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ENGINEERING & CONSTRUCTION

# TECHNICAL GUIDE
# ACROW POWERSHORE 150

FASLEWORK & SHORING

Any safety provisions as directed by the appropriate governing agencies must be observed when using our products. The pictures in this document are snapshots of situations at different stages of assembly, and therefore are not complete images. For the purpose of safety, they should not be deemed as definitive.

The loads featured in this document, related to the parts of the product, are approximate.

The company reserves the right to introduce any modifications deemed necessary for the technical development of the product.



DOCUMENT NO: POWERSHORE150_SEP2024_ISSUE_C

## Technical Manual Release Notes

This page is intended to record all changes to the **POWERSHORE 150** technical manual pages.

Changes or additions to this manual will be itemised with a brief description and date when the amendments were made.

| ISSUE | DATE | Amendment Description |
|---|---|---|
| A | 09/2023 | First Release |
| B | 02/2024 | Second Release |
| C | 09/2024 | Third Release |
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| | | |

## Contents

# 1. Technical Specifications

## System Description

The Acrow **POWERSHORE 150** is a heavy-duty high load propping and shoring system designed to withstand up to 150 tonne shoring loads per vertical member.

The flexible Acrow **POWERSHORE 150** is primarily used to create temporary stand-alone frames and raking strut structures for the mining, infrastructure, and commercial industries.

The heavy-duty system is also more versatile for propping high structures as the tower takes large lateral forces. The **POWERSHORE 150** components can also be used as a horizontal beam, removing the need to use steel beams. The built-in strength of each individual **POWERSHORE 150** galvanised component contributes to construction of a support tower capable of supporting loads in excess of 6000kN.

## Purpose of the Document

The purpose of this document is to provide guidelines for design, safe handling, transport and installation of the **POWERSHORE 150** system.

The document also outlines the various components of the system and it features illustrations, working load limits, typical assembly arrangements and safe transport and handling measures.

The information contained in this document is provided as a general guide only and does not replace the need for the design to be reviewed and checked by a qualified person in the field of temporary works design and installation, concrete, steel, building construction and services.

This material has been prepared in the context of relevant Australian Standards and the National Construction Code (NCC). Users should make themselves aware of any recent changes to these documents referred to therein and to local variations or requirements.

This document is NOT a substitute for site-specific Safe Operation Procedures. It is the Installation Contractors responsibility to prepare safe work method statements and observe and comply with site specific health and safety regulations, standards and policies.

Acrow has dedicated engineering services available for project assistance. We can provide design support for clients to determine the best way to specify and document **POWERSHORE 150**. Our technical experts can identify the most efficient temporary work design meeting project requirements, specifications and installation process.

Should the users require any further information or guidance, they are encouraged to contact their local Acrow branch.

## Safety Information

This safety information is to draw the user's attention to possible musculoskeletal disorders as a result of manual handling during assembly and dismantling of the **POWERSHORE 150** system.

It is recommended that users of the **POWERSHORE 150** system employ and implement appropriate procedures and control measures to eliminate or control any risk of Musculoskeletal disorder/injury while handling.

Refer to the Code of Practice on manual handling published by local Workcover Authority or other approved and recognised guidelines for correct and appropriate manual handling procedures.

# 1. Technical Specifications

## Important Information

The erection and application instructions contained in this manual are the recommended methods to be used for **POWERSHORE 150** products.

The technical function related instructions must be accurately followed to obtain the correct performance of the product. Any deviation from the recommended usage will require a separate design and/or verification by Acrow Engineering.

The safe use and application of the system must be in accordance with Australian Standard AS 3610 Formwork for Concrete, Occupational Health & Safety regulations, approved industry codes of practice and relevant regulatory authority requirements.

The illustrations in these assembly configurations are minimum guidelines only.

The combined use of the **POWERSHORE 150** system with equipment from other suppliers may entail performance issues and therefore requires a design check and/or verification by Acrow Engineering or a qualified experienced engineer.

Hazard Identification/Risk Assessments for the erection and dismantling of the system are available from Acrow branches. Site specific Hazard and Risk assessments may need to be generated for specific projects.

## Disclaimer

1. The photographs/illustrations shown within this manual are intended as expressing the diversity and possible applications of the product and as such must not be used as assembly instructions.
2. In line with Acrow commitment to continuous product development and improvement, the information contained in this manual may be changed without notice. Please confirm with Acrow Engineering for latest update.
3. While all reasonable effort has been taken to ensure the accuracy and adequacy of the information contained herein, Acrow, accepts no responsibility or liability for any loss or damage suffered by any person acting or refraining from action as a result of this information.

Should users require any expert assistance, they are encouraged to contact Acrow Engineering department.

## Applicable Codes and Standards

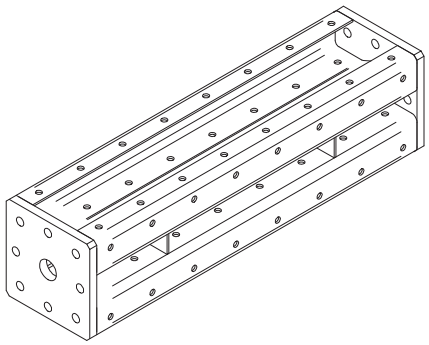
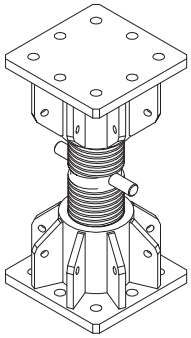
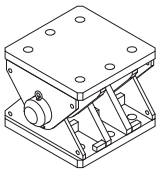
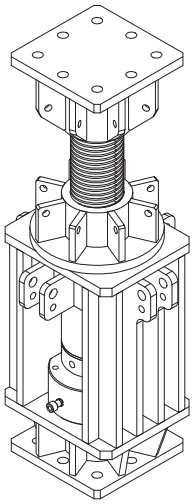
The structural design information and guide provided in this document are limited to the relevant codes nominated below. It does not include certification of any structures or works associated with a project.

| ELEMENT | DESCRIPTION | CODE |
|---|---|---|
| **LOADING** | Structural Design Actions – General Principles | AS/NZS 1170.0-2002 |
| | Structural Design Actions – Permanent, Imposed And Other Actions | AS/NZS 1170.1-2002 |
| **STEEL** | Cold-Formed Steel Structures | AS 4600-2020 |
| | Steel Structures | AS 4100-2020 |
| **FORMWORK** | Formwork for Concrete | AS 3610-1995 |
| | Formwork for Concrete Part 1- Specifications | AS 3610.1-2018 |

# 2. GENERAL PRODUCT INFORMATION

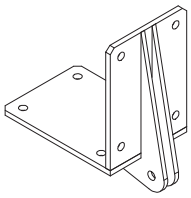
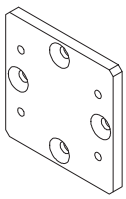
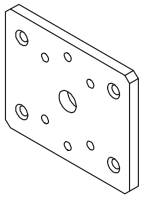
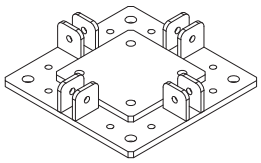
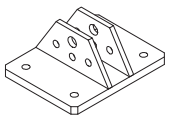
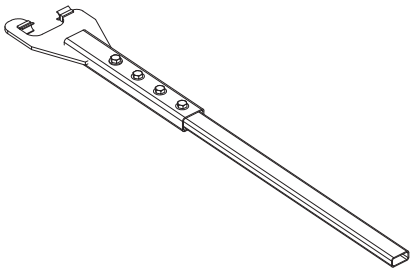
## 2. General Product Information

### Powershore 150 Components

| PRODUCT | DESCRIPTION | PRODUCT CODE | MASS (kg) |
|---|---|---|---|
|  | **Powershore 150 Props**<br>A wide range of heavy-duty load props designed to be bolted together. The Powershore 150 props are capable of withstanding 1500 kN shoring loads. | | |
| | 100mm Prop | AP150P01 | 35.4 |
| | 300mm Prop | AP150P03 | 46.9 |
| | 600mm Prop | AP150P06 | 65.0 |
| | 1200mm Prop | AP150P12 | 100.6 |
| | 1800mm Prop | AP150P18 | 136.2 |
| | 2400mm Prop | AP150P24 | 171.7 |
| | 25mm Packer Plate | APS15025PP | 16.4 |
|  | **1500 kN Screw Jack**<br>A jack designed to interface with the Powershore 150 Prop section and is suitable for a 1500kN WLL at full 200mm extension. | | |
| | 420 - 620mm | APS150SJ | 108.6 |
|  | **1500 kN Raking Bracket**<br>Up to 60° rotation capacity, the Raking Bracket is designed to be bolted to the Powershore 150 props end-plates. | | |
| | Raking Bracket | APS150RB | 74.6 |
|  | **1500 kN Hydraulic Jack**<br>A 1500 kN hydraulic jack designed to be bolted to the Powershore 150 prop end-plates. The Hydraulic Jack has a 200mm jacking capacity at 16 mm intervals. | | |
| | Hydraulic Jack | APS150HJ | 331.0 |

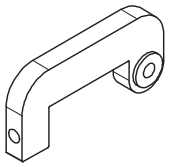
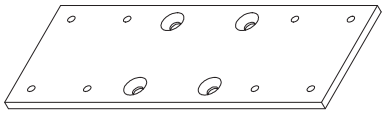
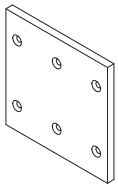
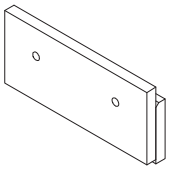
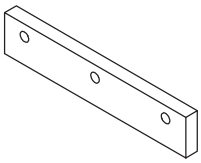
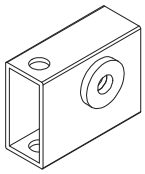
## 2. General Product Information

### Powershore 150 Adapters & Spanner

| PRODUCT | DESCRIPTION | PRODUCT CODE | MASS (kg) |
|---|---|---|---|
|  | **Brace Adapter**<br>Bolted to the Powershore 150 props wall, designed for plan brace of the Powershore 150 structure. | | |
| | Brace Adapter | APS150BA | 14.7 |
|  | **Powershore 150 End Plate Adapter**<br>Designed for connecting the Powershore 150 prop end plate to another Powershore 150 prop side wall. | | |
| | End Plate Adapter | APS150EPA | 17.0 |
|  | **Powershore 150 Soldier Adapter**<br>Designed for Slim-Max soldier end plate connection to Powershore 150 Prop wall flange and lip. | | |
| | Soldier Adapter | APS150SA | 10.3 |
|  | **Powershore 150 Jack Brace Adapter**<br>Designed for HT Thru Tie Rod (Z-bar) brace connection to Screw Jack (or Hydraulic Jack). | | |
| | Jack Brace Adapter | APS150JBA | 54.8 |
|  | **Powershore 150 Prop / Turnbuckle Adapter**<br>Designed for Slim-Max Prop or Turnbuckles Connection to Powershore 150 Prop side wall. | | |
| | Turnbuckle Adapter | APS150PTA | 12.9 |
|  | **Powershore 150 Spanner**<br>This spanner is used for adjusting the 1500kN Screw Jack height. The spanner is designed to fit into the jack's screw Handle Locating Lug. | | |
| | Spanner | AP150S | 48.0 |

## 2. General Product Information

### Powershore 150 Tie Rod Adapters & Waler Brackets

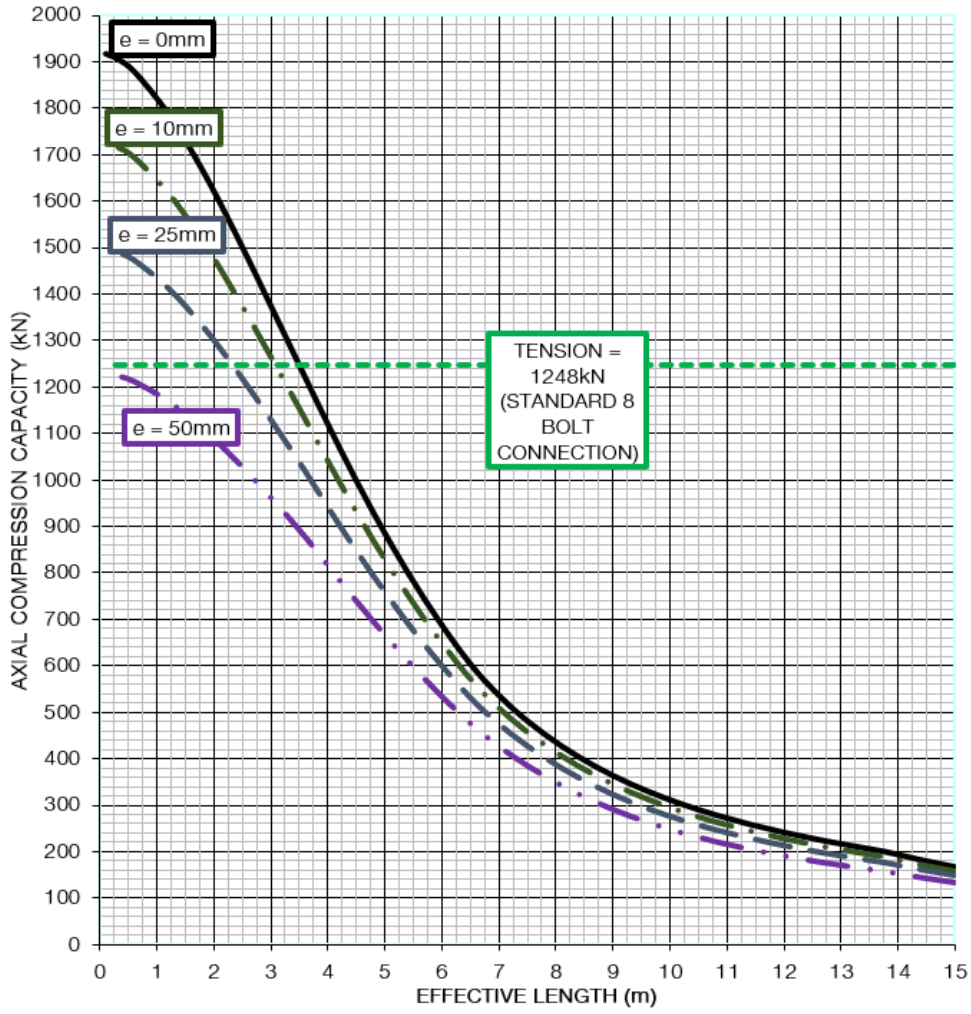
| PRODUCT | DESCRIPTION | PRODUCT CODE | MASS (KG) (NOM.) |
|---|---|---|---|
|  | **Powershore 150 Tie Rod Adapter Type 1**<br>Designed for cross bracing the Powershore 150 structure. The Tie Bar adapter is fixed into members using D19 podger pin. A 15mm diameter HT Thru Tie Rod with HT Thru Tie Hex Nut are used as bracing members. | | |
| | Tie Rod Adapter Type 1 | APS150TBA | 5.2 |
|  | **Powershore 150 Tie Rod Adapter Type 2**<br>With 15mm diameter x 50mm HT Hex nut fully welded. Designed for cross bracing the Powershore 150 structure. The tie Bar adapter is fixed into members using D19 podger pin. | | |
| | Tie Rod Adapter Type 2 | APSTBAF | 5.9 |
|  | **Waler Bracket Adapter Type 1**<br>Designed to sandwich the vertical Powershore 150 member and allow a point to attach the raker bracket. | | |
| | Waler Bracket Adapter Type 1 | APS150WB1 | 39.7 |
|  | **Waler Bracket Adapter Type 2**<br>The Waler Bracket Adaptor Type 2, together with the Waler Bracket Inner Washer, is designed to fix the horizontal Powershore 150 member to the vertical Powershore 150 member. | | |
| | Waler Bracket Adapter Type 2 | APS150WB2 | 28.8 |
|  | **Waler Bracket Clamp Washer**<br>Designed to hold the Waler Bracket Adaptor Type 2 and attach it to the Powershore 150 shoring structure. | | |
| | Clamp Washer | APS150WB3 | 23.5 |
|  | **Waler Bracket Internal Washer**<br>The Waler Bracket Internal Washer, together with the Waler Bracket Adaptor Type 2, is designed to hold the horizontal PS150 waler | | |
| | Internal Washer | APS150WB4 | 5.6 |
|  | **Powershore 30 Adapter**<br>Adapter connecting the Powershore 150 Props to a Powershore 30 prop. | | |
| | Powershore 30 adapter | PS150PS30ADP | 3.65 |

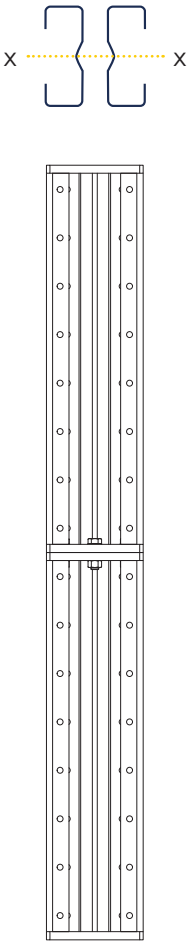
# 3. WORKING LOAD LIMITS (WLL)

## 3. Working Load Limits (WLL)

### Prop Axial

Eccentricity in XX Axis:



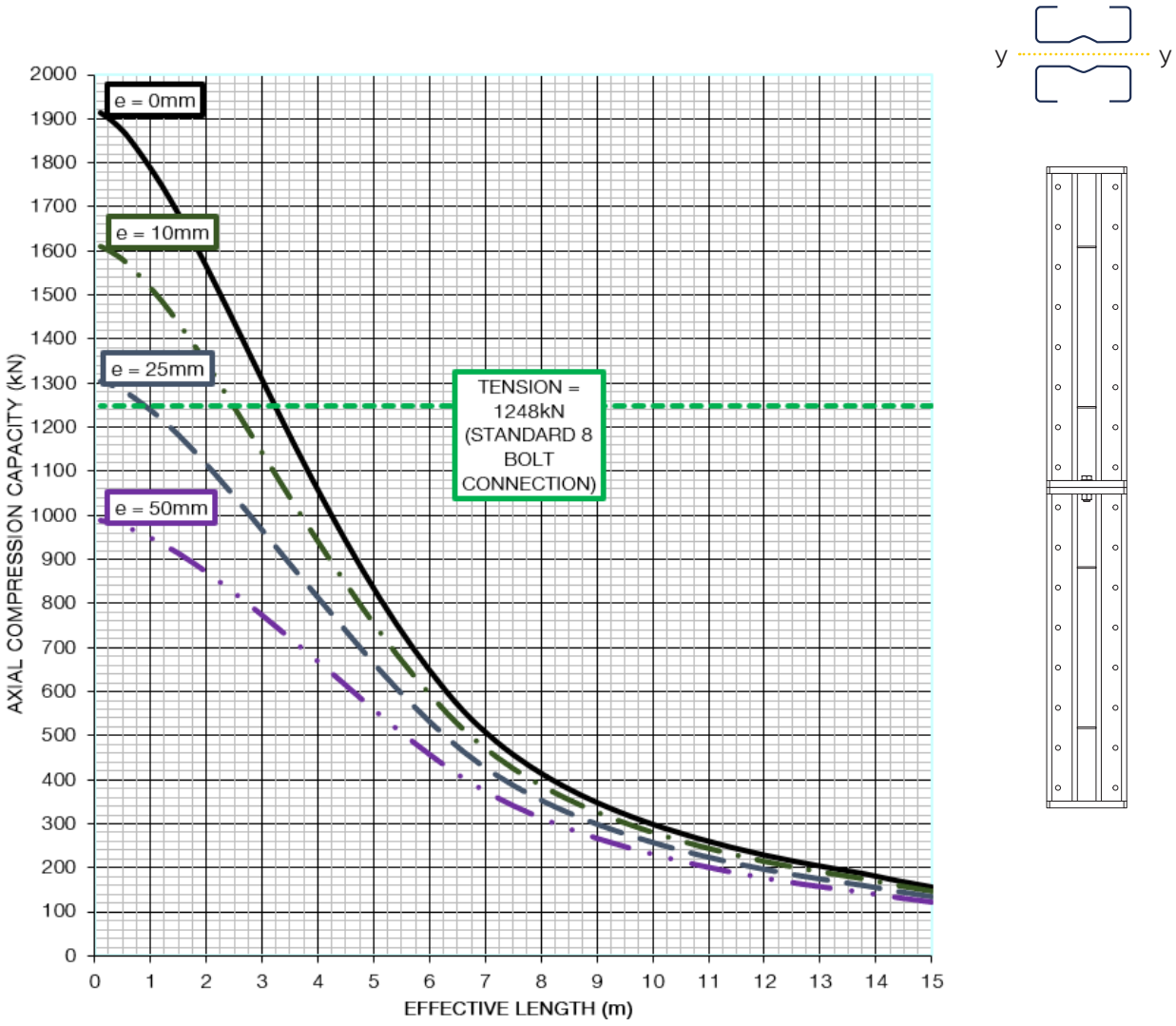

Notes for X-X Axis:

1. Maximum capacity is with component configured as shown. Other components may limit capacity. All system components must be checked to ensure sufficient capacities.
2. Fixing at the base and top plates to be suitably capable to transfer loads. Loads are based on a prop pinned at each end.
3. Maximum capacity is with components in working condition.
4. Initial eccentricity due to the possibility of the strut being set L/400 out of plumb (about the XX axis) has been considered for all eccentricities of load.
5. Limit State Conversion Factor (LSCF) of 1.5.
6. Tension capacity is based on standard 8 bolt pattern applied to the connection. Maximum tension capacity of the prop section is 1818kN (WLL).
7. Capacities are based on effective length of individual prop legs. The designer shall ensure all towers are adequately braced to prevent global tower buckling.

## 3. Working Load Limits (WLL)

### Prop Axial

Eccentricity in YY Axis:



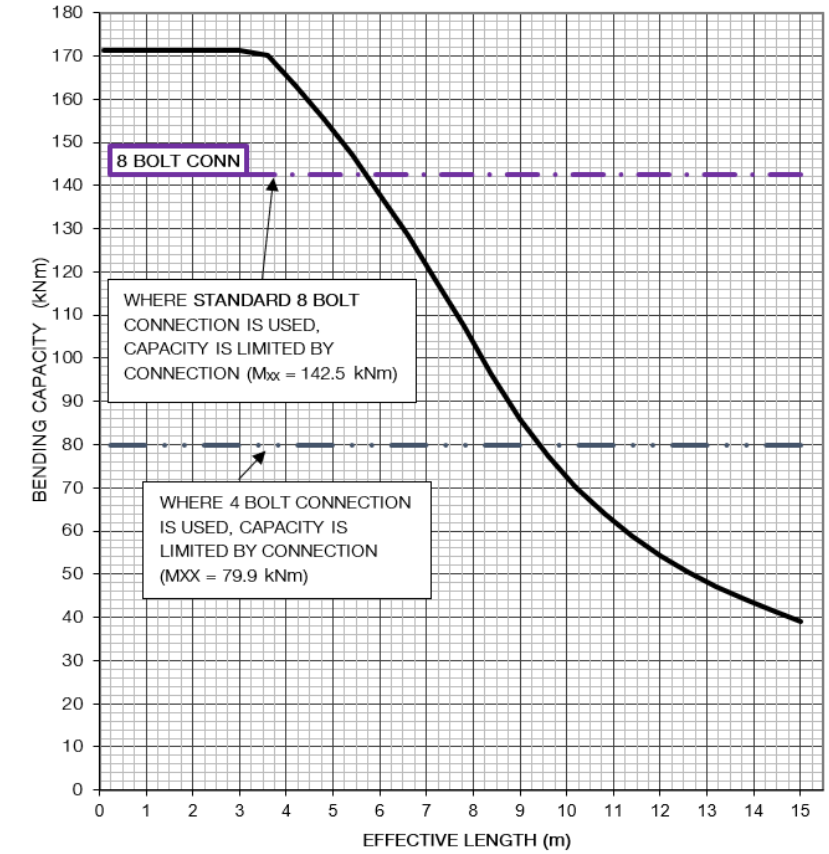

Notes for Y-Y Axis:

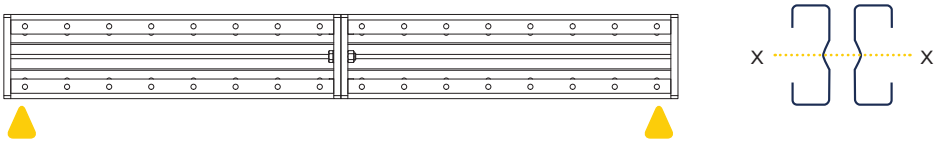
1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Users shall check and ensure all components in the system have sufficient capacities.
2. Fixing at the base and top plates to be suitably capable of transferring loads. Loads are based on a prop pinned at each end.
3. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
4. Initial eccentricity due to the possibility of the strut being set L/400 out of plumb (about the YY axis) has been considered for all eccentricities of load.
5. Limit State Conversion Factor (LSCF) of 1.5
6. Tension capacity is based on standard 8 bolt pattern applied to the connection. Maximum tension capacity of the prop section is 1818kN (WLL).
7. Capacities are based on effective length of individual prop legs. The designer shall ensure all towers are adequately braced to prevent global tower buckling.

