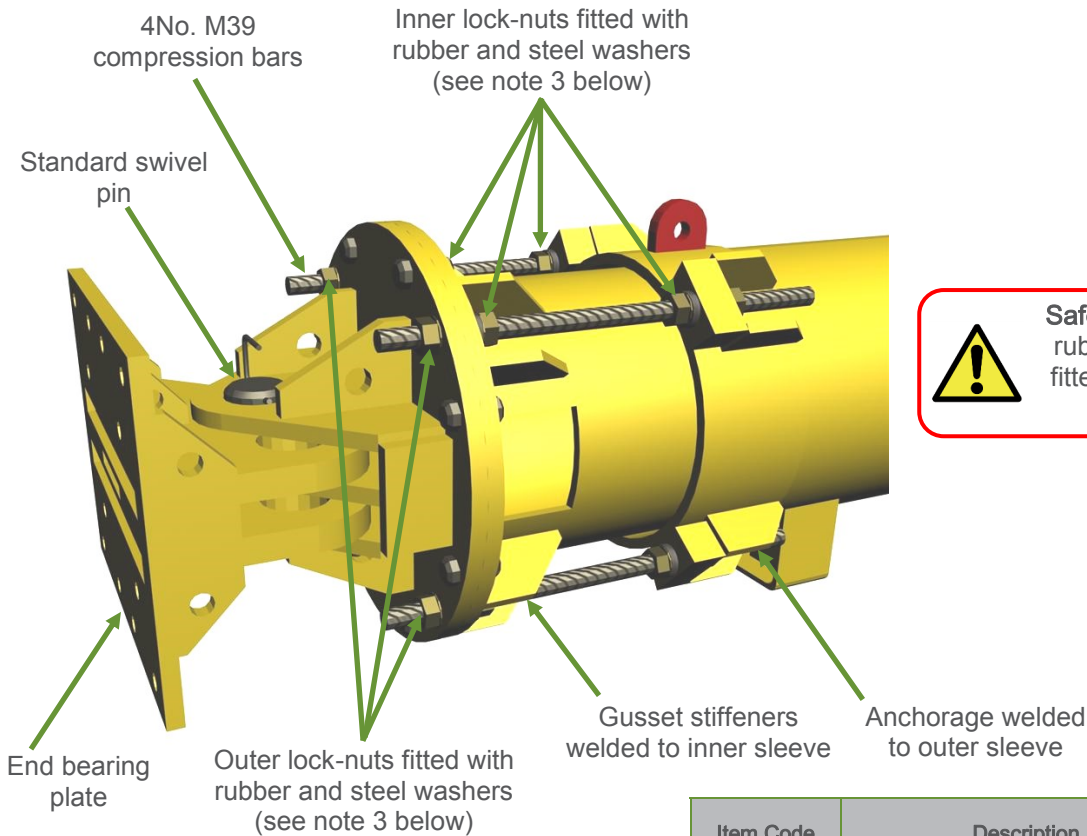
4. If not already done, reconnect both pump hoses to the pump block by sliding the retaining collars backwards following the same procedure as described earlier. Move the lever on the pump to the 'Ram In' position and gradually open the Lock-off Valve with the tool provided to release the pressure from within the strut. After the pressure has been released, unscrew the Lock-off Valve by two full turns. With the weight of the strut being taken by the lifting device, retract the strut by pumping until the strut is clear of the walings and can be lifted clear of the excavation.
5. Before finally lowering the strut to the ground, fully retract the strut, ensuring that the hydraulic coupling housing cover plate lines up with the hydraulic outer sleeve cut out to prevent damage to the plate. If this cannot be easily achieved then do not fully retract the strut. Disconnect the hoses from the strut cylinder block by sliding the retaining collars backwards on the female couplings. Close the protective cover and secure with the clips provided.

Note: See the following pages for instructions on fitting the optional Mechanical Lock-off

Mechanical Lock-Off (optional)

The Mechanical Lock-Off system is designed to act as a fail-safe in the unlikely event of hydraulic failure. Providing that the hydraulic unit has been appropriately modified, it is possible to isolate the integral hydraulic ram after installation by installing four M39 high yield compressions rods and locknuts through housings attached to the inner and outer sleeves of the hydraulic ram unit. Please note that this feature is only available by prior agreement with Groundforce.

Equipment Identification



Safety Note: Steel and rubber washers to be fitted on all inside and outside faces.

