



The MP750 is the pre-eminent prop in the Groundforce's fleet of high strength modular struts. When combined with 1.2m Ø super tubes extensions, it is capable of providing a design resistance (ULS) of up to 11700kN at short spans and can operate larger spans up to 50m with the aid of an intermediate support (scheme specific. Please contact Groundforce Technical Team).

The strut has been designed to combine the well known benefits of hydraulic adjustment and pressurisation with the safety and security of the axial load being resisted by large diameter screw jacks. A specially designed release mechanism on the screws enables the strut to be released in a controlled manner, even when under significant residual loading.

Typical Applications

The MP750 is intended for heavy duty propping directly between diaphragm walls or concrete capping beams in basement propping type excavations.

Key Features and Benefits

- The strut employs an integral hydraulic ram with 0.5m stroke for rapid installation and on-site adjustment.
- The integral hydraulic ram enables pre-loads of up to 120 tonnes to be induced into the strut. Higher pre-loads can be achieved using specialist jacking equipment; refer to technical services for more information.
- Imposed loads are resisted by twin large diameter mechanically locking screws, incorporating a release mechanism.
- The mechanical load holding feature provide increased strut stiffness over non-mechanical hydraulic struts.
- Employs a modular extension system using 1.2m Ø super tubes to enable large clear spans to be achieved.
- An optional integral wireless on-board load monitoring system can be fitted to these struts.

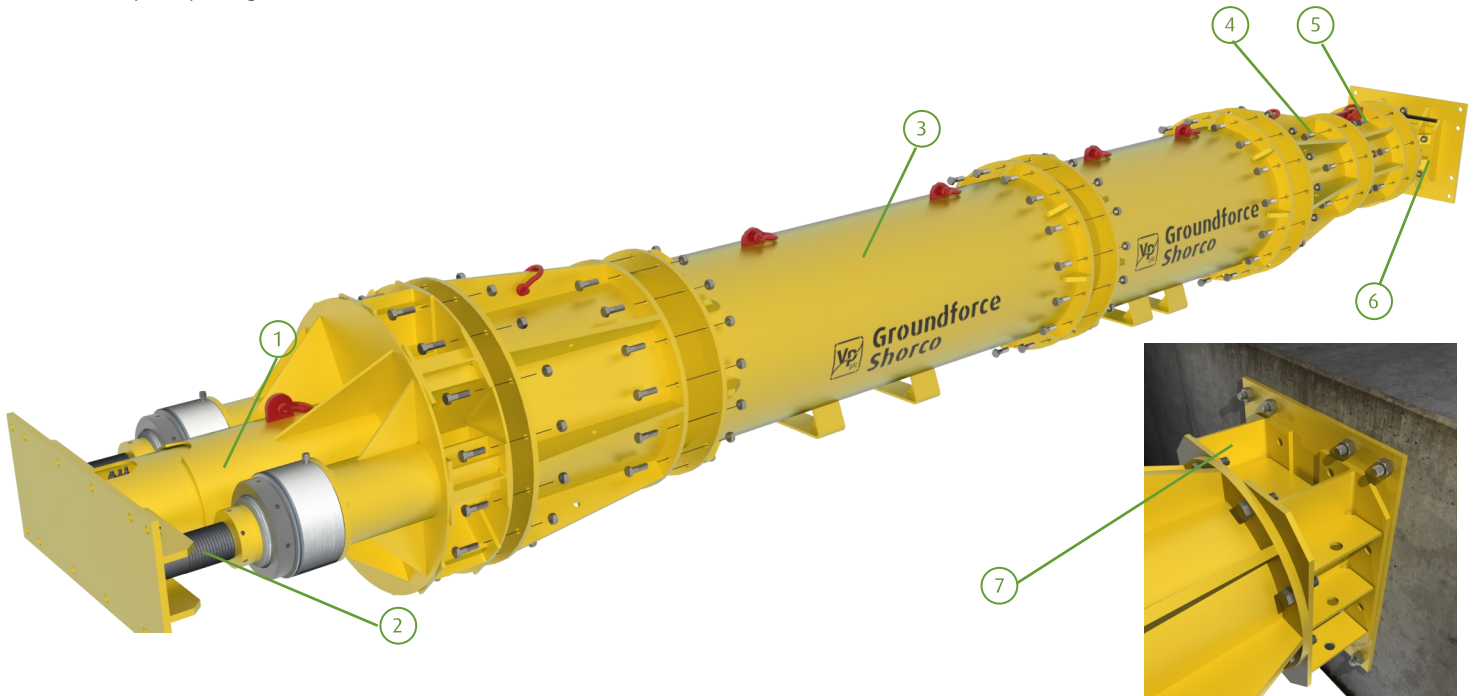


Design Considerations

Although basic technical information is tabulated in the following pages, it is recommended that the design of MP750 struts and super tubes is carried out from first principles on a job by job basis so as to fully assess the loads and combination of loads acting on individual struts.