## 3. Working Load Limits (WLL)

### Prop Bending

Eccentricity in XX Axis:



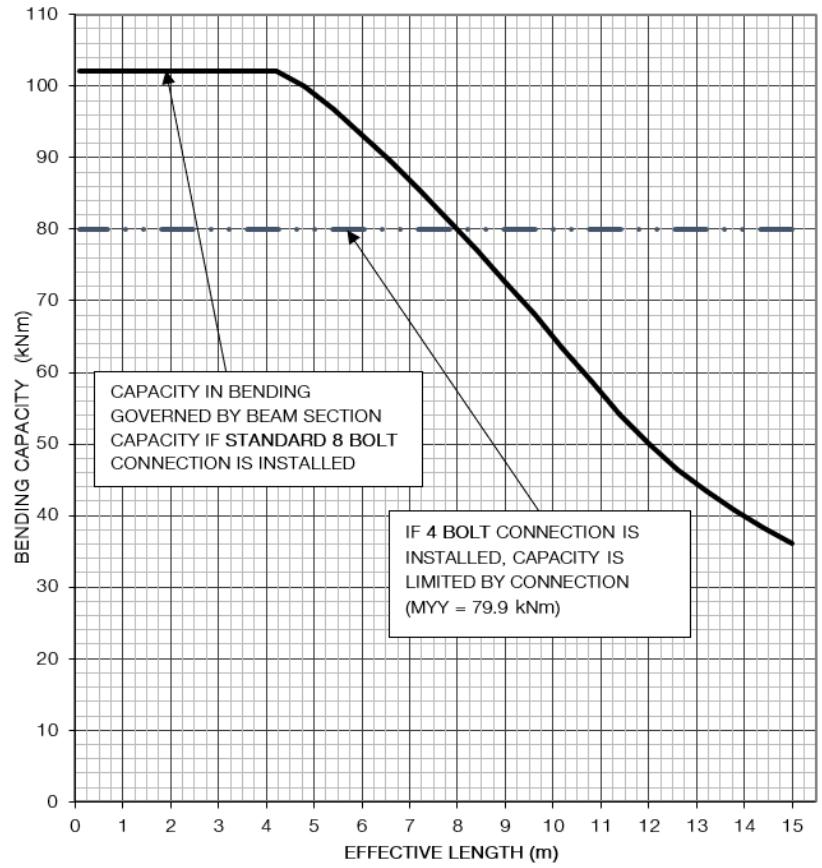

Notes for X-X Axis:

1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Users shall check and ensure all components in the system have sufficient capacities.
2. Maximum capacity in X-X is governed by the bolt group when a standard 8 bolt connection is installed.
3. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
4. Limit State Conversion Factor (LSCF) of 1.5

## 3. Working Load Limits (WLL)

### Beam Bending

Eccentricity in YY Axis:

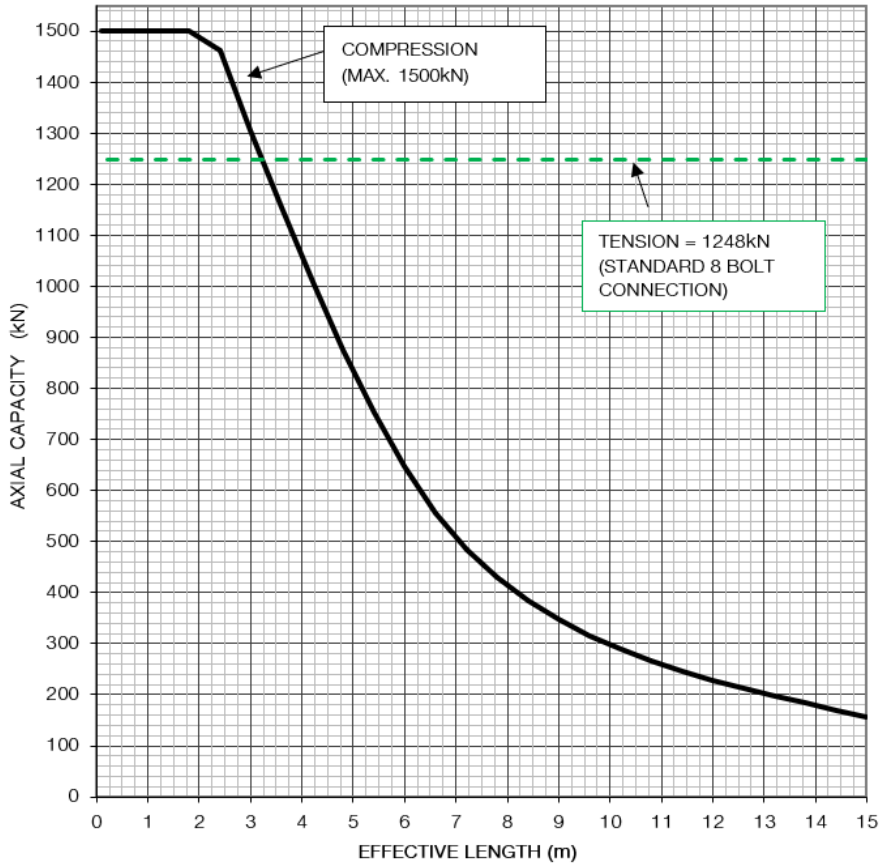


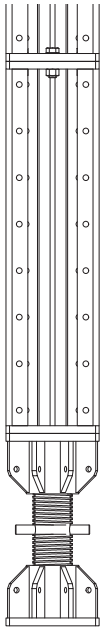

Notes for Y-Y Axis:

1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Users shall check and ensure all components in the system have sufficient capacities.
2. Maximum capacity in Y-Y is governed by the beam section when a standard 8 bolt connection is installed.
3. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
4. Limit State Conversion Factor (LSCF) of 1.5

## 3. Working Load Limits (WLL)

### Axial - Prop Combined With Screw Jack



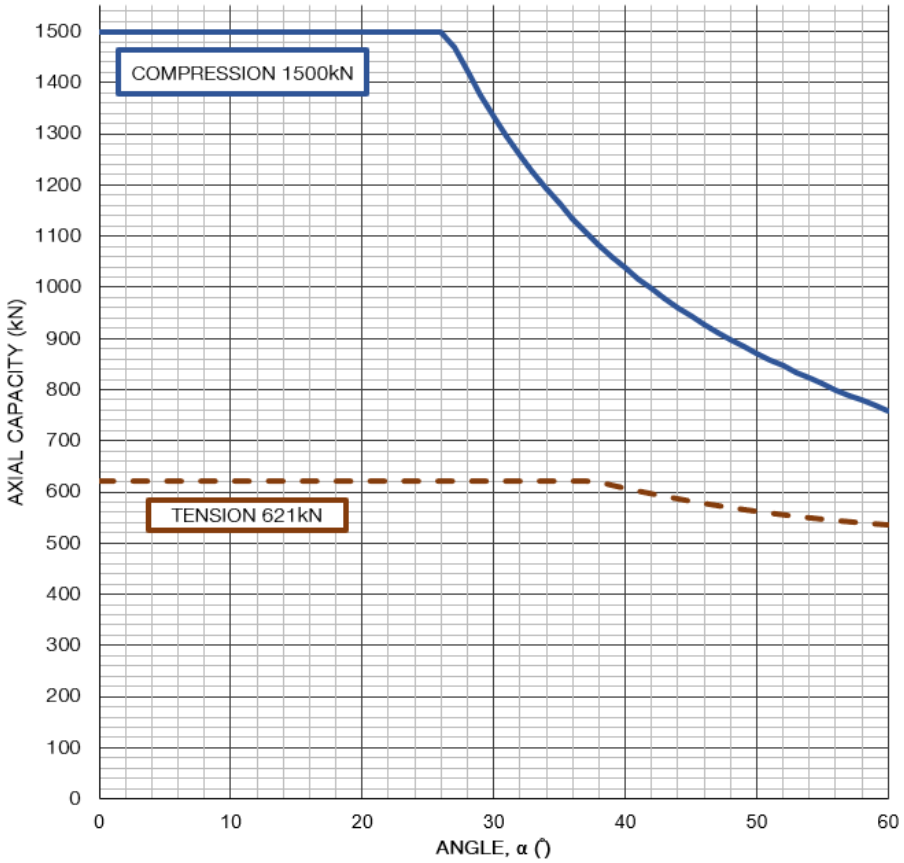



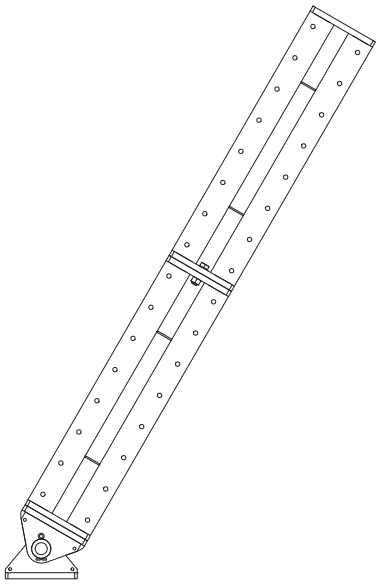
Notes:

1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Users shall check and ensure all components in the system have sufficient capacities.
2. Fixing at the base of screw jack and top plate of beam to be suitably capable of transferring loads. Beam to screw jack connection via standard 8 bolt connection. Loads are based on a prop pinned at each end.
3. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
4. Initial eccentricity due to the possibility of the strut being set L/400 out of plumb (about the YY axis) has been considered for all eccentricities of load.
5. Limit State Conversion Factor (LSCF) of 1.5
6. Capacities are based on effective length of individual prop legs. The designer shall ensure all towers are adequately braced to prevent global tower buckling.
7. Tension capacity is based on standard 8 bolt pattern applied to the connection. Maximum tension capacity of the prop section is 1818kN (WLL).

## 3. Working Load Limits (WLL)

### Axial - Prop Combined With Raking Bracket Assembly



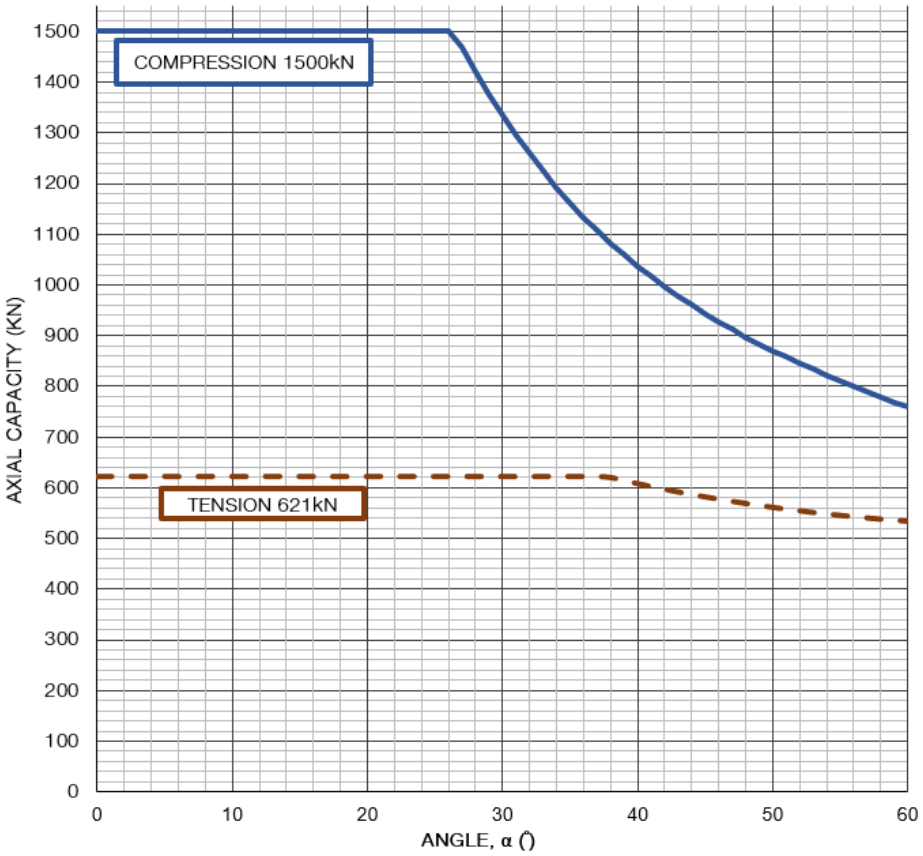



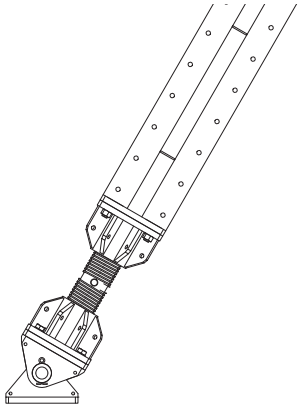
Notes:

1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Users shall check and ensure all components in the system have sufficient capacities.
2. Angle 'a' (degrees) measured from vertical.
3. Fixing at the base of raking bracket and substrate to be suitably capable to transfer loads. Beam to raking bracket connection via 6 bolt connection (6 No. M24 Grade 10. 9 bolts, nuts and washers).
4. Maximum compression capacity is subject to raking bracket orientation:
5. Max. Compression is limited to 1500kN for raker main ply parallel to beam webs
6. Max. Compression is limited to 900kN for raker main ply perpendicular to beam webs
7. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
8. Limit State Conversion Factor (LSCF) of 1.5
9. Tension capacity is based on standard 8 bolt pattern applied to the connection. Maximum tension capacity of the prop section is 1818kN (WLL).

## 3. Working Load Limits (WLL)

### Axial - Prop Combined With Screw Jack And Raking Bracket



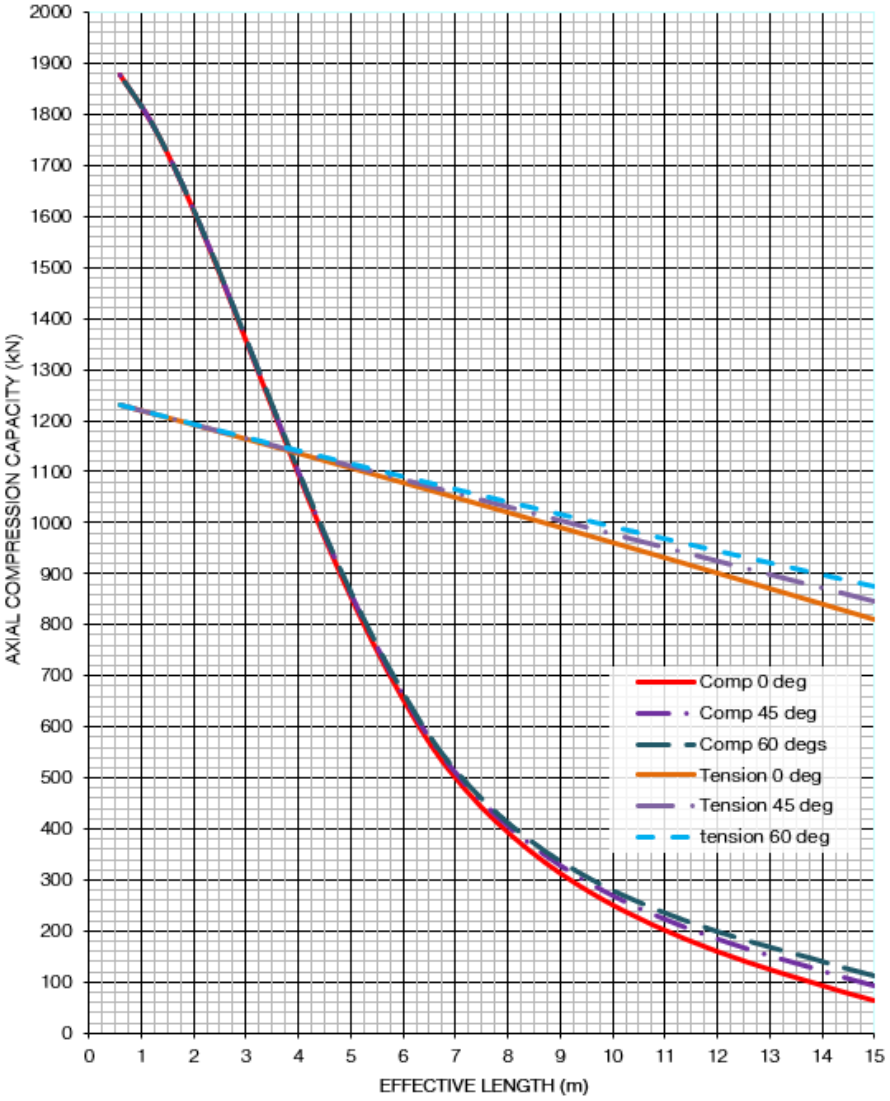



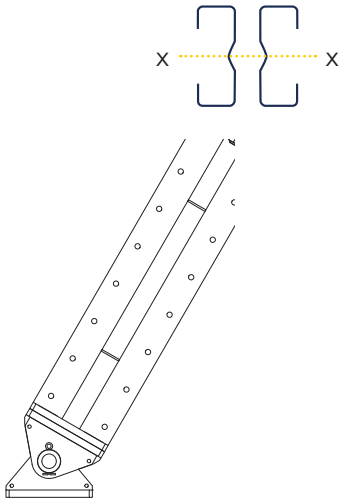
Notes:

1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Users shall check and ensure all components in the system have sufficient capacities.
2. Angle 'a' (degrees) measured from vertical.
3. Fixing at the base of raking bracket and substrate to be suitably capable to transfer loads. Beam to screw jack connection via standard 8 bolt connection and screw jack to raking bracket connection via 6 bolt connection (6 No. M24 Grade 10.9 bolts, nuts and washers).
4. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
5. Limit State Conversion Factor (LSCF) of 1.5

## 3. Working Load Limits (WLL)

### Axial - Prop Raking Bracket With XX-Axis Taking Bending



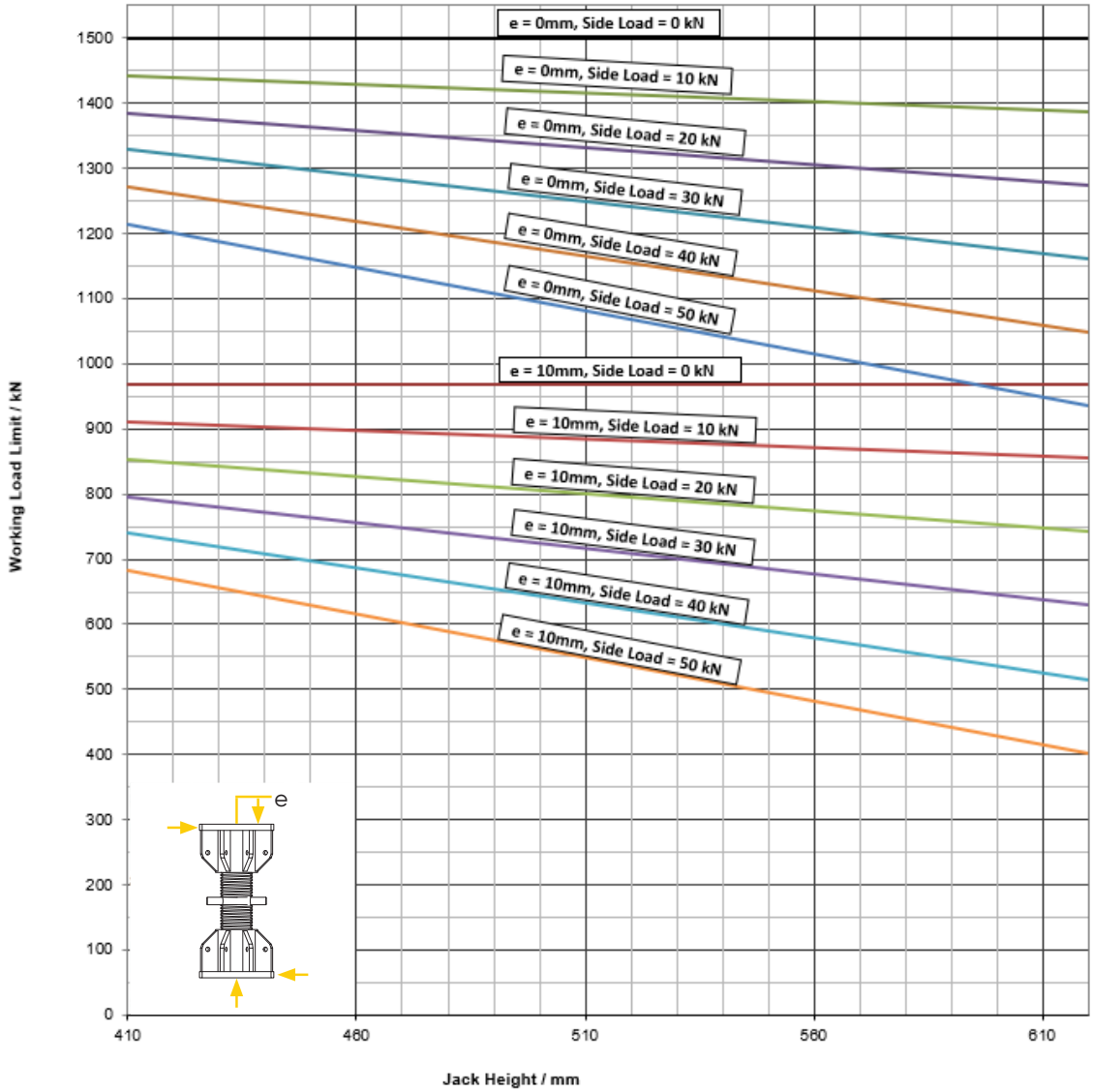




Notes:

1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Designers shall check and ensure all components in the system have sufficient capacity.
2. Fixing at the base and top plates to be suitably capable of transferring loads. Theoretical model is pinned at each end with 0 eccentricity.
3. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
4. Maximum initial straightness tolerance of the strut = L/400 (about the XX axis) has been considered.
5. Second order effects have been considered.
6. Limit State Conversion Factor (LSCF) of 1.5
7. Tension capacity is limited by typical:
    - 8 bolts pattern Powershore 150 prop to prop connection
    - 6 bolts pattern Raking Bracket to Powershore 150 prop connection
8. Raking Prop webs shall be in the vertical planes when loaded (X-X axis in bending to counter self-weight gravity).
9. Effective length from 0.6m to 15m with 0.6m increment. Length excludes jack and Raking Bracket
10. Min. average segment length 2400mm. Segments less than 2400mm in length shall be positioned at prop ends whenever possible.