Item Code	Description	Quantity
M39.TB	M39 Threaded Bar G10.9	4
M39.HN	M39 Hex Full Nuts G10	16
M39.SW	M39 Flat Hardened Washer	16
M39.RW	M39 Rubber Washer	16

Installation

Note: All four rods, inner nuts and washers must be located through the holes in the housings prior to pumping out the strut. If this is not done, the holes may twist out of alignment making it difficult to insert the rod.

1. If the rods have been supplied loose, pass a threaded rod through one of the locating holes and attach two nuts, two plain steel washers and two rubber washers. Screw down towards the centre of the rod. Note: it is essential that these are assembled in the correct order (see above enlarged view). Repeat for all four rods.
2. Install and pressurise the strut as described in the relevant user guide. Ensure that the nuts are positioned on the rods to prevent the strut expanding fully.
3. Adjust the *inner* nuts and washers so the bar is positioned approximately central between the housings before tightening the nuts to lock the bar into place. **Note: Do not overtighten - a light 'nip up' is all that is required to slightly compress the rubber washers.**
4. Attach two rubber washers and two plain steel washers and tighten the *outer* nuts onto the housings using only moderate force. **Note: Do not overtighten - a light 'nip up' is all that is required to slightly compress the rubber washers.**
5. Apply grease and Denso tape, or a similar method of protection, to the threads over the full length of the bar in order to aid removal.
6. Repeat for all four rods.

Removal

Note: The rods must be released before depressurising and the ram must be retracted with the rods in place.

1. Remove the protective tape and using the spanners provided in the installation kit, loosen the 'external' locknuts by a couple of turns.
2. Gradually slacken the 'internal' locknuts on both rods in turn until they become free.
3. Screw the 'internal' nuts towards the centre of the bars until they meet.
4. De-pressurise and remove the strut in the normal manner.



Note: Any sign of damage or fluid loss or hydraulic systems failure during use must be notified to Groundforce immediately.



Note: Waste fluids should be disposed of safely with due regard to local regulations

Do

- ✓ Have a lifting plan in place before installation
- ✓ Visually check all safety critical parts as listed below prior to each use and replace if necessary:
 - Lifting eyes, Handling points
 - Hydraulic couplings and Lock-off valve
 - Lifting equipment (e.g. chains and slings)
- ✓ Prepare a detailed site specific method statement before installation and removal
- ✓ Ensure the strut is adequately located onto the bearing surface and always use a designed and approved connection to support both ends of each strut
- ✓ Clean and oil the hose couplings before making connections
- ✓ Only use this equipment in temperature range -20°C to +40°C
- ✓ Only use the red painted points for lifting
- ✓ Inspect struts regularly and check overall strut alignment after installation
- ✓ Adequately support strut sub-assemblies during installation and removal
- ✓ Ensure all flange joint bolts are of the correct grade and are torqued to the specified value
- ✓ Take care to protect the strut from accidental strikes, concrete accumulation, etc
- ✓ Take care to avoid trapping fingers at all stages of work
- ✓ Ensure you are using the correct fluid for the Motorised Shoring Pump being used
- ✓ Store all equipment in a safe manner when not in use or when ready for collection. Ensure equipment stability and protection from damage, away from site activity

Do Not

- ✗ Laterally load the strut from the side
- ✗ Use bolts other than those supplied by Groundforce for any flange connection
- ✗ Strike or impact the strut
- ✗ Allow debris to accumulate on the strut
- ✗ Exceed the stated installation pressure
- ✗ Use Shoring Fluid or Hydraulic Oil other than supplied by Groundforce
- ✗ Use uncertified lifting equipment
- ✗ Attempt to remove the strut under load
- ✗ Relocate the equipment once it is installed
- ✗ Suspend or store materials on the struts
- ✗ Over-tighten the Lock-off valve (see note on page 7)
- ✗ Over-tighten the inner locknuts against the rubber washers on the Mechanical Lock-off System (if fitted) light nip only required
- ✗ Swap between different types of Motorised pump (the shoring/hydraulic fluid will be cross-contaminated)
- ✗ Attempt to lift assemblies greater than 30m long without a lift plan being supplied by Groundforce

EXCAVATION TRAINING AVAILABLE

Train your team with **Groundforce Training Services**

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The theoretical safety course is mapped to both EUSR and the National Occupational Standards and introduces the learner to the basics of working around excavations. Designed as an awareness course, particular emphasis is provided to key aspects of managing and/or overseeing excavation work. [Visit the course page](#) for more details.

The one day course can accommodate up to 20 delegates per day