MP750 - Product Description

The MP750 strut is made up of a number of distinct components (see picture below) each with their own load characteristics, which when bolted together in a specific configuration will dictate the overall load capacity of the strut. Some basic technical information on the various components is provided within this document, however due to the complexity of the design considerations relating to these struts and the combination of components of differing strengths it is strongly recommended that design verification for MP750 struts are carried out on a first principles, job specific basis by a qualified and experienced Groundforce Major Project Engineer.



MP750 - Component Identification and Basic Specification

1. **Adjustable unit** - Offers 0.5m of on-site adjustment for installation purposes only.
2. **Screw jacks mechanical**: Maximum design resistance is 7792kN per screw: this includes appropriate partial factors as per Eurocode design standards.
Note: this refers to the maximum design resistance of the twin screws taking into account any load reduction for potential buckling of the complete strut assembly at longer spans. **Note**: maximum design resistance of MP750 is governed by the swivel assembly where $N_{Rd} = 11700\text{kN}$.
3. **Super tube extensions** - Fabricated from 1220mm $\varnothing$ x 16mm thk grade S355 cold formed CHS of cross-sectional area of 605.3cm². They are available in 1m, 2m, 4m, 8m, 10m, & 12m standard modular lengths. The 8m, 10m & 12m extensions are pre-cambered to reduce self-weight deflection. Overall flange diameter is 1420mm and units are connected by 16No. M30 Grade 10.9 bolts - tightening torque 150Nm. Working bending moment resistance of the flange joint is 2845kNm.
4. **1220 / 610 Tapered adaptor piece** - 1m long to connect super tubes to end bearing components. The large flange is as per the super tube. The smaller flange is 810mm overall diameter and uses 8No. M30 Grade 10.9 bolts - tightening torque 1650Nm. The bending moment resistance of the joint is 760kNm.
5. **0.5m long 610mm $\varnothing$ short Heavy Duty infill extensions** - ex 610mm $\varnothing$ x 12.7mm grade S355 tube with additional stiffening ribs.
6. **Swivel end unit** - provides a zero moment connection to the wall. Maximum design resistance $N_{Rd} = 11700\text{kN}$. It can be fitted with a special electronic load monitoring swivel pin if required. See page 6.1.4 for more information.
7. **Non-swivel end bearing unit** - bearing plate is pre-drilled to with 36mm $\varnothing$ holes accept fixing bolts to connect to a waling, wall or capping beam. **Note**: this unit is used in lieu of item 6.



MP750 - Technical Specification

- Minimum span: 2.97m between bearing faces.
- Maximum span (un-supported) ~45.0m - subject to detailed design checks.
- Component / assembly weights: see configuration chart on page 6.1.5.
- Nominal unfactored self-weight (udl) for design purposes = 5.5kN/m length of strut.

Hydraulic Ram Details: Note the ram is used for installation and pre-stressing purposes only.

- Ram construction: Steel, double acting hydraulics incorporating a mechanical lock-off valve on the full bore (load bearing) side.
- Ram dimensions: Bore - 250mm, piston rod diameter 140mm, stroke 500mm, full bore area 490.9cm², annulus area 153.9cm², fluid volume required to achieve 50% stroke ~ 4 litres.
- Pressure / load ratio: ~33.8 tonnes per 1000psi (69 bar) - maximum possible induced pre-stress load ~1200 kN Note: Higher pre-loads can be achieved using internal supplementary hydraulic jacks; refer to technical services for more information.

Screw Details: Note these are designed to resist all of the applied axial load shared equally between both screws.

- Mechanical screws: 2 No. solid 160mm Ø acme thread screw bars with 100mm long locknuts (all Grade 605M36R) - 500mm of adjustment is available.