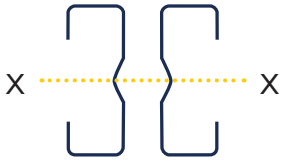
## 3. Working Load Limits (WLL)

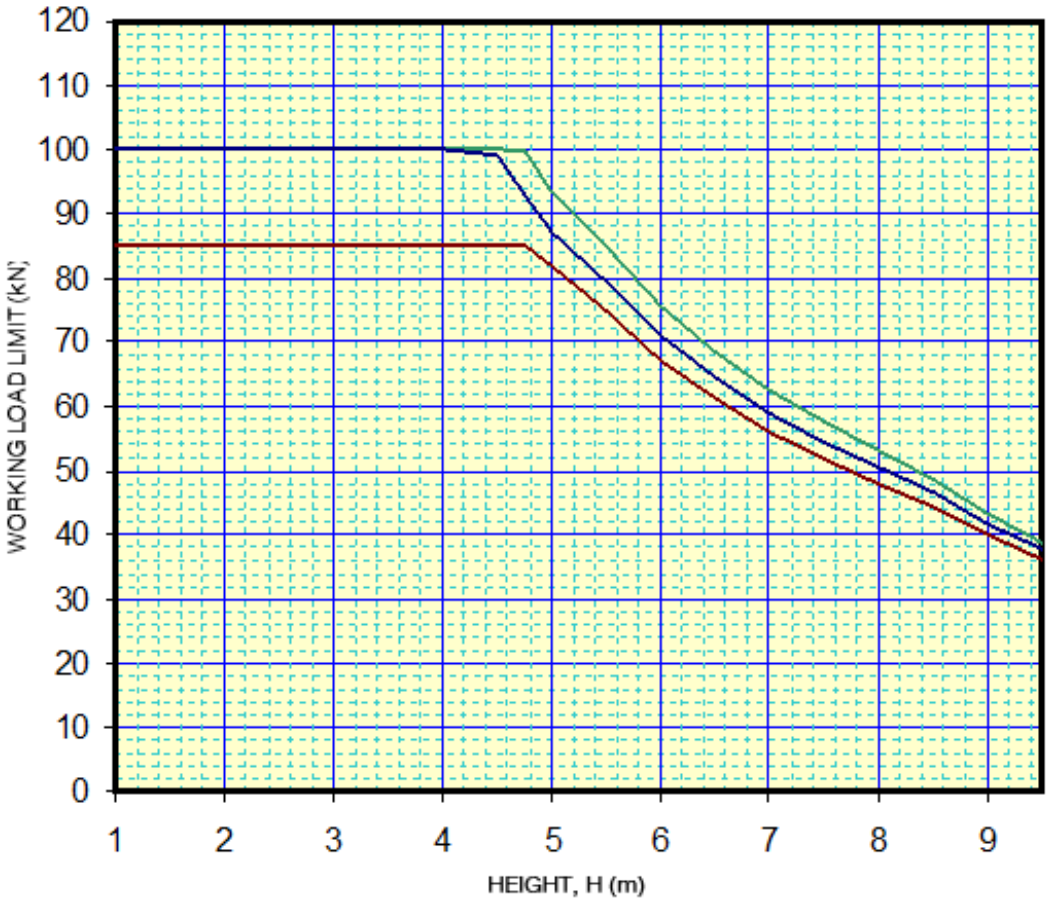
Screw Jack WLL



## 3. Working Load Limits (WLL)

Slim-Max Soldier Axial Working Load Limit (Eccentricity In XX Axis)



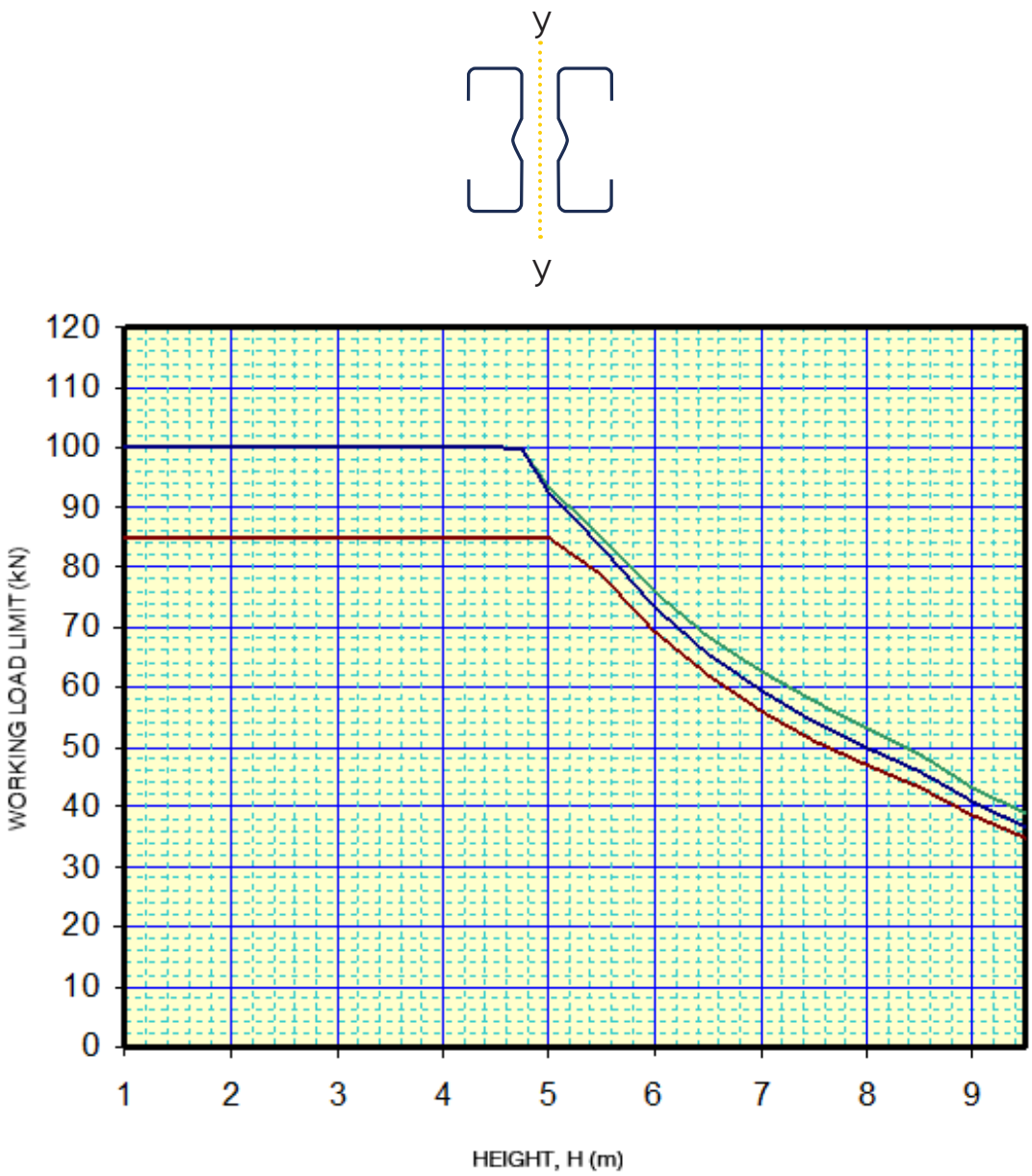




Notes:

1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Users shall check and ensure all components in the system have sufficient capacities.
2. Fixing at the base and top plates to be suitably capable of transferring loads. Theoretical model is pinned at each end.
3. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
4. Initial eccentricity due to the possibility of the strut being set L/400 out of plumb (about the XX axis) has been considered for all eccentricities of load.

## 3. Working Load Limits (WLL)

Slim-Max Soldier Axial Working Load Limit (Eccentricity In YY Axis)




Notes:

1. Maximum capacity is with component configured as shown, capacity may be limited by other components. Users shall check and ensure all components in the system have sufficient capacities.
2. Fixing at the base and top plates to be suitably capable of transferring loads. Theoretical model is pinned at each end.
3. Maximum capacity is with components in working condition. Contact Acrow Engineering if components are damaged during site use.
4. Initial eccentricity due to the possibility of the strut being set L/400 out of plumb (about the XX axis) has been considered for all eccentricities of load.

## 3. Working Load Limits (WLL)

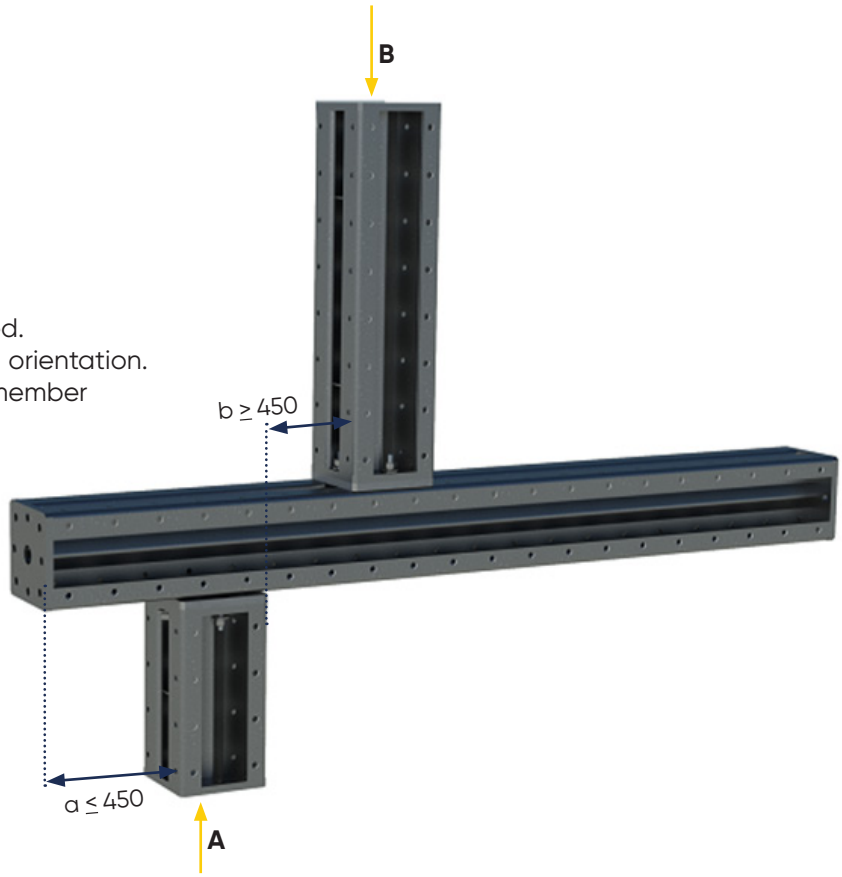
### End Plate Adapter

Prop body bearing capacity:

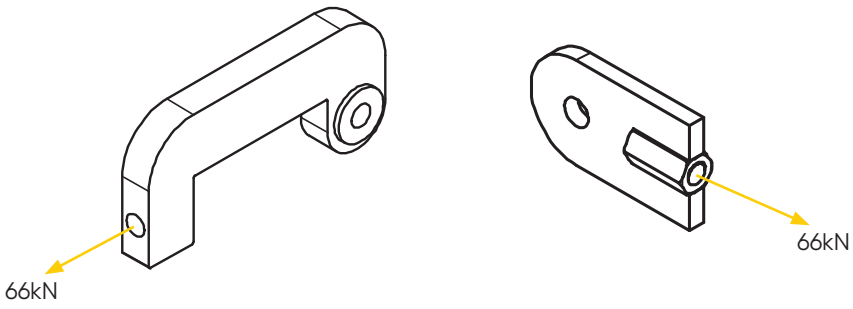
Case A- Exterior flange loading
- Compression –157kN
- Tension – 80kN

Case B- Internal flange bearing
- Compression – 334kN
- Tension – 80kN

- Minimum bearing length 300mm.
- Both flanges must be evenly loaded.
- Prop body to be used in the strong orientation.
- Distance to end plate or another member

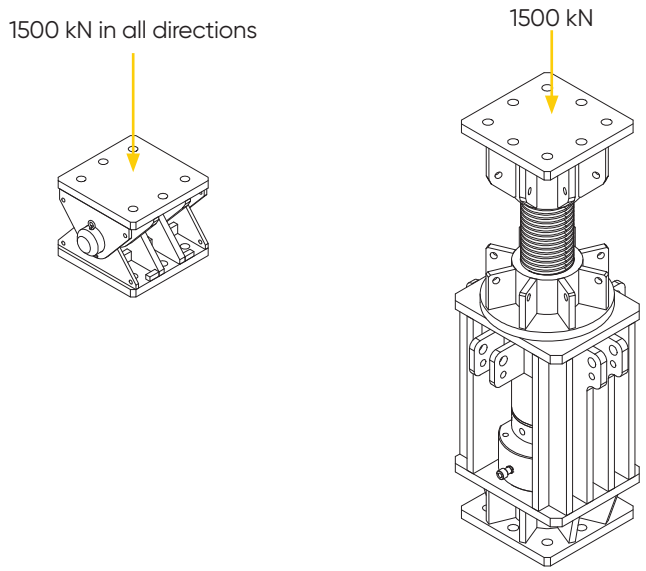



### Tie Rod Adapters

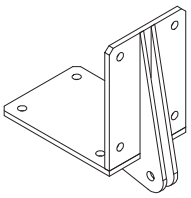


## 3. Working Load Limits (WLL)

### Raking Bracket and Hydraulic Jack WLL

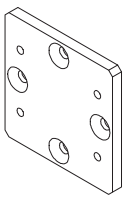



### Brace Adapter WLL



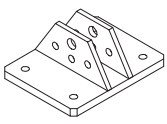
| | |
|---|---|
| **Capacity (WLL)** | 90kN Tension, 0 - 90° |

### End Plate Adapter WLL



| | |
|---|---|
| **Shear:** | 158kN |
| **Bending (connect to prop lips):** | 3.5kNm |
| **Bending (connect to prop flanges):** | 8.0kNm |
| **Comb1 (connect to prop lips):** | 79kN(V)+3.5kNm(M) |
| **Comb2 (connect to prop flanges):** | 79kN(V)+8.0kNm(M) |

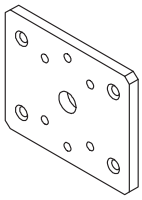
### Prop / Turnbuckle Adapter WLL



| | |
|---|---|
| **0-180° (connect to prop flanges):** | 50kN total resultant Tension/ Compression on lugs |
| **0-180° (connect to prop lips):** | 30kN total resultant Tension/ Compression on lugs |

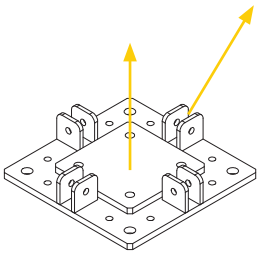
## 3. Working Load Limits (WLL)

### Soldier Adapter WLL



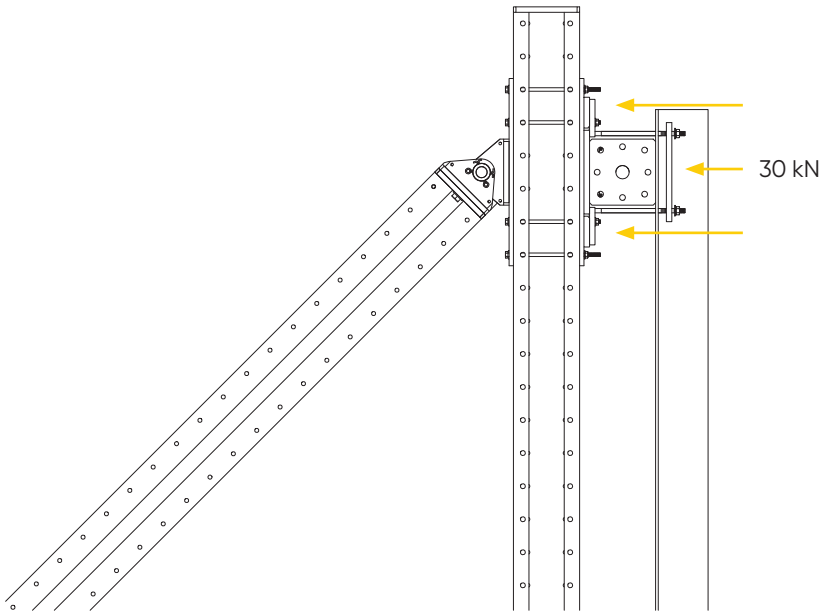
| | |
|---|---|
| **Shear:** | 158 kN |
| **Bending (connect to prop lips)** | 3.5 kNm |
| **Bending (connect to prop flanges)** | 8.0 kNm |
| **Compression (connect to prop lips)** | 87.7 kN |
| **Compression (connect to prop flanges)** | 126.1 kN |
| **Tension (connect to prop lips)** | 60 kN |
| **Tension (connect to prop flanges)** | 80 kN |
| **Comb1 (connect to prop lips)** | 79kN(V)+3.5kNm(M) |
| **Comb2 (connect to prop flanges)** | 79kN(V)+8.0kNm(M) |
| **Comb1 (connect to prop lips)** | 79kN(V)+60kN(T) |
| **Comb2 (connect to prop flanges)** | 79kN(V)+80kN(T) |

### Jack Brace Adapter WLL



| | |
|---|---|
| **Capacity on lugs (WLL)** | 90kN tension, 0-90° |
| **Tension** | 158kN |

### Waler Brackets WLL



# 4. SYSTEM DETAILS

# 4. System Details

## System Overview

The Powershore 150 system consists of five major components designed to be joined using M24 G10.9 bolts including a range of adapters:

1. 100mm to 2400mm Props / Beams
2. 1500kN Screw Jack
3. Raking Bracket
4. 1500kN Hydraulic Jack
5. Adapters:
    - Brace Adapter
    - Prop / Turnbuckle Adapter
    - Tie Rod Adapters - Type 1 & 2
    - Jack Brace Adapter
    - Soldier Adapter/Plate
    - End Plate Adapter
    - Powershore 150 Spanner
    - Waler Bracket Adapters - Type 1 & 2

The range of adapters are designed to enable the bracing of the Powershore 150 props, bolting of vertical and horizontal props and to enable the connection of the Powershore 150 components to Acrow's range of shoring systems such as the Slim-max soldier.

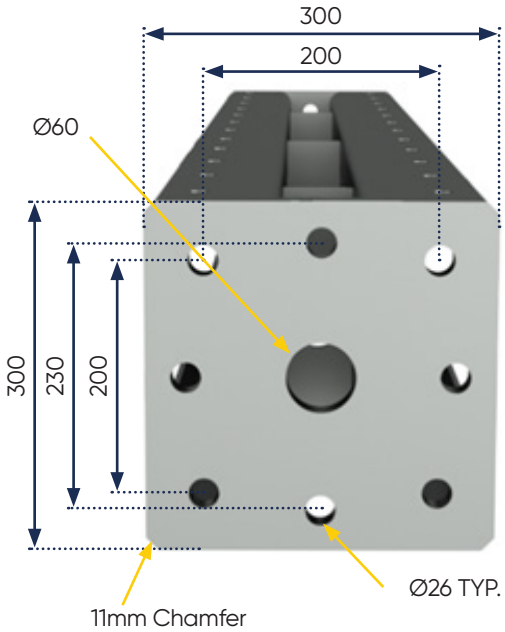
## 4. System Details

### Prop / Beams

Acrow's Powershore 150 offer a range of props / beams from 100mm to 3000mm high. The prop's section consists of two lipped channels Grade 550 steel sections spaced apart by battens and welded to 25mm thick Grade 450 steel end plates.

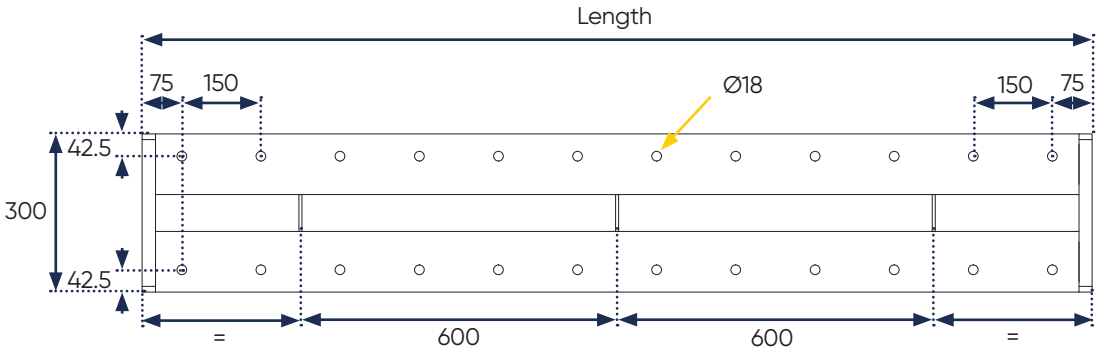
The hole patterns in the end plates enable the positive and direct bolting of props / beams to achieve a desired height and length, and to connect to the Screw and Hydraulic jacks. Another hole patterns in the flanges of the prop sections enable the direct connection of brace members and the remaining of the Powershore 150 components.

The Powershore 150 props have been designed to resist loads in bending, tension, compression and a combination of these actions. Connection strength can be increased with added bolts and / or splice plates. These actions will be transferred when components of the Powershore 150 system are bolted together. The End Plate Adapter is designed for the prop end plate connection to another Powershore 150 prop side wall.

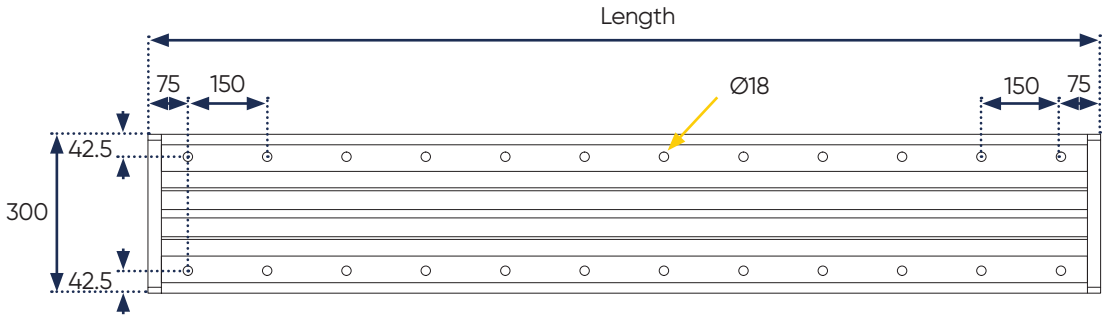


## 4. System Details

Acrow Powershore 150 offer a range of props / beams from 100mm to 2400mm high. The prop's section consists of two lipped channels Grade 550 steel section spaced apart by battens and welded to 25mm thick Grade 450 steel end plates. A 25mm Packing Plate can be used to accommodate prop heights variances multiple of 25mm.