Design Resistance: 7792kN per screw at max stroke which includes a partial factor γ_{M0} and γ_{M1} of 1.0 and 1.1 respectively as per Eurocode

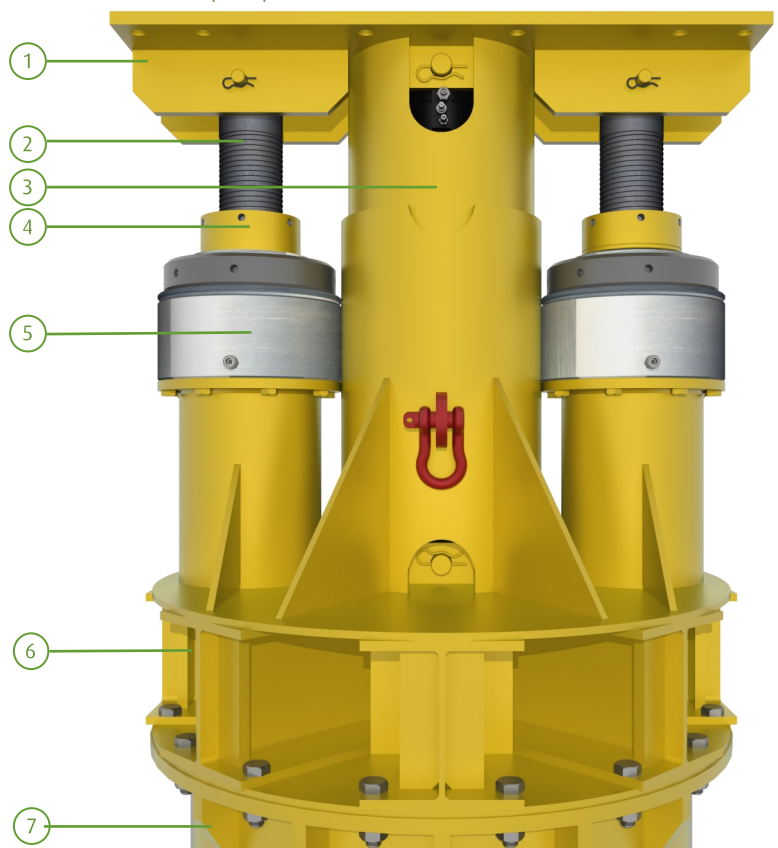
MP750 - Mode of Operation

The centrally mounted hydraulic unit (1) with integral hydraulic ram (3) is used to adjust the strut to its desired length and induce pre-load (up to 1200kN maximum) whilst at the same time, interaction between the sliding inner and oversleeves resists the bending moment and shear induced by the self weight of the prop. Once pressurised, the twin mechanical screw jacks (2) are locked in place to isolate the hydraulics from further load increase. The twin screw arrangement transfers the axial load through a heavily reinforced diaphragm plate (6) and into 1.2m Ø super extensions (7). Locking nuts (4) fit between the hydraulic nut (5) and the bearing plate (1). A 1.5m long x 0.6m deep 30mm thick stiffened end bearing (1) plate transfers load into the support walls, walling or a capping beam. The bearing plate is pre-drilled with 36mm Ø holes to accept fixing bolts as required.

MP750 - Key Component Identification

1. Fixed End bearing plate
2. Screw Jack
3. Hydraulic Ram
4. Locking nut
5. Hydraulic nut
6. Diaphragm assembly
7. Supertube Ø1220 extension*

(when connected with Eurotube, a 1m adapter must be used between the diaphragm assembly and the extension)



Video Link: Watch this video, and more on our YouTube Channel:
www.youtube.com/vpgroundforce

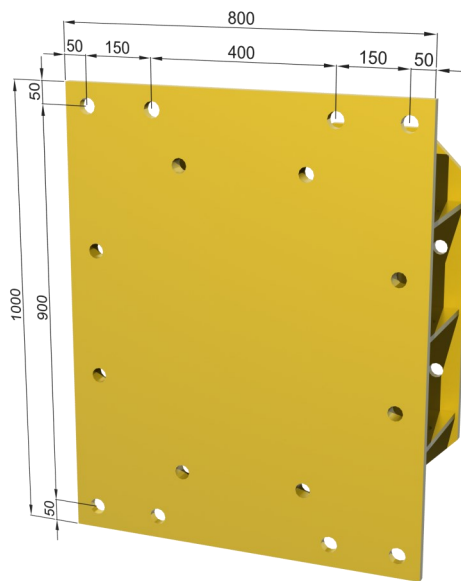
Ancillary Components

The MP750 strut is designed for spanning between walls or capping beams at a right angles. It is not designed for raking or knee bracing applications. Consequently connection to non-perpendicular faces will need to be accommodated by corbels incorporated into the capping/waling beams.