**Flange View**



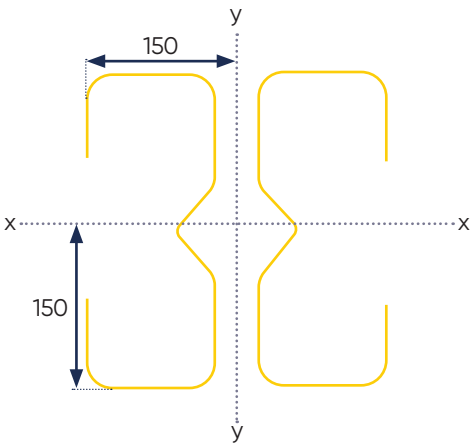

**Lip View**

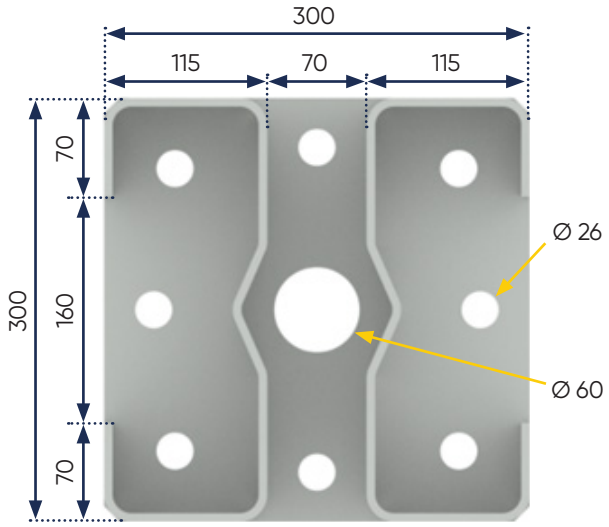
## 4. System Details

### Prop / Beams Section Properties

The table below outlines the various section properties for the Powershore 150 props / beams.

| PROPERTY | | | VALUE |
|---|---|---|---|
| A | Area | x $10^3$ $mm^2$ | 6.179 |
| Ixx | Second moment of area (x axis) | x $10^6$ $mm^4$ | 77.80 |
| Iyy | Second moment of area (y axis) | x $10^6$ $mm^4$ | 46.40 |
| Zxx | Section modulus (x axis) | x $10^3$ $mm^3$ | 518.69 |
| Zyy | Section modulus (y axis) | x $10^3$ $mm^3$ | 309.32 |
| J | Torsion constant | x $10^3$ $mm^4$ | 166.60 |
| Rx | Radius of gyration (x axis) | mm | 122.84 |
| Ry | Radius of gyration (y axis) | mm | 86.65 |
| Fy | Yield stress | MPa | 550 |
| E | Young's modulus | GPa | 200 |
| ΔN | Axial shortening (per meter length) | x $10^{-4}$ mm/kN/m | 6.8 |

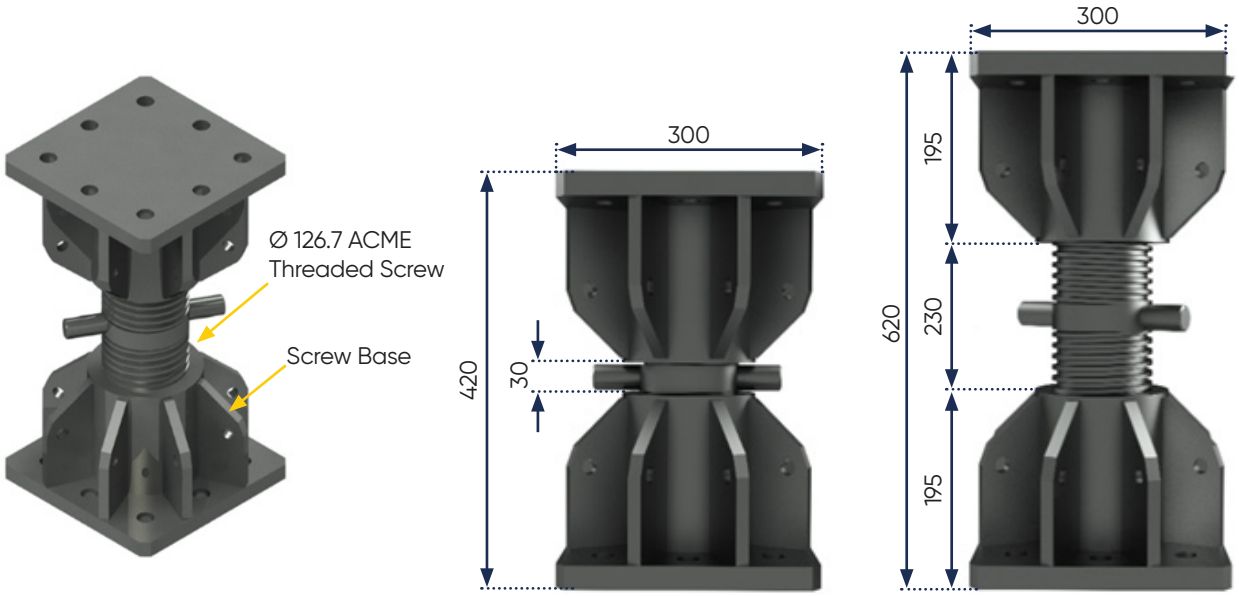


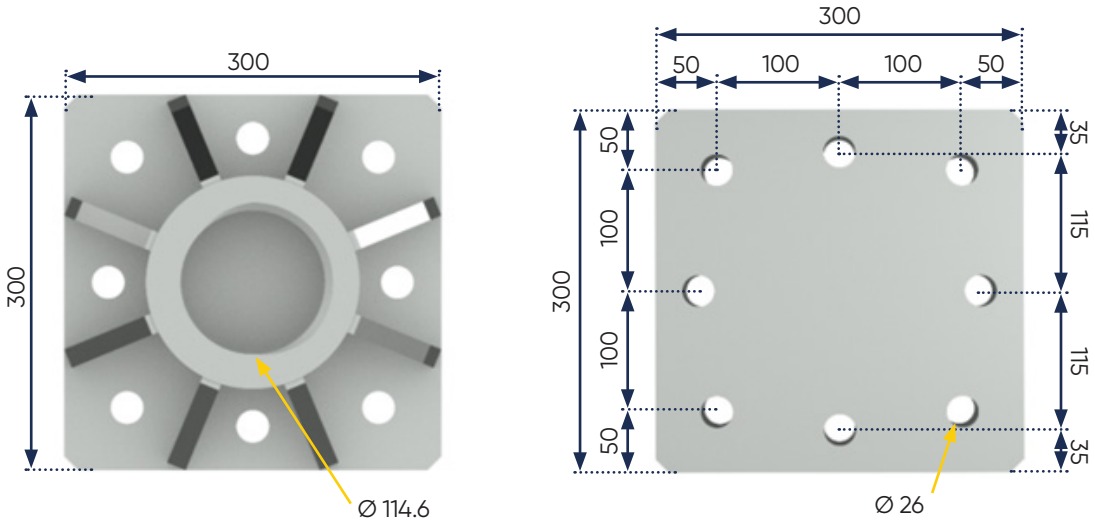

## 4. System Details

### Screw Jack

The Screw Jack is designed to interface with the Powershore 150 Prop section and is suitable for a 1500kN WLL at full extension. The screw jack connects to the Powershore 150 Prop / Beam Section via 6 x M24 x 250mm GR 10.9 bolts, nuts and washers.

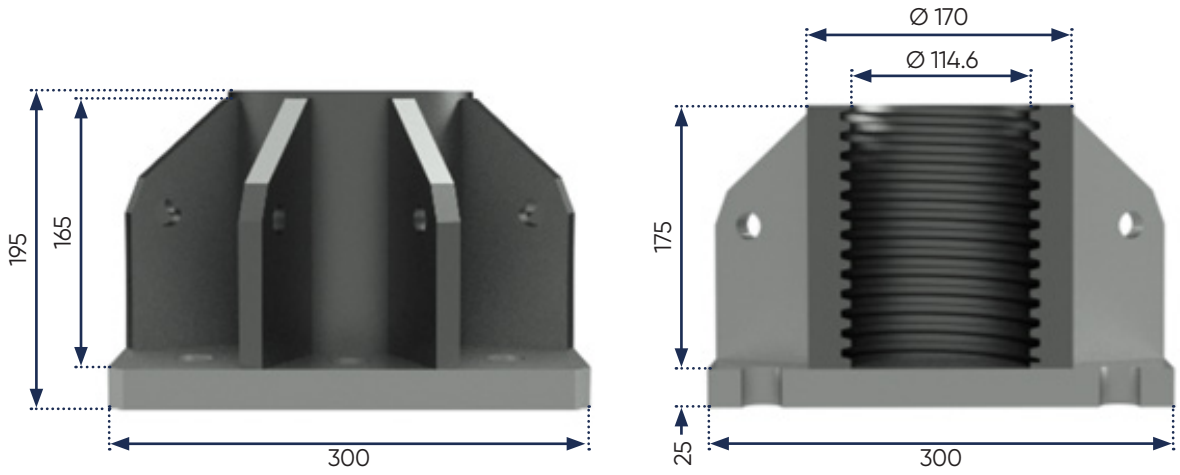



The Screw Jack's bases are identical in geometry, except the ACME thread direction, to facilitate the Screw Jack mechanism. One has a Right-Hand Thread and the other has a Left-Hand Thread.

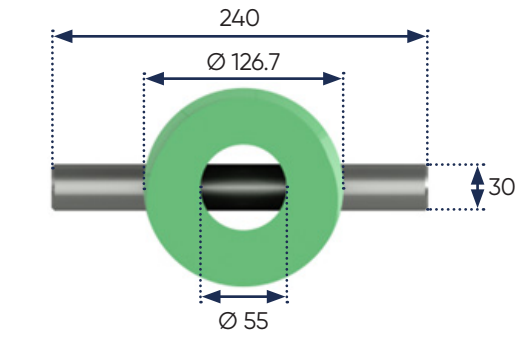


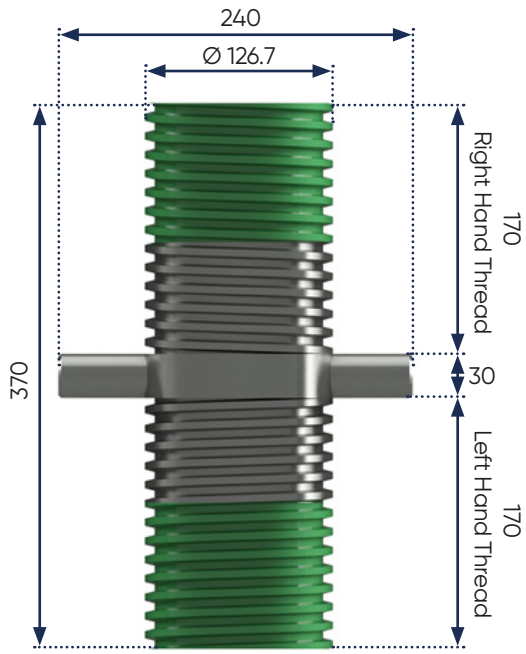
## 4. System Details

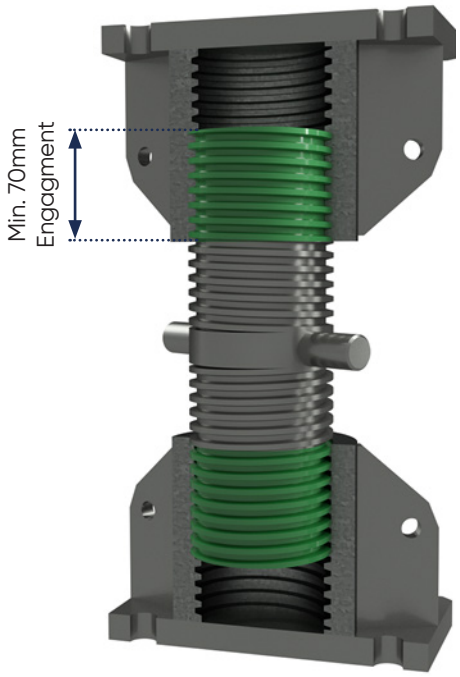
### Screw Jack




To ensure the Screw Jack maintains a safe 1500KN WLL, a minimum 70mm thread engagement is required on both ends of the shaft. The 70mm is marked in Green on both ends of the Ø126.7 ACME thread screw.



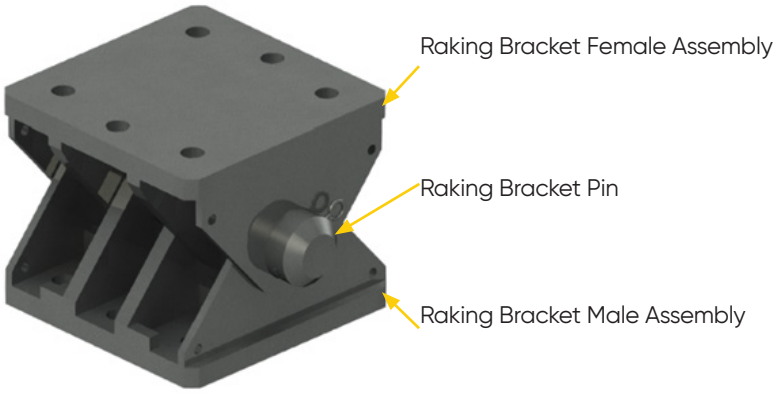
## 4. System Details

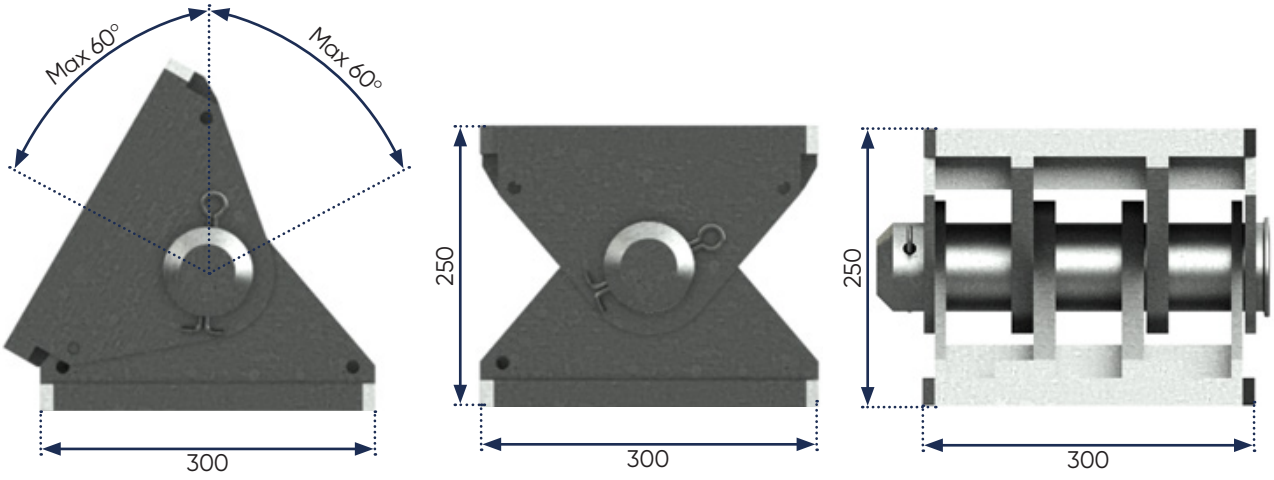
### Raking Bracket

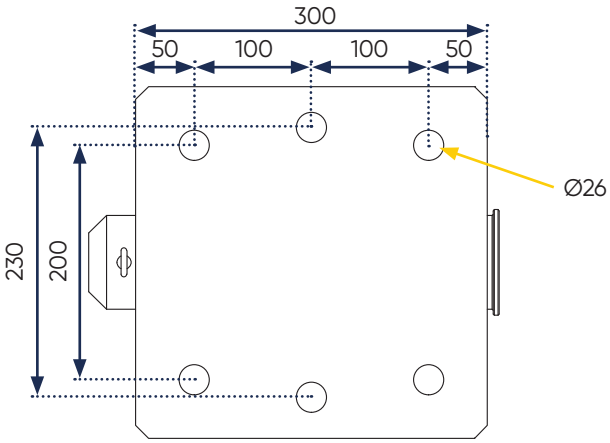
The Raking Bracket is designed for connection to the Powershore 150 Prop / Beam Section via 6 x M24 x 250mm GR 10.9 bolts, nuts and washers.
Axial compression capacity at 0 eccentricity and 0 degree pivoting angle 'a':

- WLL for raker main ply parallel to beam webs: 1500kN
- WLL for raker main ply perpendicular to beam webs: 900kN

Allowed applied force directions shall be within the same plane of the raker main ply.



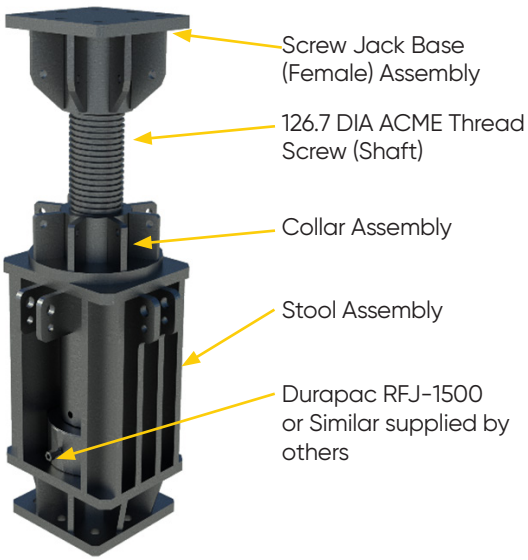



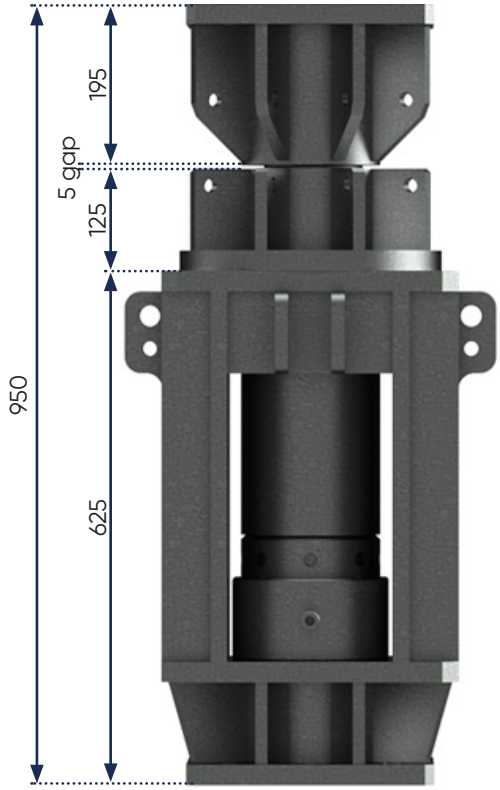
## 4. System Details

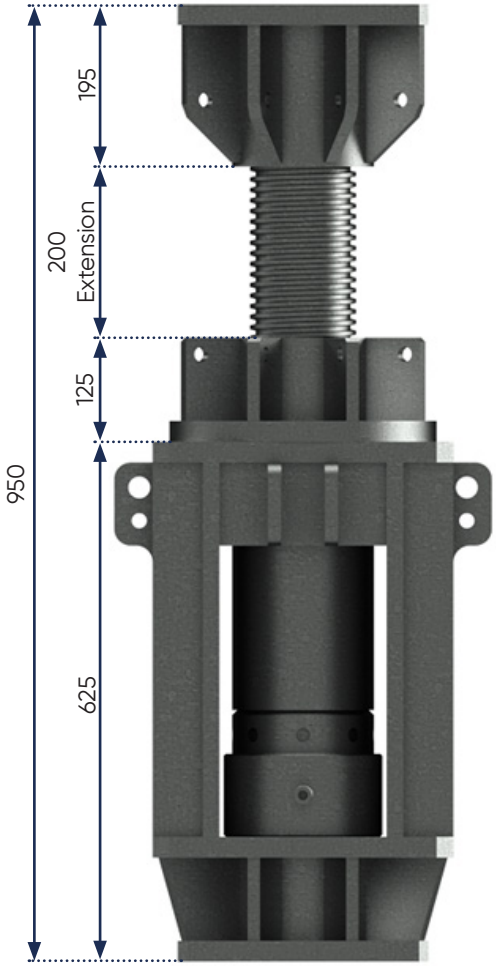
### Hydraulic Jack

The Hydraulic Jack unit is designed to suit the 150 tonne RFJ-1500 Durapac Jack or similar supplied by others. It connects to the Powershore 150 Prop / Beam Section via 6 x M24 x 250mm GR 10.9 bolts, nuts and washers.

- Ø126.7 acme thread screw.
- Low-profile socket may be required for double base bolt group installation using the Jack Brace Adapter.



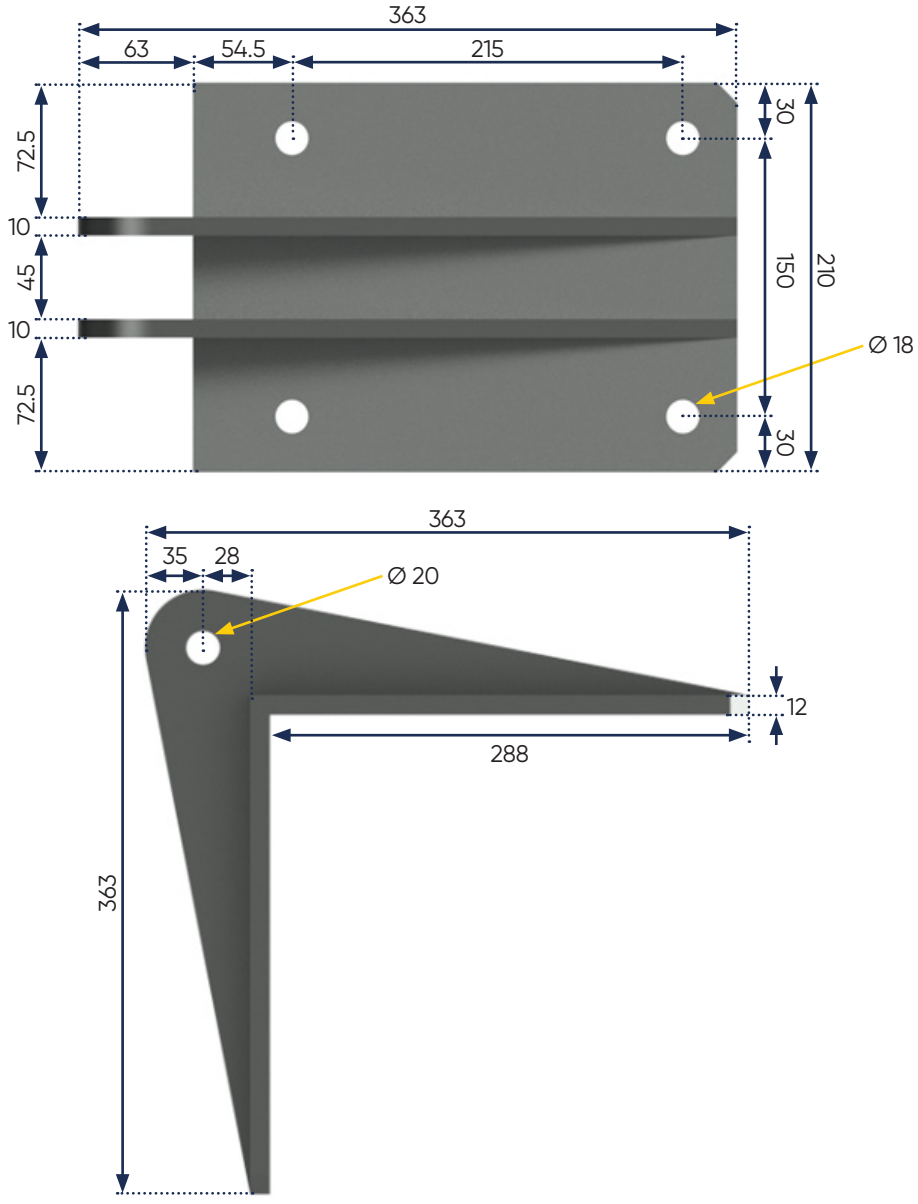



## 4. System Details

### Brace Adapter

The Brace Adapter is designed to plan brace the Powershore 150 Props structure using a turnbuckle assembly.

- The Brace Adapter shall be connected to prop wall with 8 x M16 x 55mm GR 8.8 bolts.
- Tension force directions shall be within the same plane of the parallel lugs.
- Prop torsional rotation along its axis shall be restraint if adapter applies any torque to the prop.

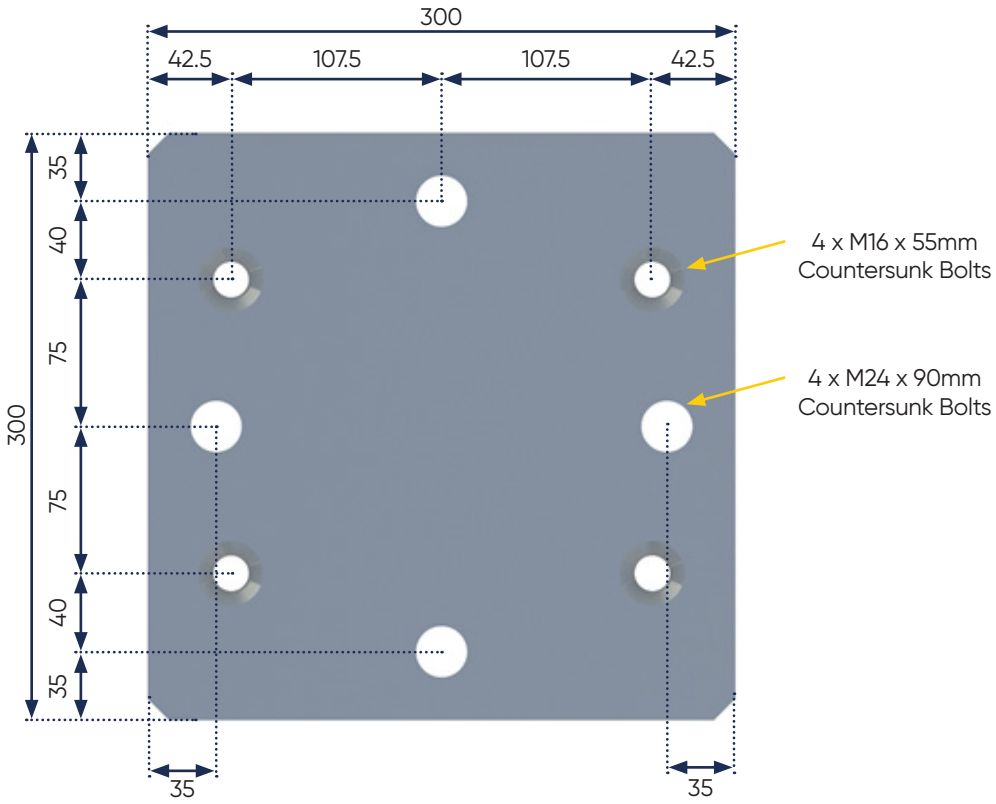


# 4. System Details

## End Plate Adapter

The End Plate Adapter is designed for the Powershore 150 Prop end plate connection to another Powershore 150 Prop side wall. The Powershore 150 Props will be acting as a beam or a soldier.

- The End Plate adapter shall be connected to prop wall with 2 groups of countersunk bolts: 4 x M16 x 55mm GR 8.8 and 4 x M24 x 90mm GR 8.8.
- The End Plate Adapter has counter sunk holes on both sides to enable the connection to the props wall or end plate using countersunk bolts.

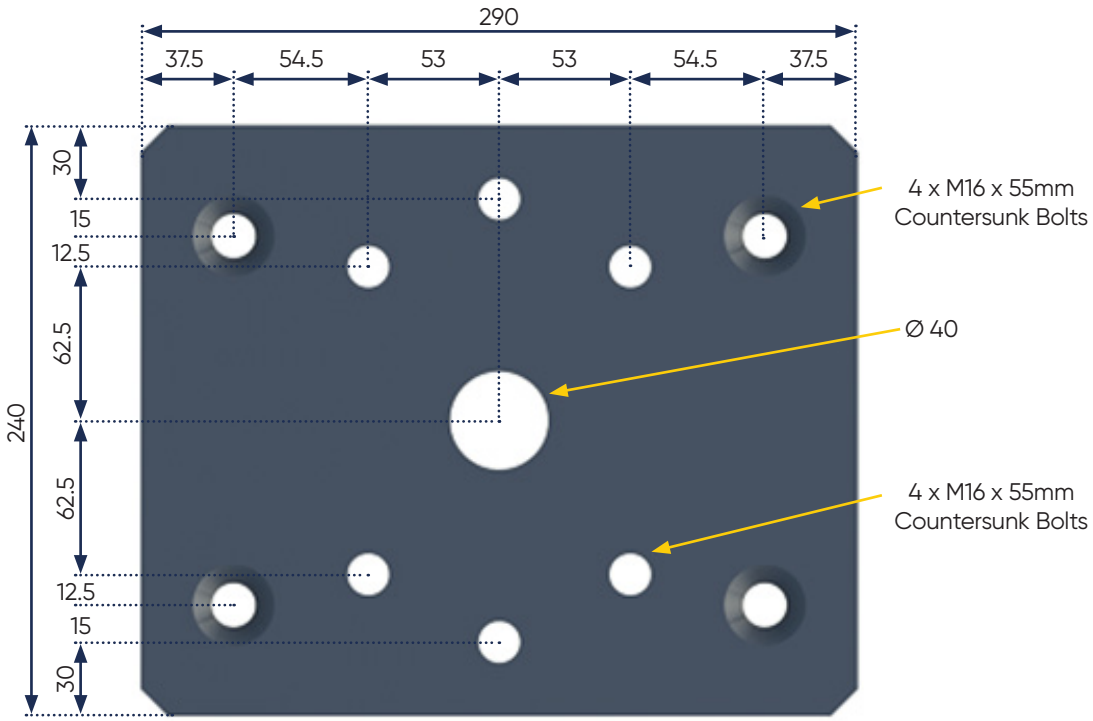


# 4. System Details

## Soldier Adapter

The Soldier Adapter is designed for the Slim-Max soldier end plate connection to the Powershore 150 prop side wall.

- The Soldier Adapter shall be connected to the Powershore 150 prop side wall with countersunk bolts 8 x M16 x 55mm GR 8.8.
- The Soldier Adapter has Countersunk holes on both sides to enable the connection to the props wall or end plate using countersunk bolts.

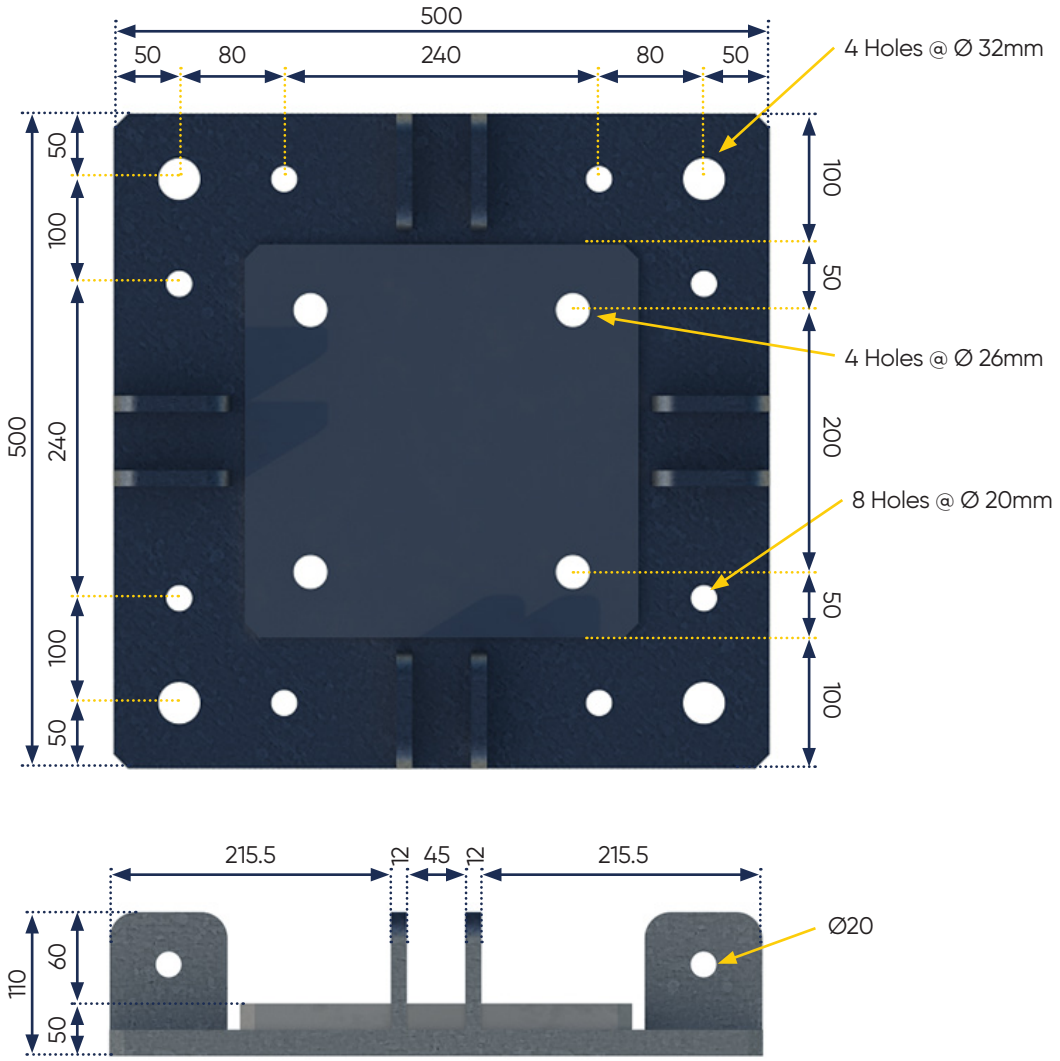


# 4. System Details

## Jack Brace Adapter

The Jack Brace Adapter is designed for the HT Thru Tie Rod (Z-bar) brace connection to the Screw Jack (or Hydraulic Jack Unit).

- Adapter fixings to footing tension and shear capacities to be checked by others
- Tension force directions shall be within the same plane of the parallel lugs

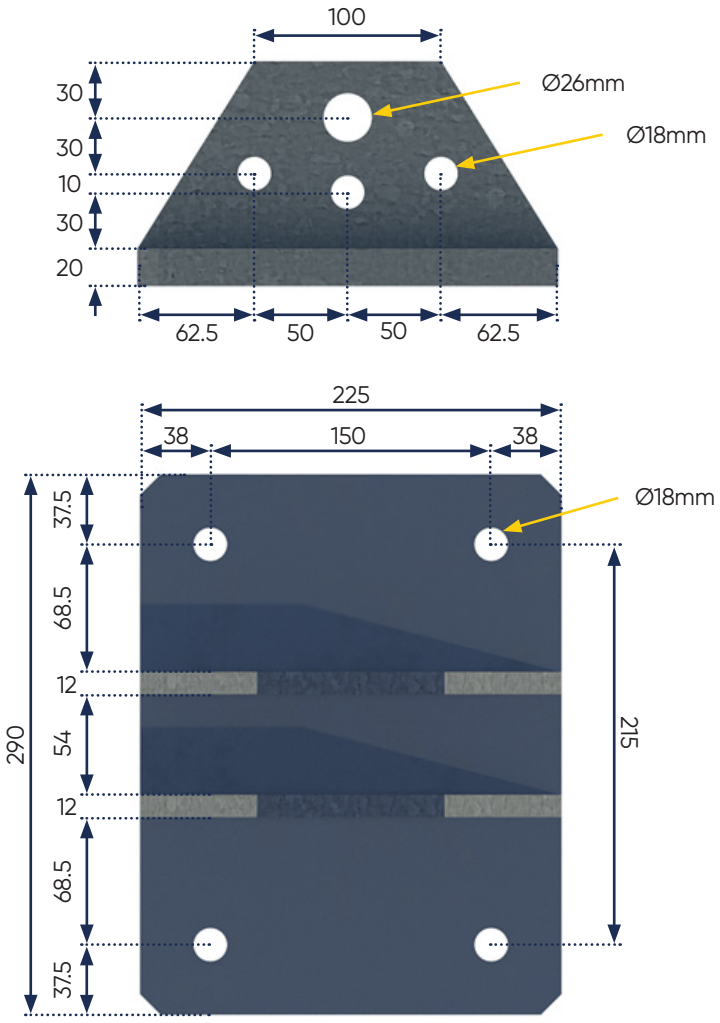


## 4. System Details

### Prop / Turnbuckle Adapter

The Prop/Turnbuckle Adapter is designed for the Slim-max Prop or Turnbuckle connection to Prop side wall.

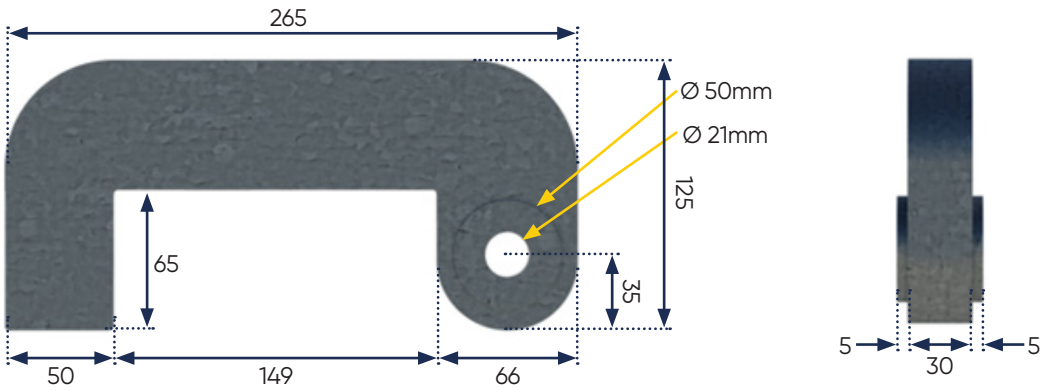
- Adapter shall be connected to prop wall with 4 x M16 x 55mm GR 8.8 bolts.
- Tension/compression force directions shall be within the same plane of the parallel lugs.



## 4. System Details

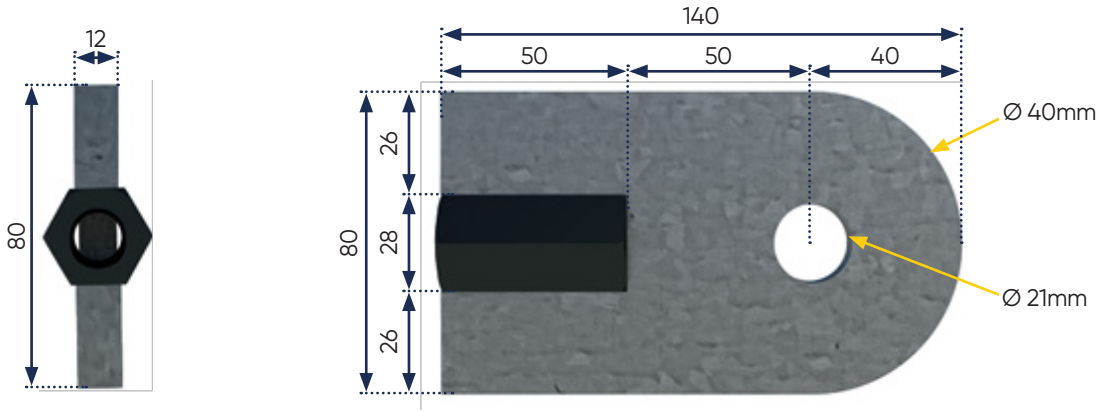
### Tie Rod Adapter Type 1

The Tie Rod Adapter Type 1, also known as Z-Bar Adapter, is designed for bracing the Powershore 150 structure. The Tie Bar Adapter Type 1 is fixed into members using D19 podger pin. A Ø15mm HT Thru Tie Rod with HT Thru Tie Hex Nut are used as bracing members.




### Tie Rod Adapter Type 2

The Ø15 x 50mm HT Thru Hex nut is fully welded and part of the adapter and is designed for bracing the Powershore 150 structure. The Tie Bar Adapter Type 2 is fixed into members using D19 podger pin.

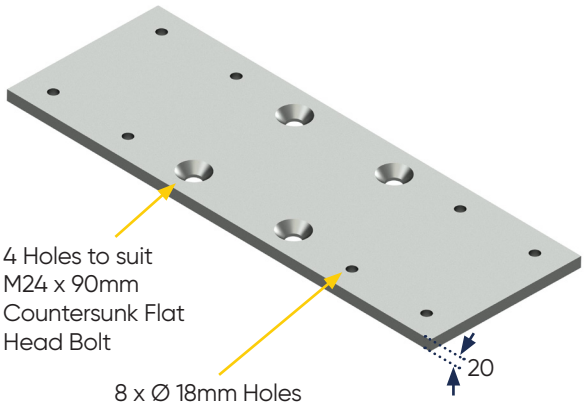


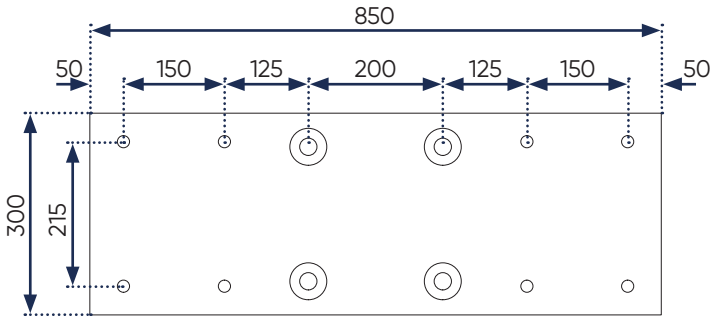
## 4. System Details

### Waler Bracket Adapter Type 1

The Waler Bracket Adapter Type 1 is designed to sandwich the vertical Powershore 150 member and allow a point to attach the raker bracket.

- Two individual Waler Bracket Adapter Type 1's are bolted to each side of the Powershore 150 prop using 8 x 400mm M16 GR 8.8 Threaded rods with nuts.
- 4 x 90mm M24 GR 8.8 Countersunk set screws with nuts are used to bolt the Powershore 150 Raking Bracket and shoring assembly into the Waler Bracket Adapter Type 1.

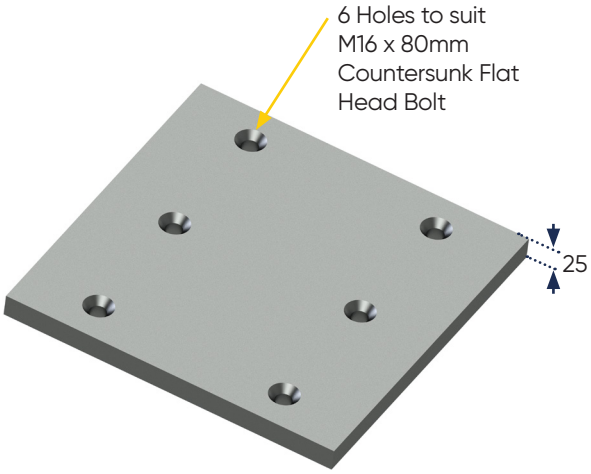


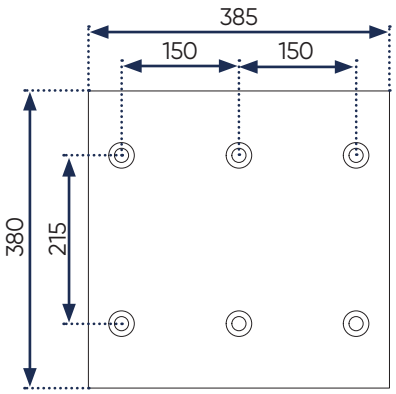




### Waler Bracket Adapter Type 2

The Waler Bracket Adapter Type 2, together with the Waler Bracket Inner Washer, is designed to fix the horizontal Powershore 150 member to the vertical Powershore 150 member.

- Waler Bracket Adapter Type 2 is fixed into the Powershore 150 shoring structure using two Waler Bracket Clamp Washer.
- The Powershore Beam (waler) is bolted into the Waler Bracket Adapter Type 2 using 6 x 80mm M16 GR 8.8 Countersunk set screws with nuts.

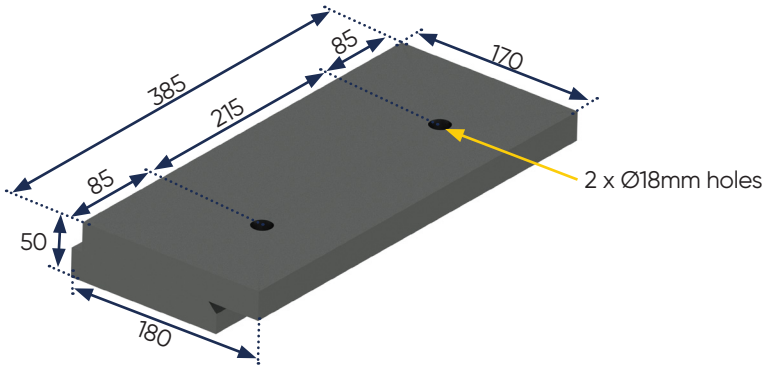


## 4. System Details

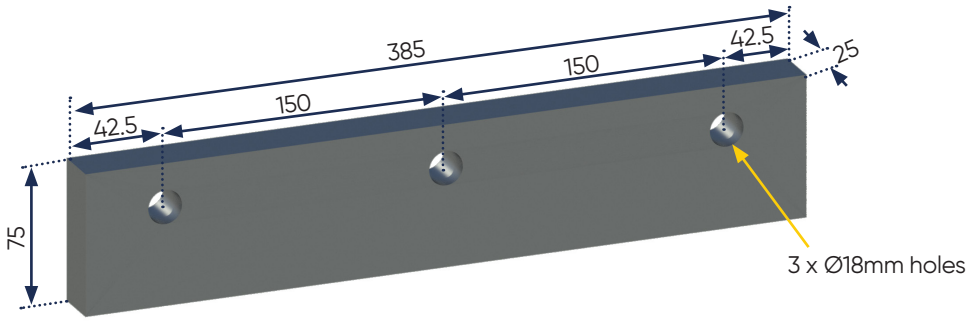
### Waler Bracket Clamp Washer

The Waler Bracket Clamp Washer is designed to hold the Waler Bracket Adapter Type 2 and attach it to the Powershore 150 shoring structure.




### Waler Bracket Inner Washer

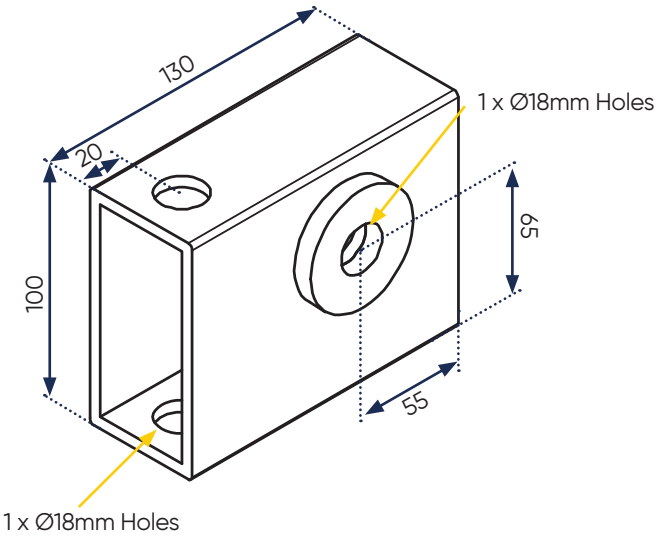
The Waler Bracket Inner Washer, together with the Waler Bracket Adapter Type 2, is designed to hold the horizontal PS150 waler. 2 x Waler Bracket Inner Washer is used to hold the horizontal PS150 waler and they are bolted to the Waler Bracket Adapter Type 2 using 6 x 80mm M16 GR 8.8 Countersunk set screws with nuts.



## 4. System Details

### Powershore 150 Prop to Powershore 30 Prop

The Powershore 30 adapter is designed to be attached to the top of the Powershore 30 Adjustable Base and standard, with 1 x 150mm M16 GR8.8 bolts and nuts. The adapter fits to the inside of the Powershore 150 with 1 x 100mm M16 GR 8.8 bolts with nuts.

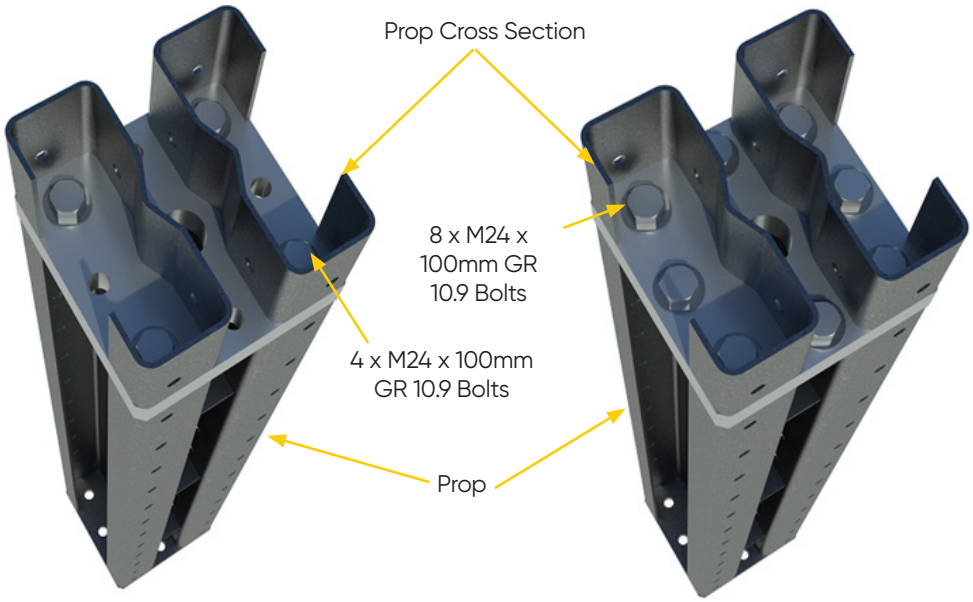


# 5. ASSEMBLY DETAILS

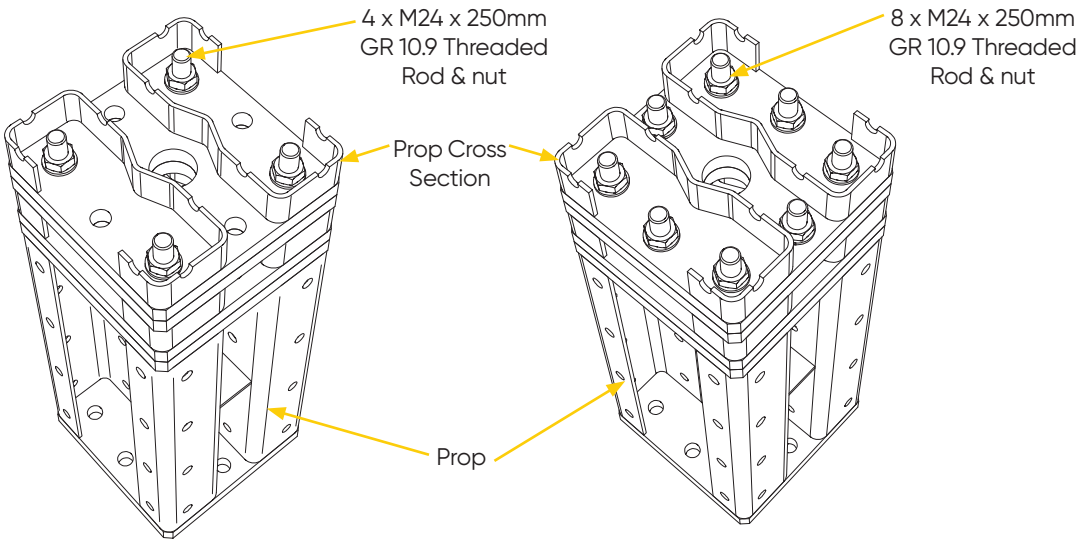
## 5. Assembly Details

### Beam End Connections Assembly

There are two bolting configurations for the prop / beam end connections. There are four and eight bolts pattern options providing different capacities to suit the application.