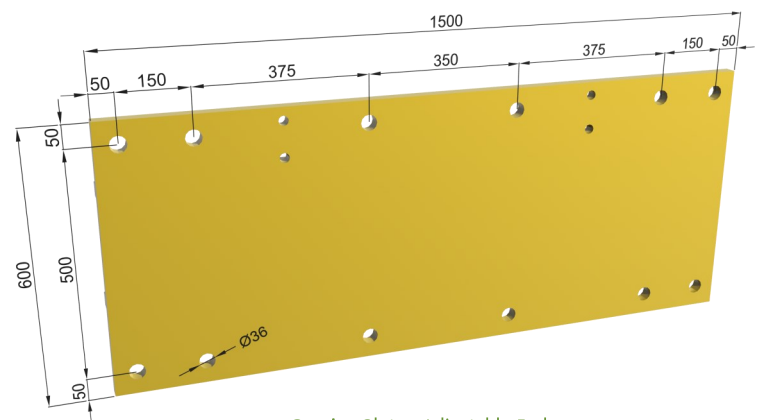
The standard end bearing plates sizes are detailed below:

- Fixed end: Plate size: 1000mm x 800mm x 20mm thick c/w 8No. 36mm Ø holes for fixing bolts.
- Adjustable end: Plate size: 1500mm x 600mm x 30mm thick c/w 12No. 36mm Ø holes for fixing bolts.

Note: end fixing details can be designed and supplied on request.



Bearing Plate - Fixed or Swivel End (optional)



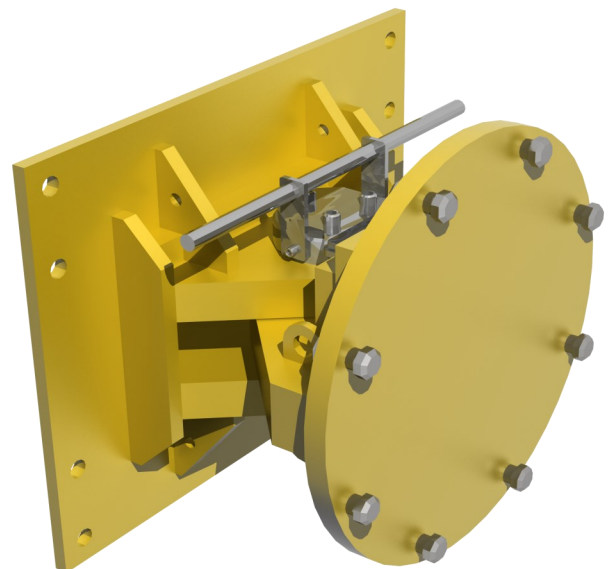
Bearing Plate - Adjustable End

Load Monitoring

The MP750 can incorporate an integral on-board load monitoring system triggered by a calibrated electronic load pin fitted within a swivel end unit. This enables the actual axial load in the strut to be monitored continuously. Load output is accessed via a dedicated secure web link. Please contact Groundforce Technical Services for more details.