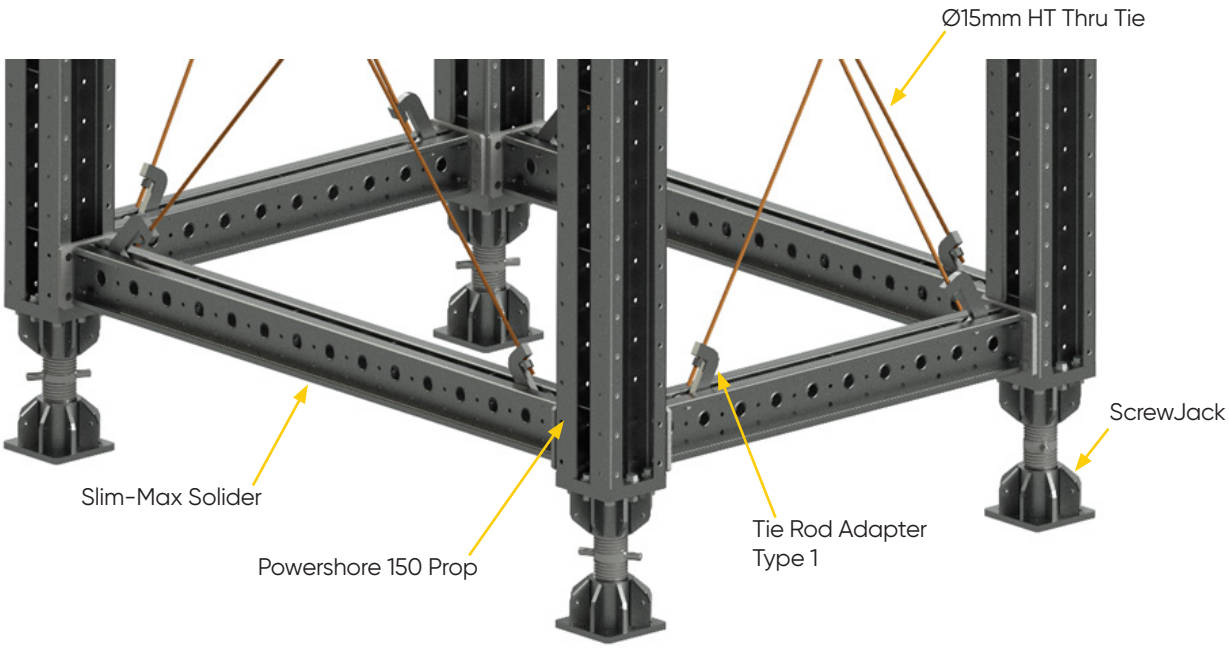

### Prop -100mm Prop - Prop Connection

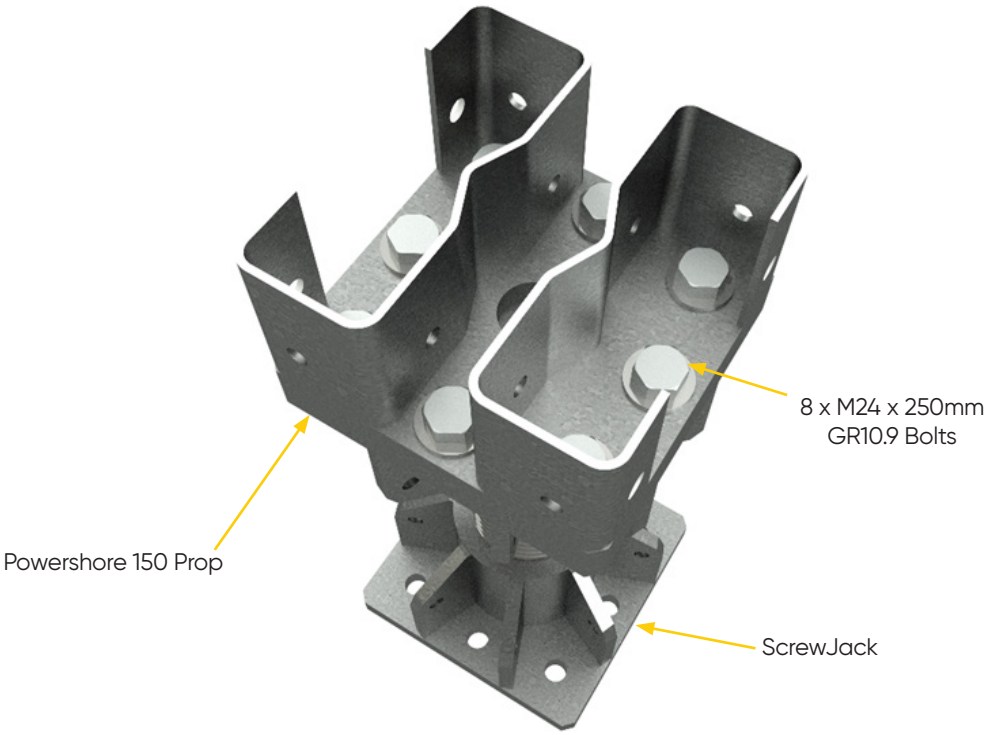


## 5. Assembly Details

### Screw Jack Assembly

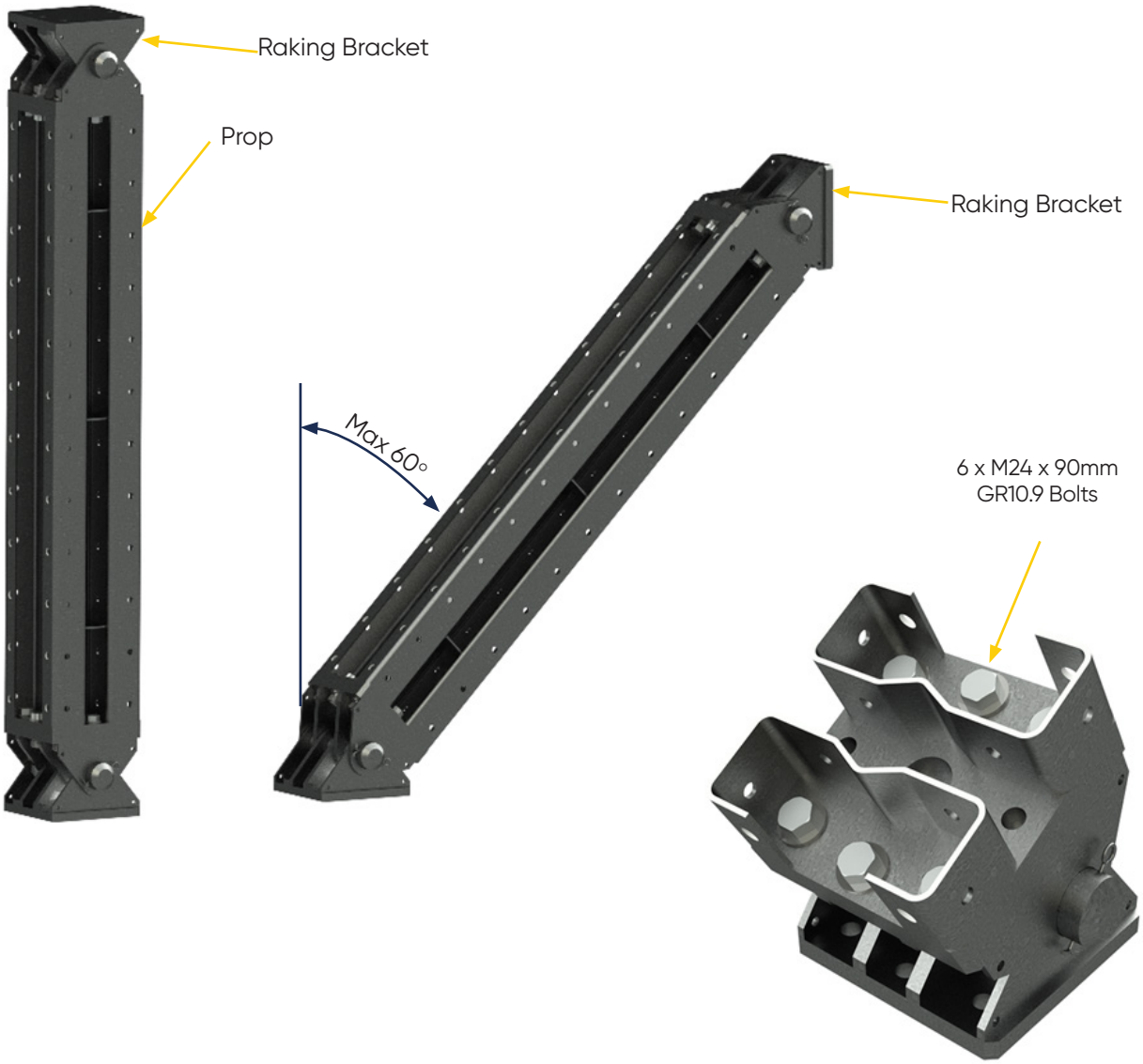
The Screw Jacks are to bear on suitable footings by others. The footing should be designed based on the applied loads. The typical configuration and bolting method of the Screw Jacks



## 5. Assembly Details

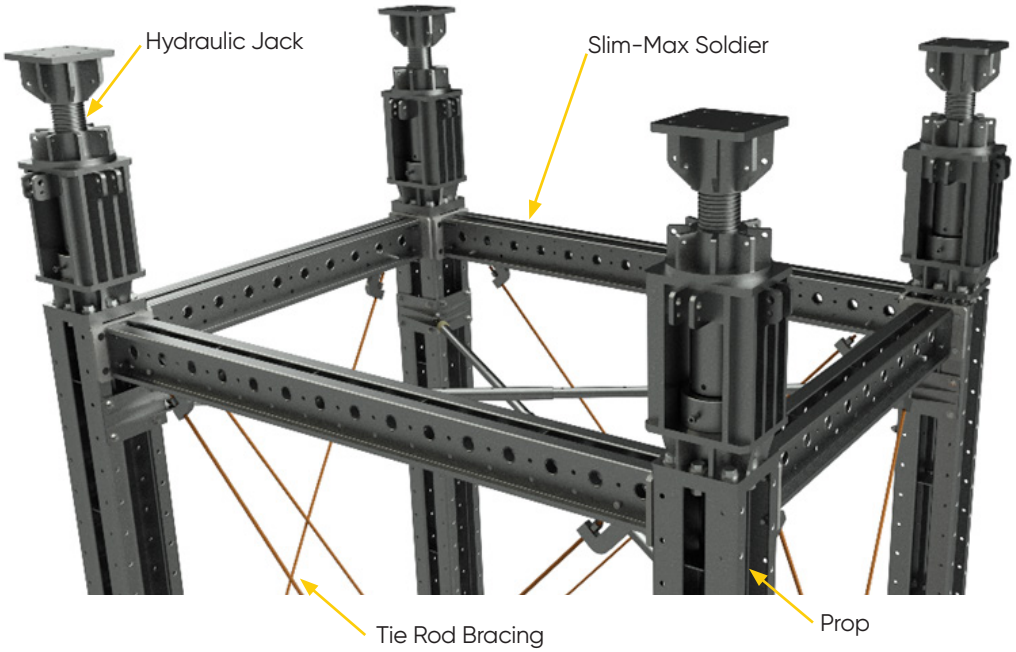
### Screw Jack Assembly

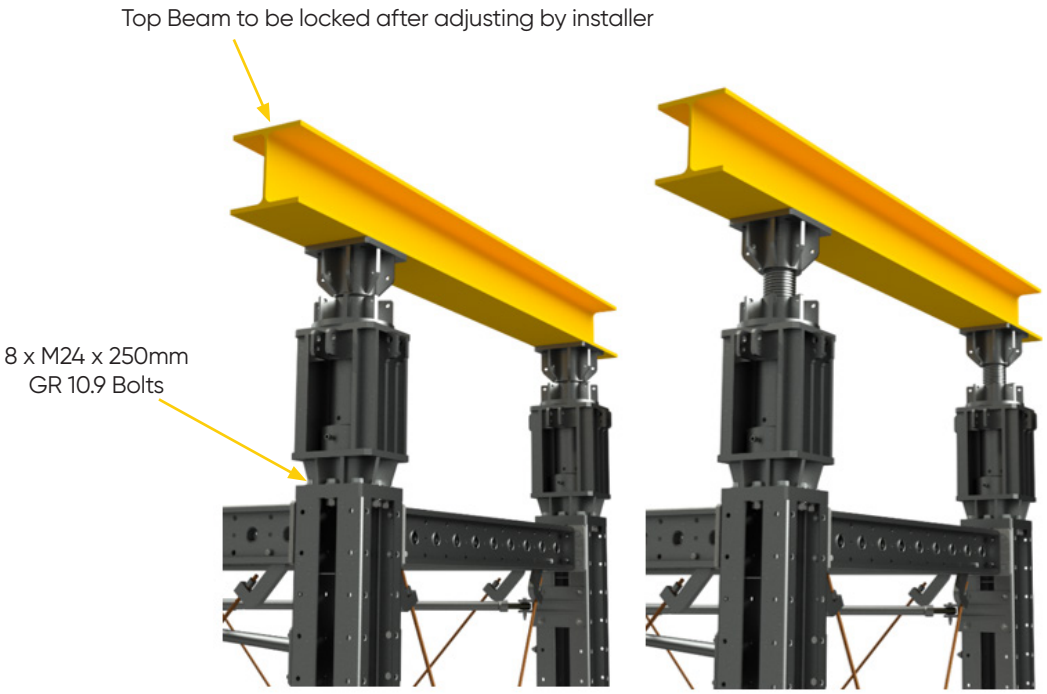


## 5. Assembly Details

### Hydraulic Jack Assembly

The Powershore 150 Hydraulic Jack works in a 16mm stroke and the jack has a 200mm jacking capacity at 16mm intervals.



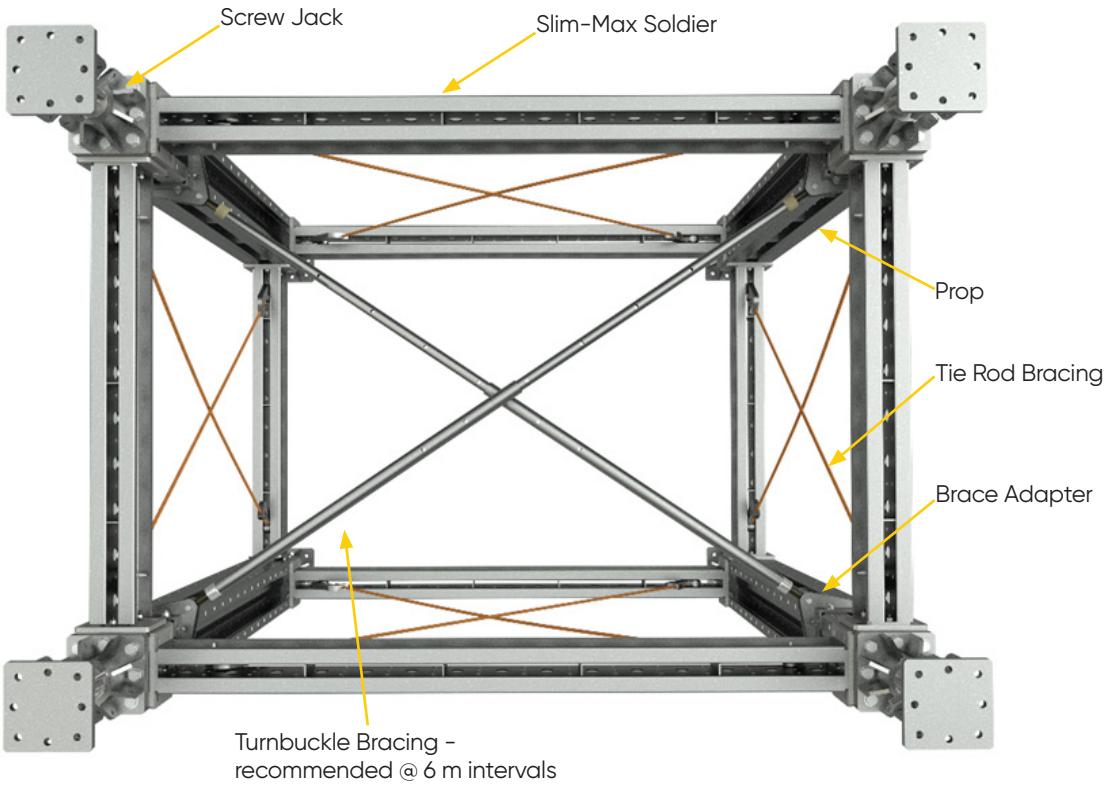

Starting the Jacking Process - Hydraulic Jack Fully Contracted

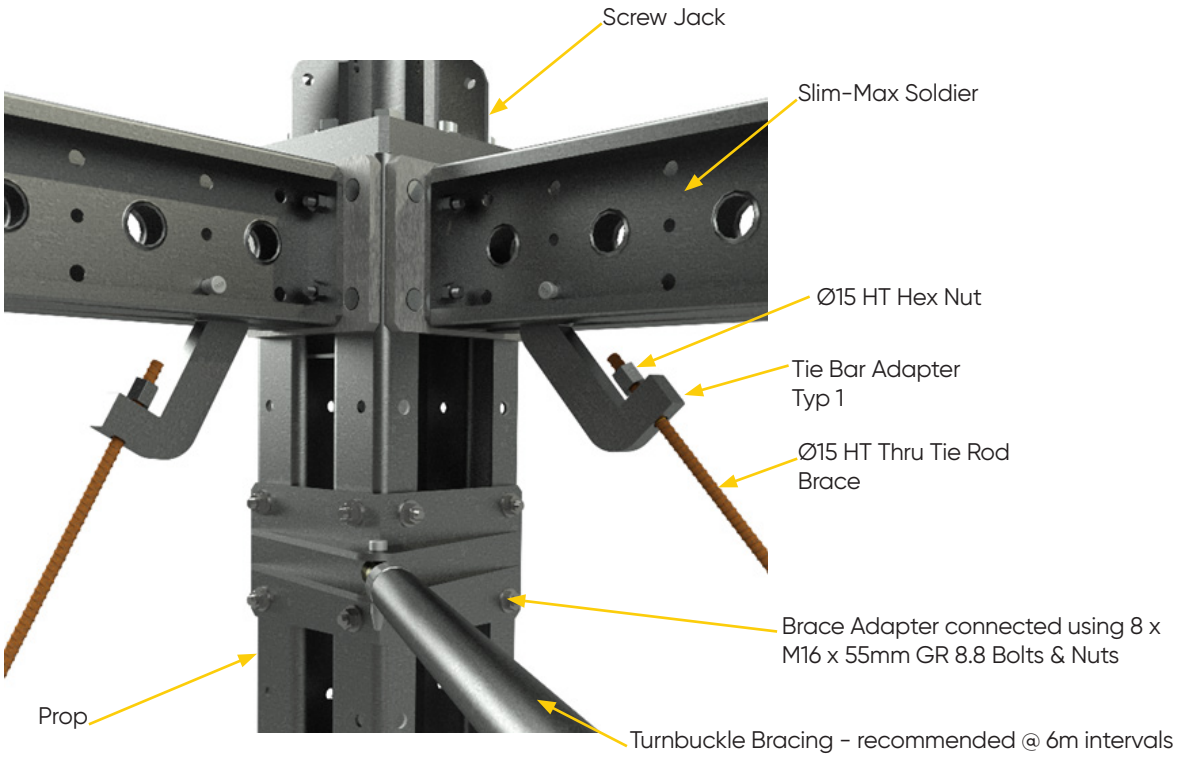
Hydraulic Jack in Operation - Fully Extended

## 5. Assembly Details

### Brace Adapter Assembly

The typical Brace Adapter connection and brace configuration. Turnbuckles bracing is recommended at 6m intervals to maintain shape.



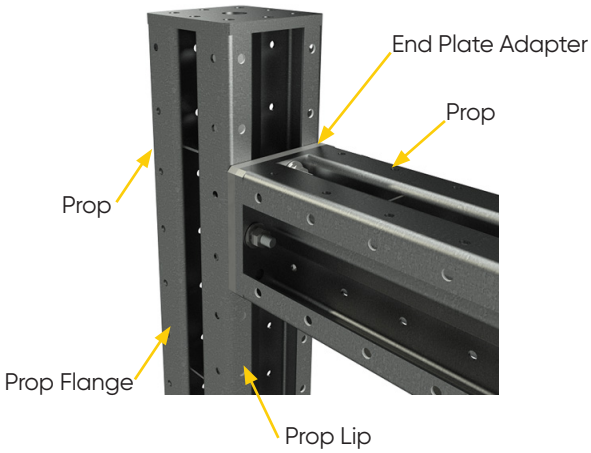



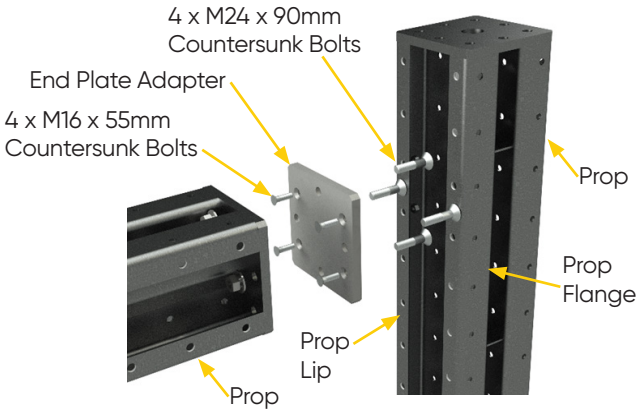
## 5. Assembly Details

### End Plate Adapter Assembly

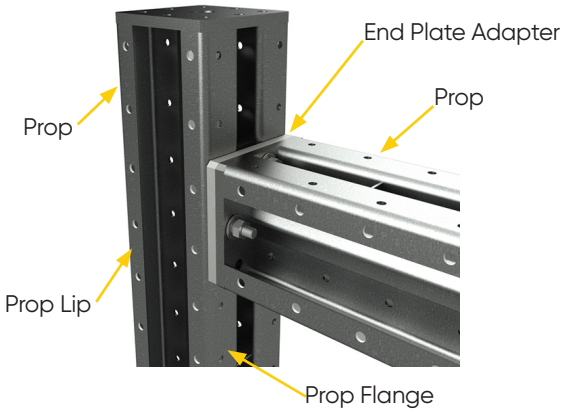
There are two methods to connect the Powershore 150 props using the End Plate Adapter.

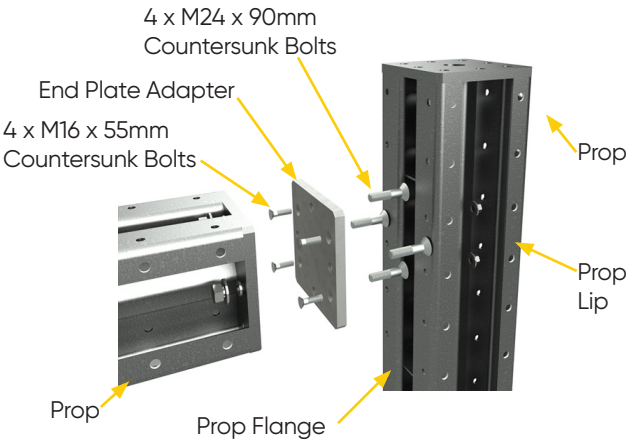
Method 1 - (a): Connecting to the Powershore 150 side wall lip.



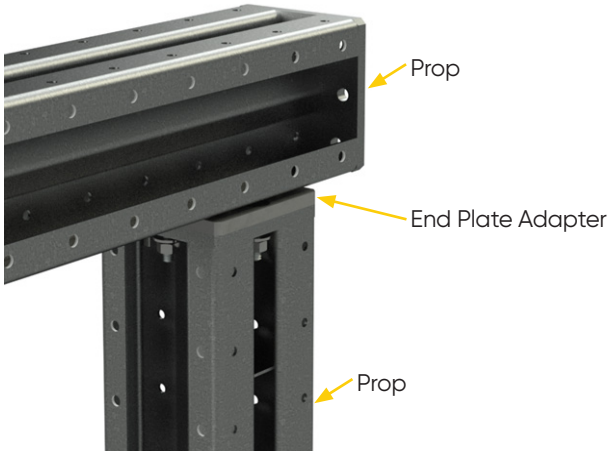



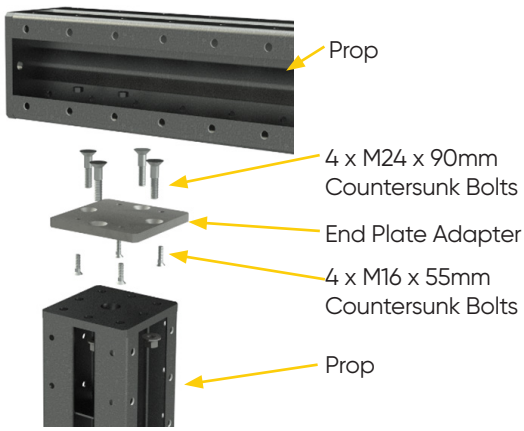

Method 1 - (b): Connecting to the Powershore 150 prop side wall flange.




Method 2: Connecting Powershore 150 beam to Powershore 150 prop end plate.



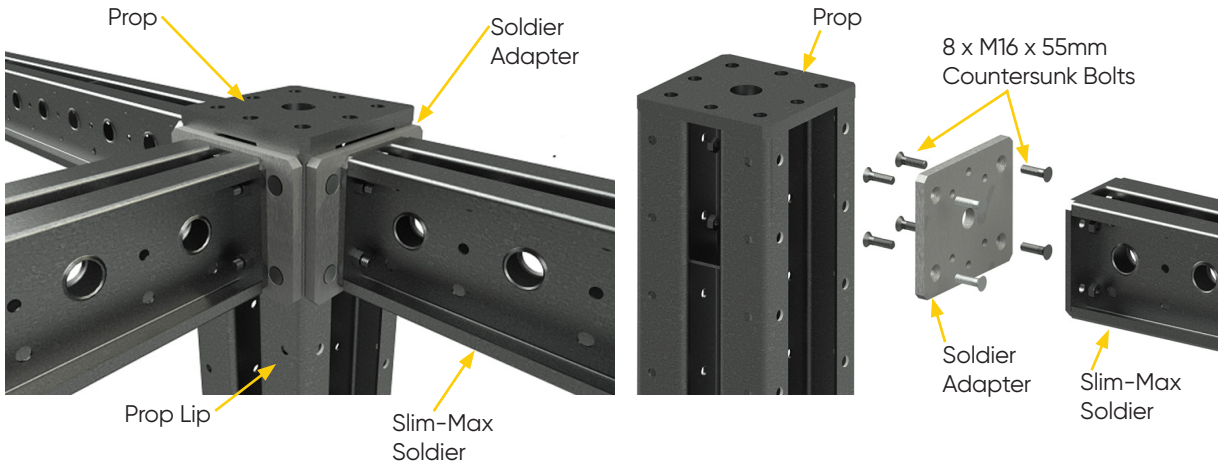



## 5. Assembly Details

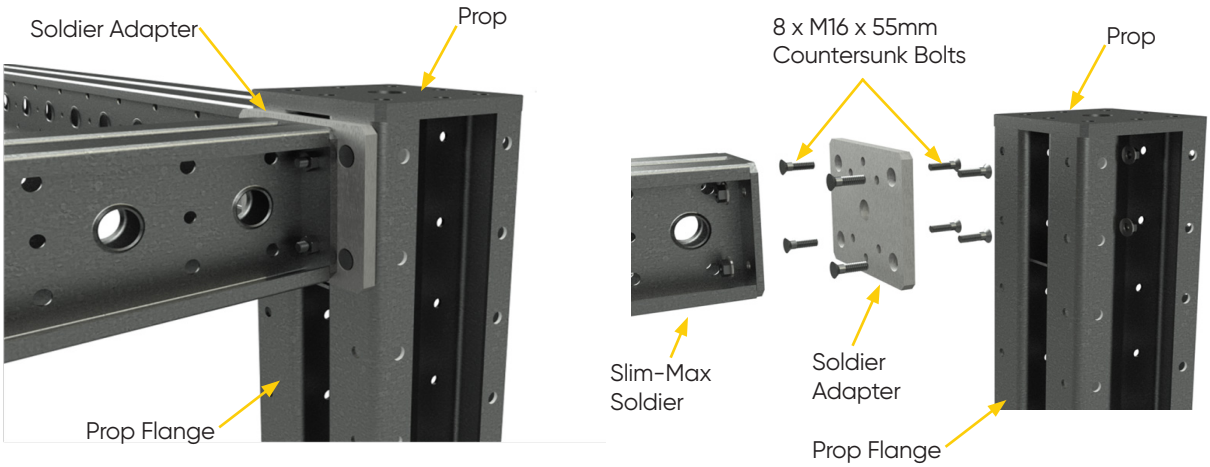
### Soldier Adapter Assembly

The two methods of connecting of the Slim-Max soldier to the Powershore 150 prop's side wall using the Soldier Adapter.

Method 1: Connecting Slim-Max soldier end plate to Powershore 150 prop lip:



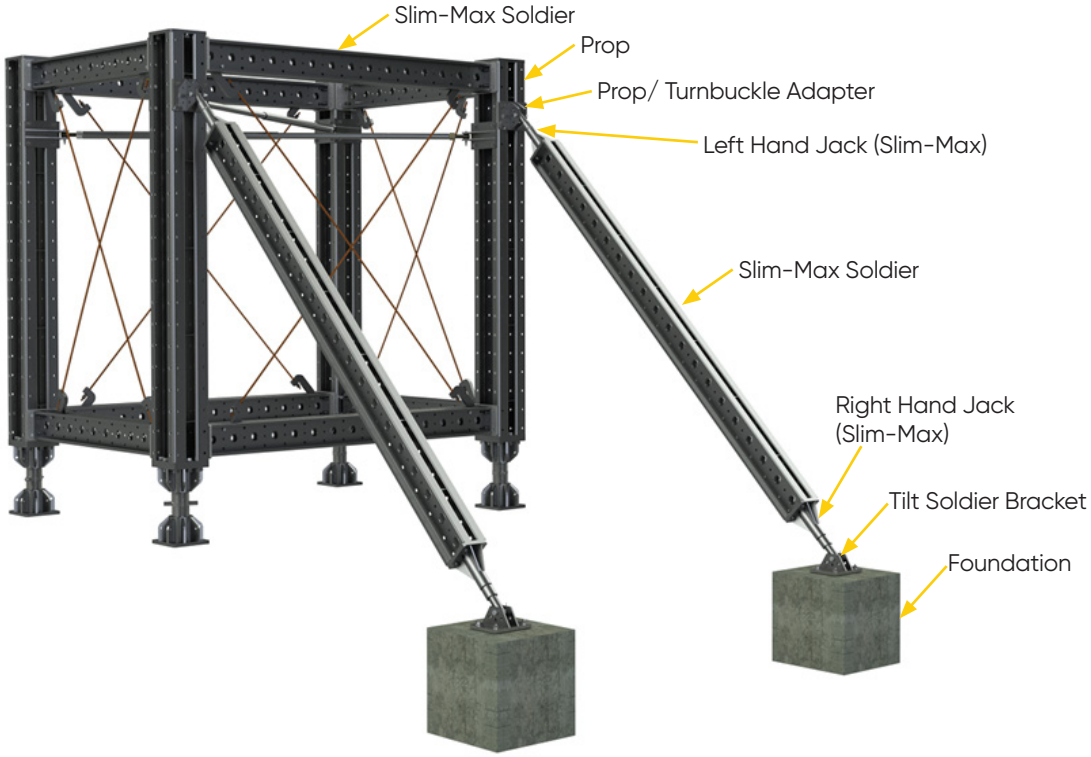

Method 2: Connecting Slim-Max soldier end plate to Powershore 150 prop flange:

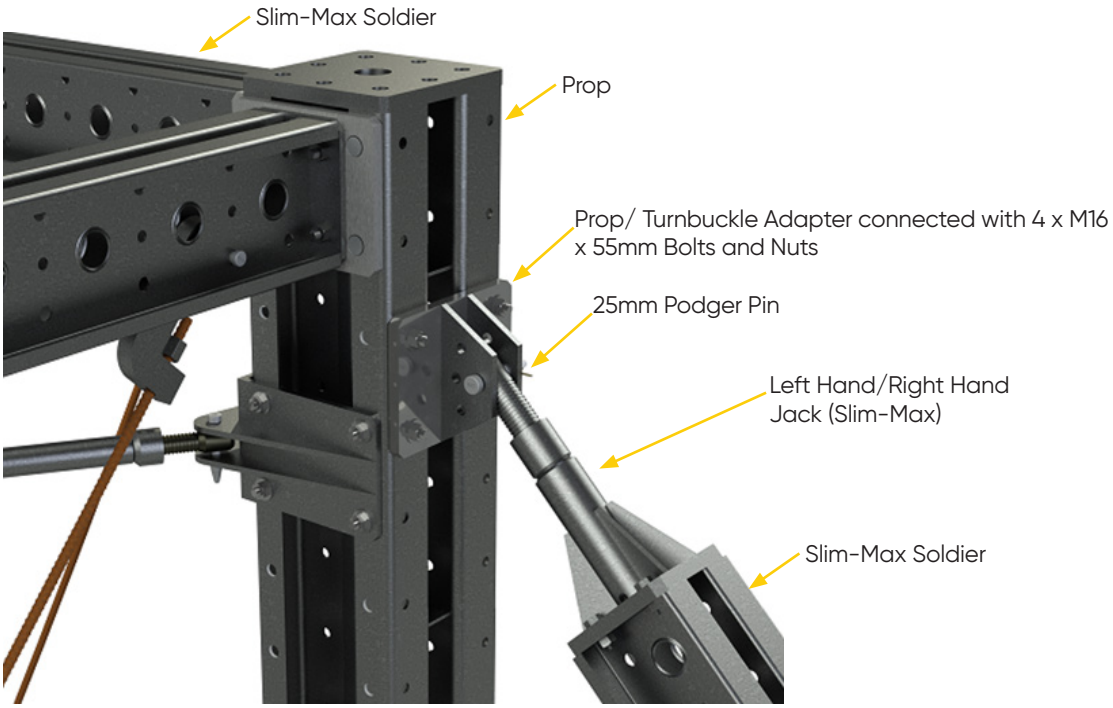


## 5. Assembly Details

### Soldier Adapter Assembly

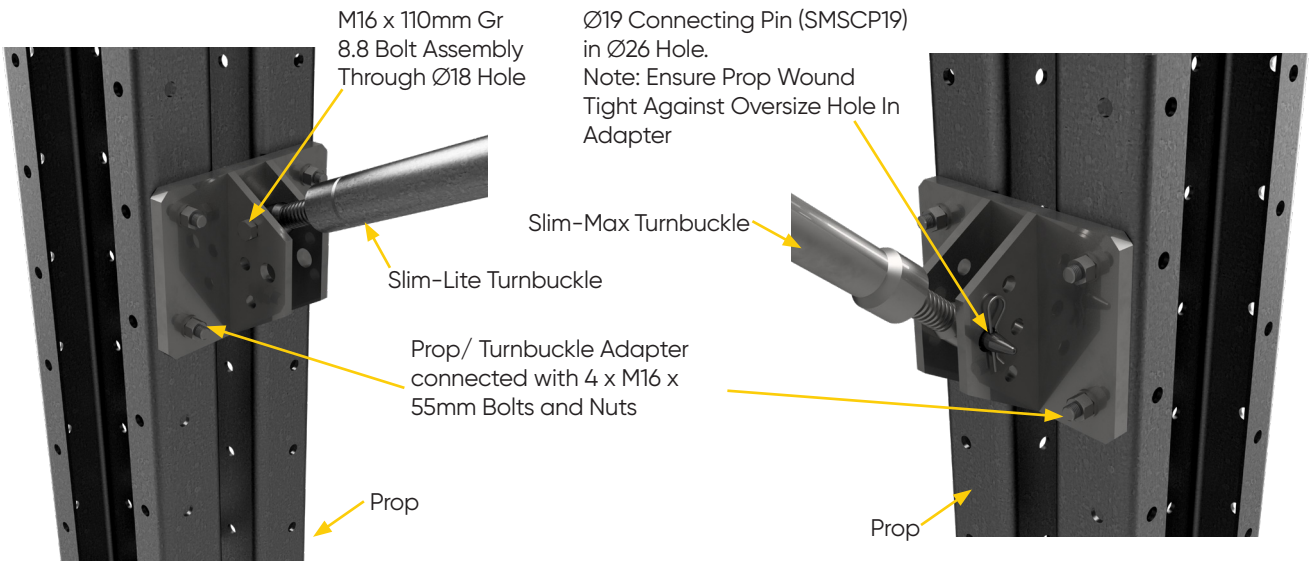
The following demonstrates the method of propping the Powershore 150 props using a Slim-Max soldier and Prop/Turnbuckle Adapter.



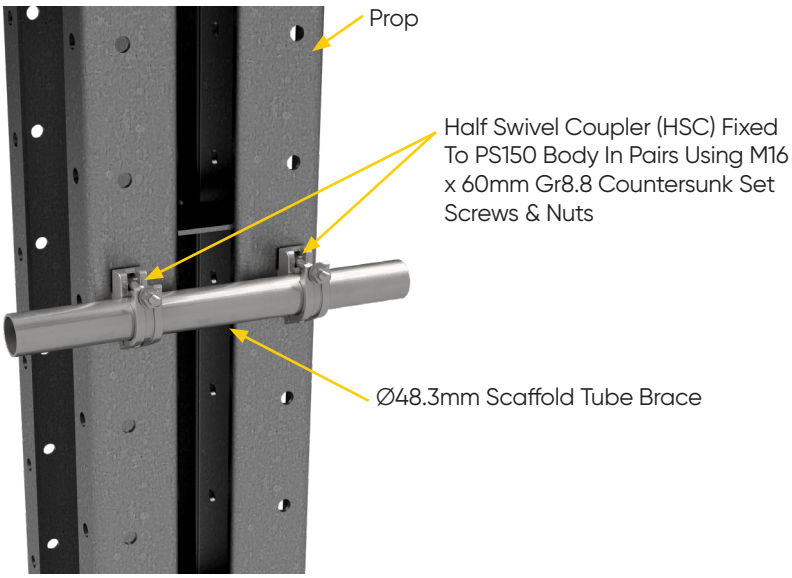



## 5. Assembly Details

### Prop/Turnbuckle Adapter Assembly

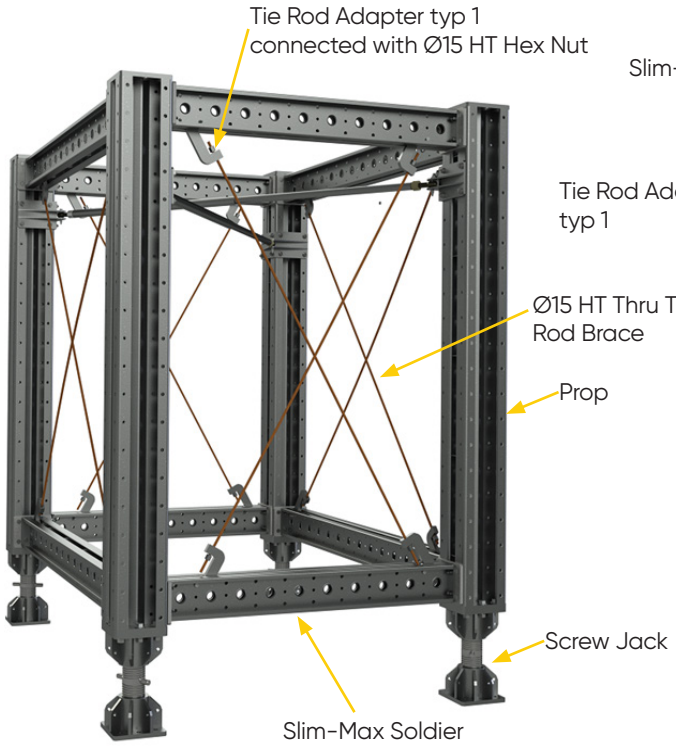


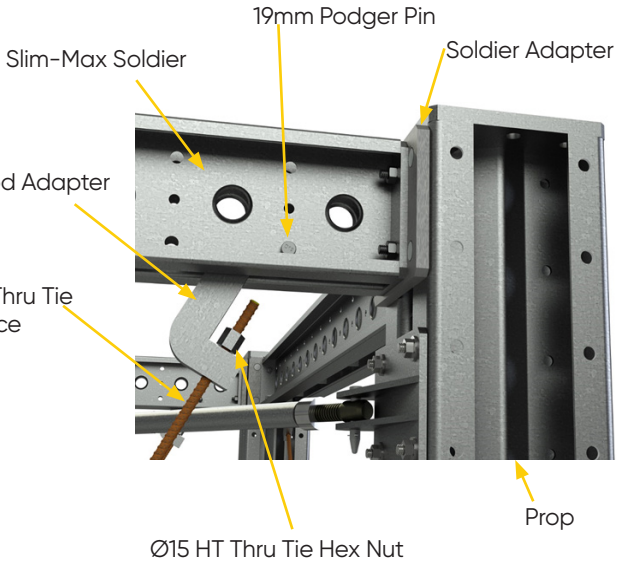

### Prop/Turnbuckle Adapter Assembly

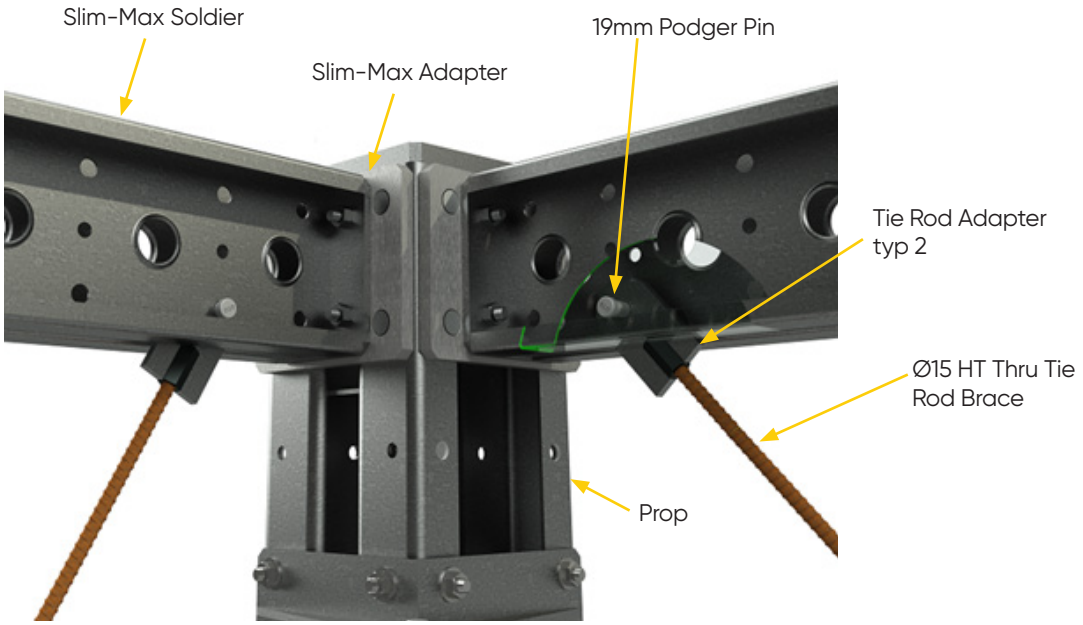


## 5. Assembly Details

### Tie Rod Adapters

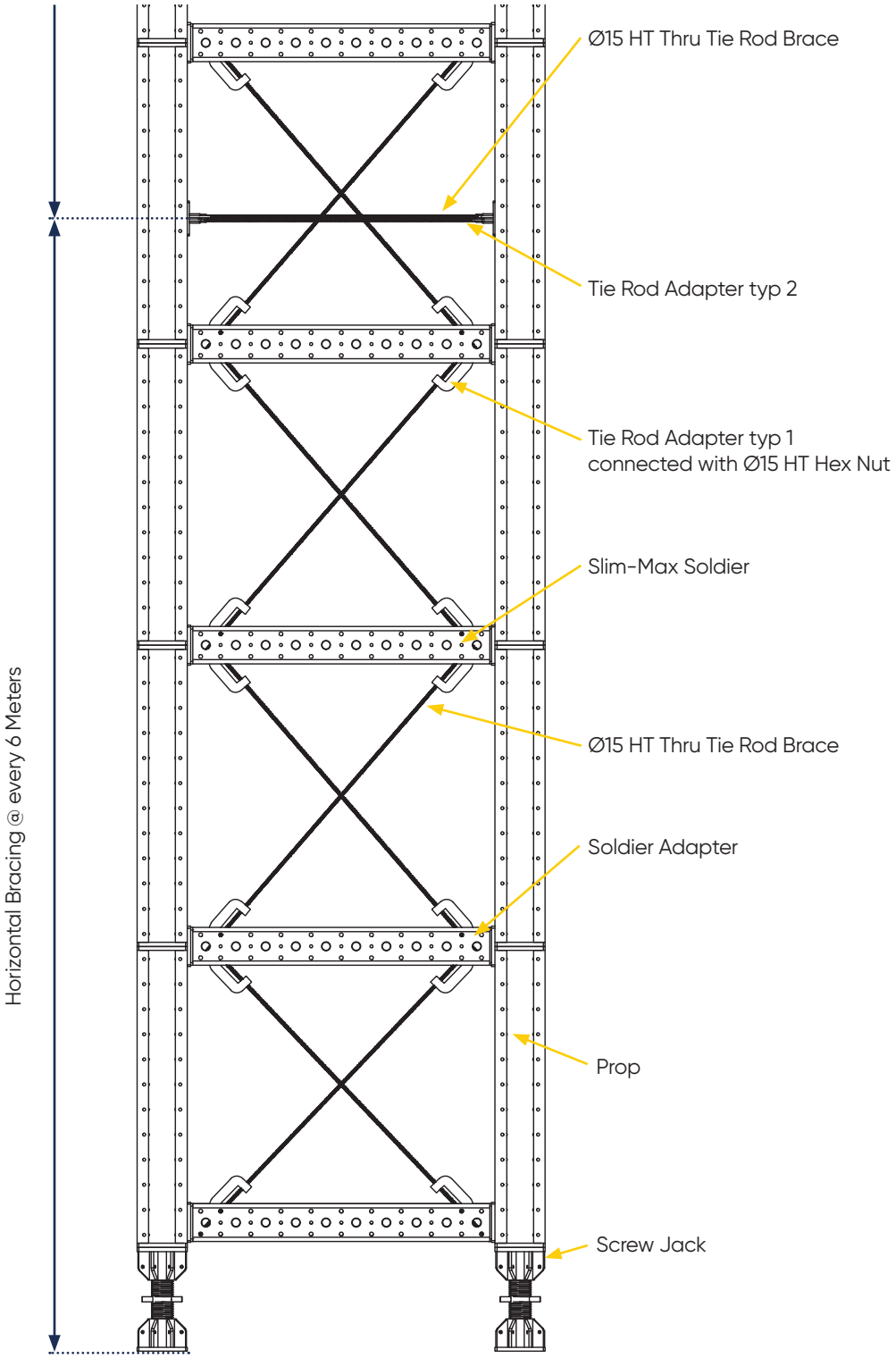


## 5. Assembly Details

### Tower Bracing

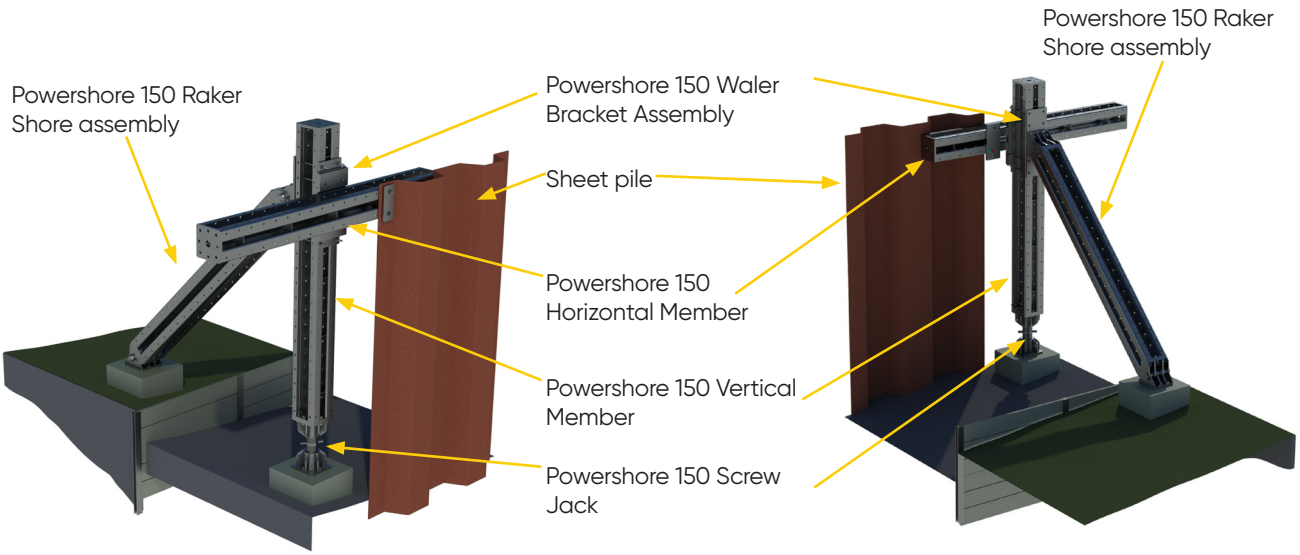


## 5. Assembly Details

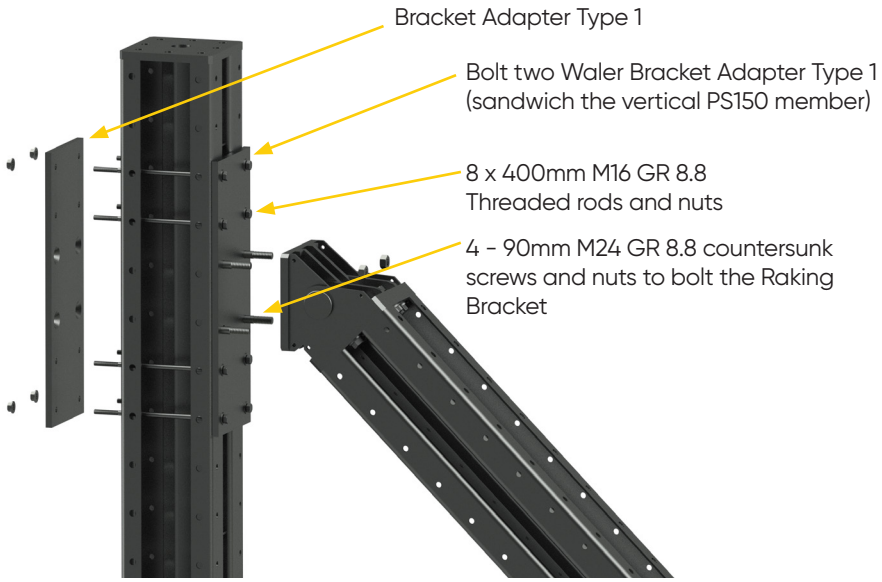
### Waler Brackets Assembly

A set of brackets and washers designed for support the Powershore 150 Beam when used as a waler to support sheet pile walls or similar.