MP750 Load Pin

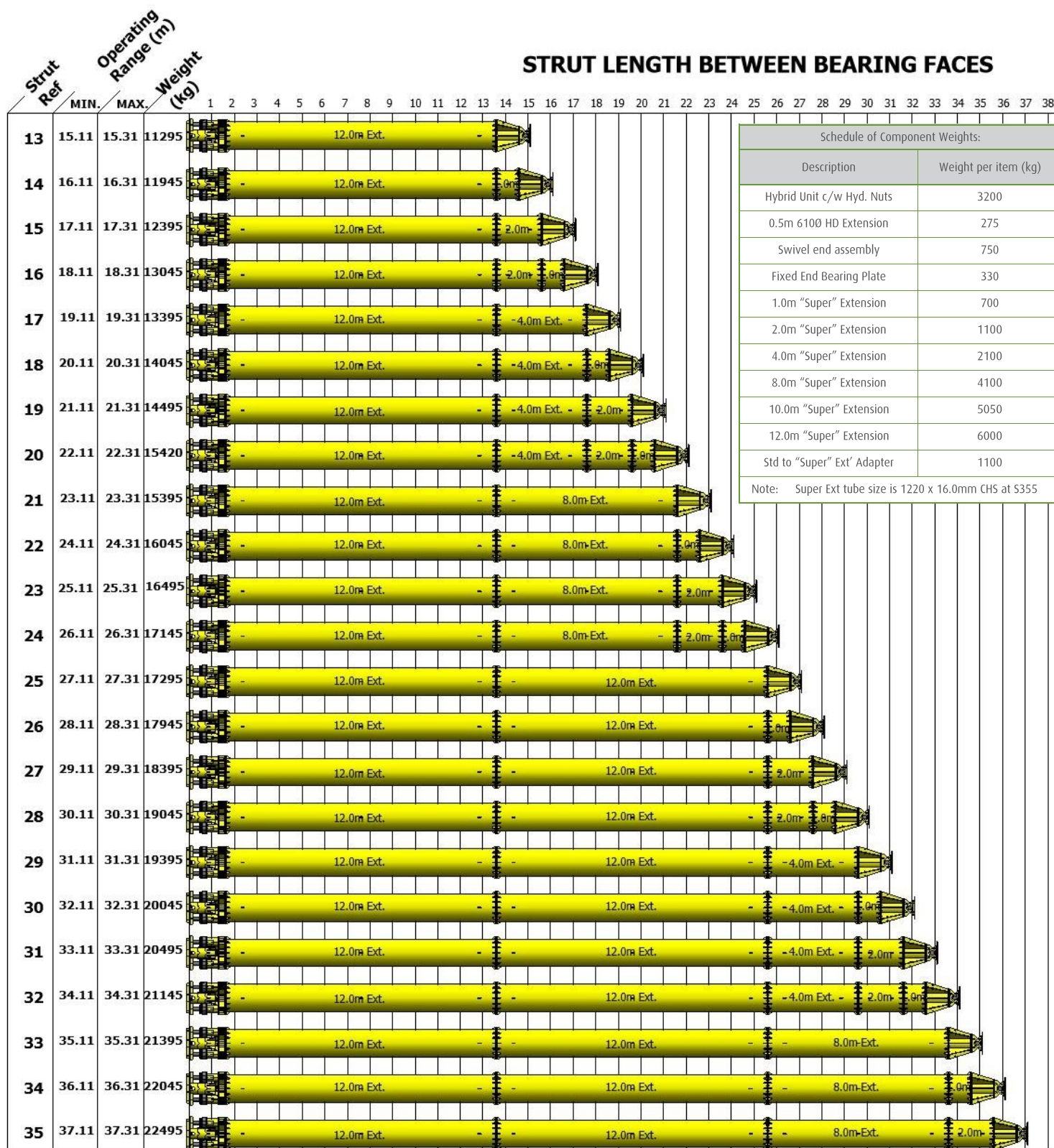


MP750 Swivel Assembly

The strut assembly uses a modular extension format comprising of an adjustable unit connected to a series of bolt together with fixed length extension units to obtain the desired length. The table below shows standard configurations of the strut. Shorter lengths are available. The list is not exhaustive as other permutations are possible and valid. Note that 0.5m HD infill extensions can be incorporated at the non-adjustable end to increase overlap between strut configurations.

MP750 Operating Range/Weight Chart

STRUT LENGTH BETWEEN BEARING FACES



MP750 Hybrid Strut - Load Chart

The lines on the chart below indicate the design resistance of the MP750 c/w the $\varnothing 1220$ mm Extension tube (Supertube) at various spans. The blue line refers to the MP750 c/w 1220 Extension tubes without intermediate support, whereas the red line accounts for an intermediate support. The area under the line indicates the envelope for a safe solution. No limitations due to the joint capacity and no allowance for accidental or thermal actions are included in this chart which can be significant (these should be applied as actions combined with relevant partial factors as per Section 6.4.3 of Eurocode 0. Please refer to the design consideration note in the text box below.

Explanation: The horizontal portion of the graph indicates design resistances that are limited by the Hybrid unit element of the strut to 11700kN assuming a γ_{MHd} factor of 1.25 on the hydraulic element and all applied actions have a minimum partial factor of 1.35. The sloping line indicates design resistances that are limited by the buckling resistance of the extension members.