Capacity of the bracket is 300kN compression load horizontally at the raker bracket connection. Capacities of the horizontal waler and diagonal members to be checked individually with the relevant technical data.



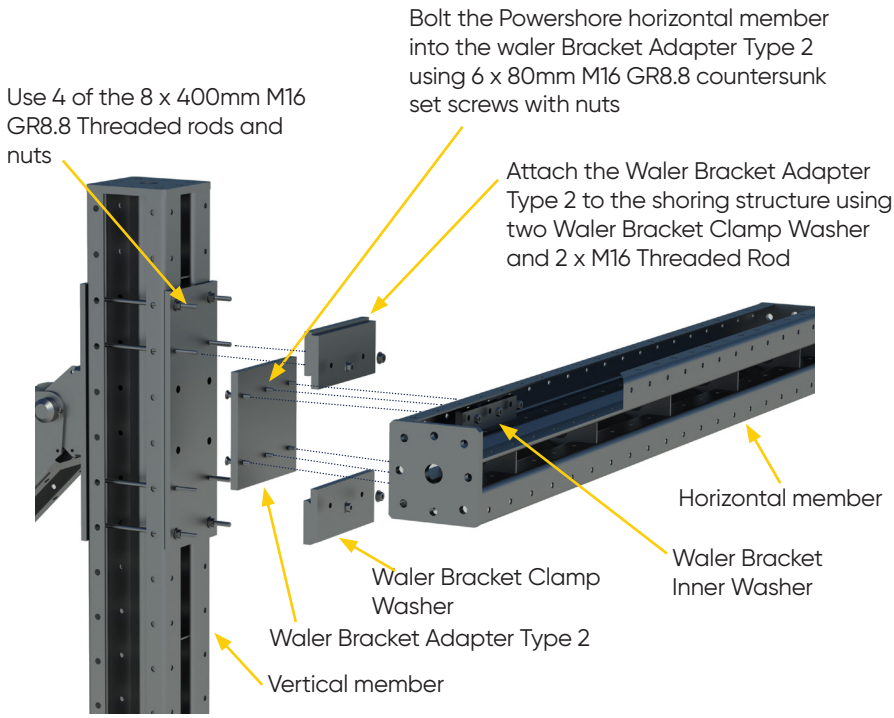

**Step 1**
Bolt two Waler Bracket Adapters Type 1 to the Powershore 150 Prop (Vertical Member). The two brackets Type 1 will sandwich the vertical Powershore 150 member and allow a point to attach the Powershore 150 Raker Bracket.



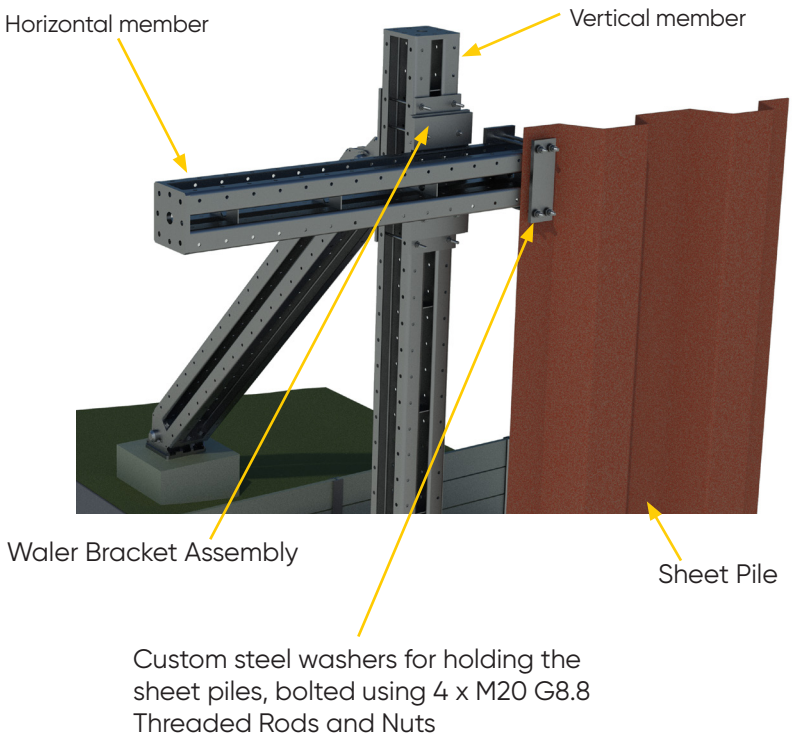
## 5. Assembly Details

### Waler Brackets Assembly

**Step 2**
Fix the horizontal Powershore 150 member to the vertical Powershore 150 member using The Waler Bracket Adapter Type 2, together with the Waler Bracket Inner Washer and waler bracket clamp washer.



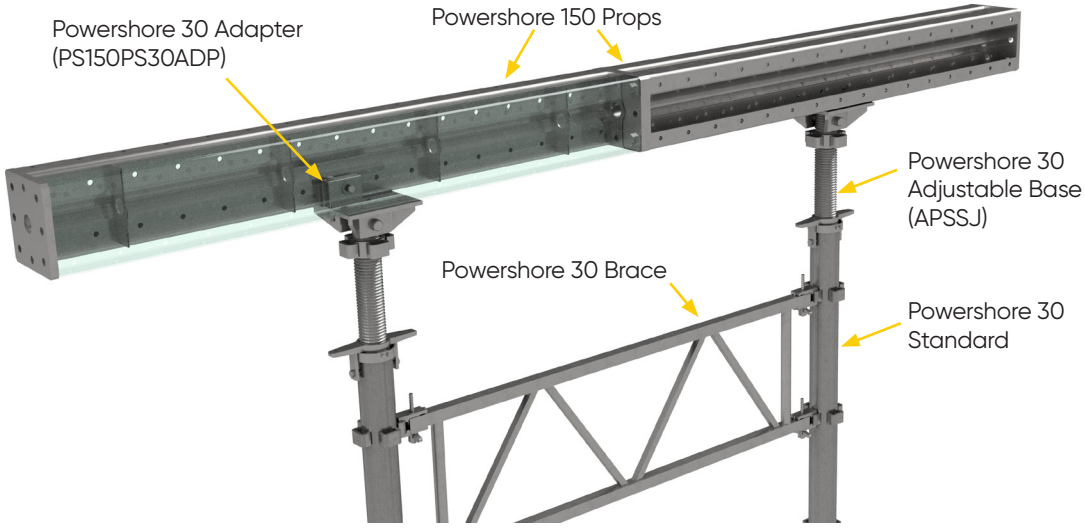

**Step 3**
Fix the sheet piles into the Powershore 150 horizontal member using custom steel washers. Commonly used steel washers is 2 x 450mm x 200 wide by 25mm thick bolted using 4 x M20 GR 8.8 Threaded rods and nuts.

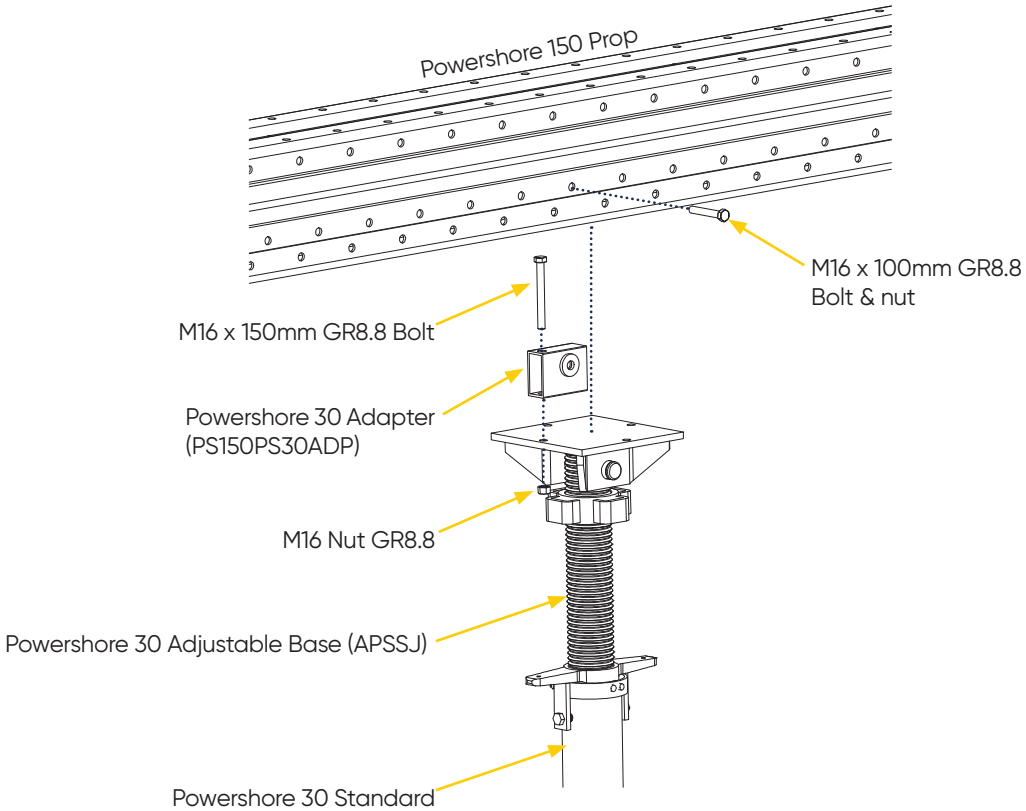


## 5. Assembly Details

### Powershore 150 Prop Adapter to Powershore 30 Prop

The Powershore 30 adapter (PS150PS30ADP) enables the use of Powershore 30 standards to be integrated into the Powershore 150 system. The adapter is screwed down onto the Powershore 30 adjustable base with one M16 x 150mm gr8.8 bolt and nut. The Powershore 150 prop is positioned on top of the adjustable base, ensuring the Powershore 30 adapter is directly in the center. The prop is fixed off with one M16 x 100mm gr 8.8 bolt and nut through the Powershore 30 adapter center hole.



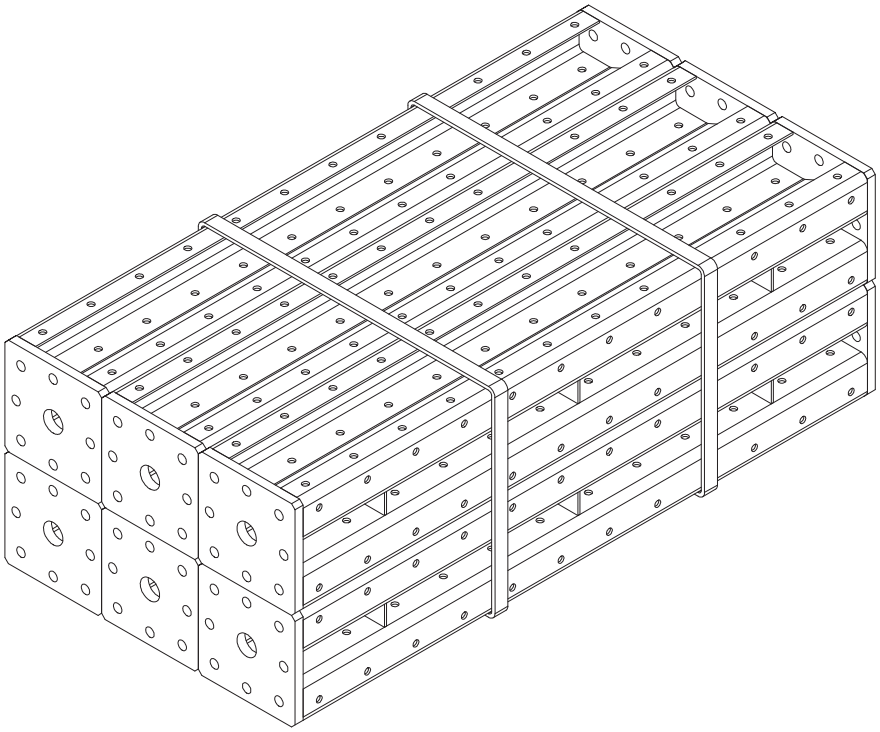
# 6. TRANSPORT & HANDLING

## 6. Transport & Handling

### Powershore 150 Props

The Acrow stillage is used to store a set number of items per a stillage. When a stillage is not used ensure items are bundled and placed on suitable dunnage. Items should be stored in a particular way to prevent them from falling off the stillage. The recommended method and process is:

- Stack items next to and on top to each other.
- Only pack and stack similar matching lengths per stillage/bundle. Do not mix different sizes or types in one stillage/bundle.
- Ensure every stillage/bundle load does not exceed the advised table below.
- Secure assembled items onto stillage/bundle by using at least two straps or plastic wrapped for enclosed stillages (two straps for enclosed stillage not applicable).
- Refer to Acrow Scaffold Stillage Transport and Manual Handling Document for further stacking and transport recommendations.



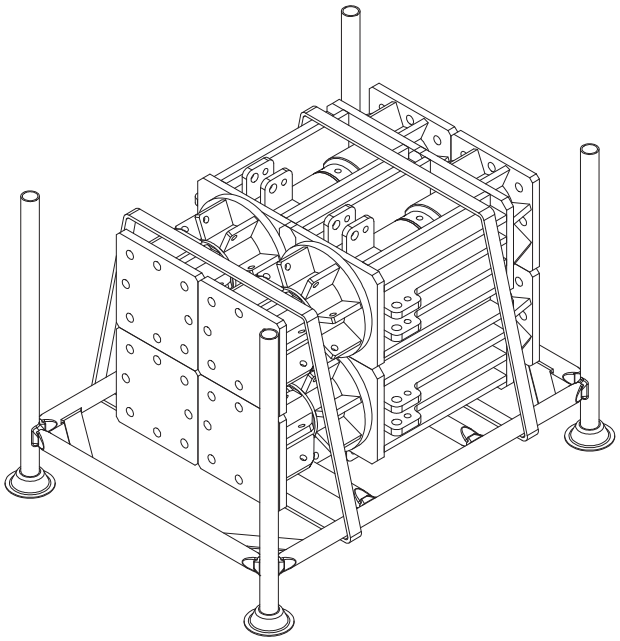
| DESCRIPTION | UNIT MASS (KG) | QTY / STILLAGE | TOTAL MASS / STILLAGE (KG) | ACROW STILLAGE TYPE |
|---|---|---|---|---|
| 100mm | 35.4 | 24 | 840 | Bundle |
| 300mm | 46.9 | 12 | 562 | Bundle |
| 600mm | 65.0 | 12 | 780 | Bundle |
| 1200mm | 100.6 | 6 | 600 | Bundle |
| 1800mm | 136.2 | 6 | 818 | Bundle |
| 2400mm | 171.7 | 6 | 1026 | Bundle |
| Inner Leg 780mm | 16.4 | 25 | 450 | MEP |

# 6. Transport & Handling

## Powershore 150 Jacks

The Acrow stillage is used to store a set number of items per a stillage. Items should be stored in a particular way to prevent them from falling off the stillage. The recommended method and process is:

- Stack items next to and on top to each other.
- Only pack and stack similar matching lengths per stillage. Do not mix different sizes or types in one stillage.
- Ensure every stillage load does not exceed the advised table below.
- Secure assembled items onto stillage by using at least two straps or plastic wrapped for enclosed stillages (two straps for enclosed stillage not applicable).
- Refer to Acrow Scaffold Stillage Transport and Manual Handling Document for further stacking and transport recommendations.



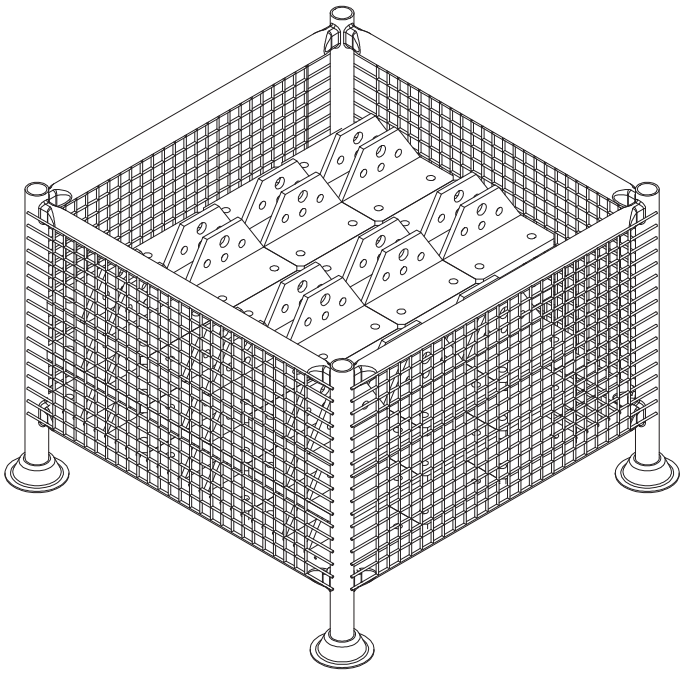
| DESCRIPTION | UNIT MASS (KG) | QTY PER STILLAGE | TOTAL MASS PER STILLAGE (KG) | ACROW STILLAGE TYPE |
|---|---|---|---|---|
| 1500 kN Screw Jack | 108.6 | 3 | 470 | MEP |
| 1500 kN Hydraulic Jack | 331.0 | 4 | 993 | SP |

# 6. Transport & Handling

## Powershore 150 Adapters

The Acrow stillage is used to store a set number of items per a stillage. Items should be stored in a particular way to prevent them from falling off the stillage.
The recommended method and process is:

- Stack items next to and on top to each other.
- Only pack and stack similar matching lengths per stillage. Do not mix different sizes or types in one stillage.
- Ensure every stillage load does not exceed the advised table below.
- Secure assembled items onto stillage by using at least two straps or plastic wrapped for enclosed stillages (two straps for enclosed stillage not applicable).
- Refer to Acrow Scaffold Stillage Transport and Manual Handling Document for further stacking and transport recommendations.

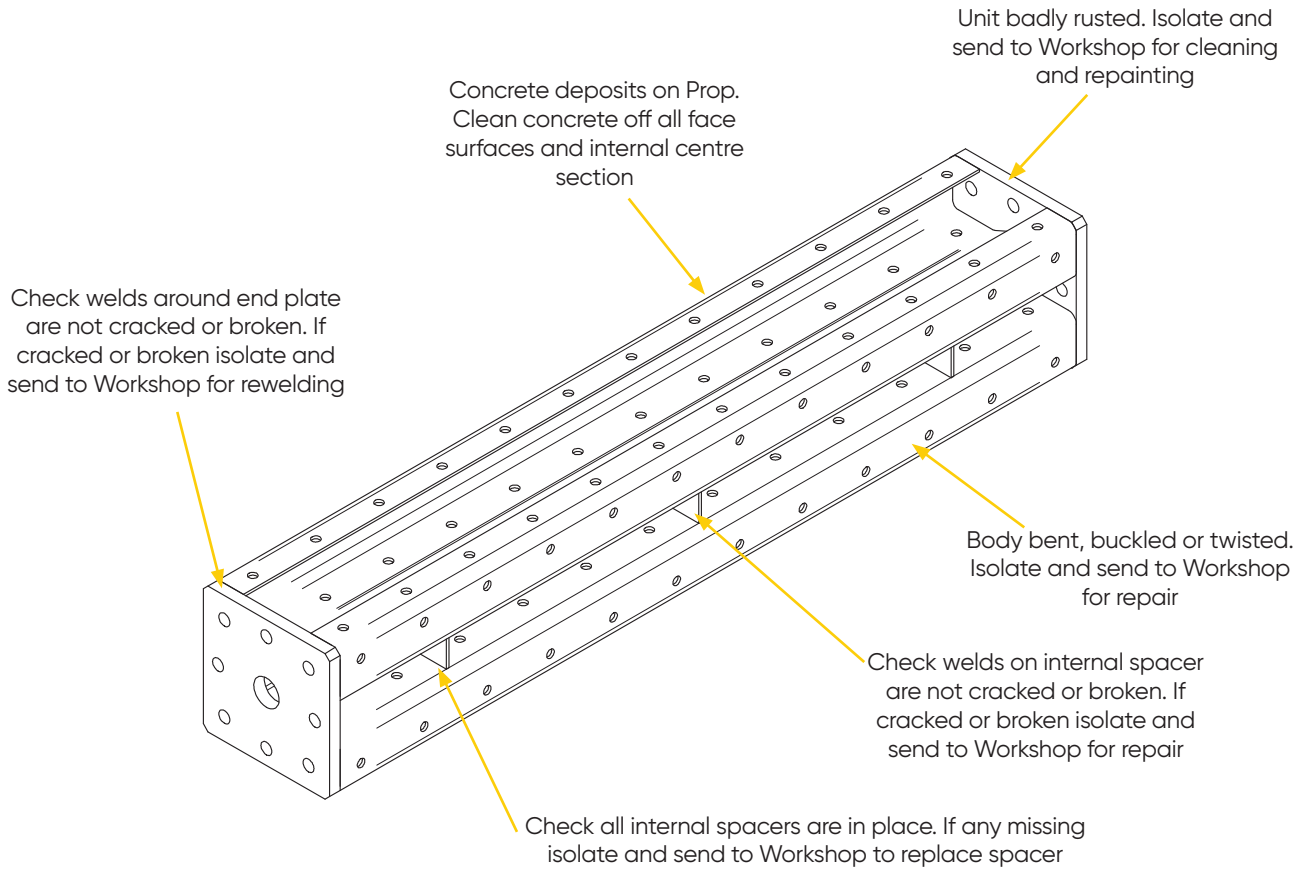


| DESCRIPTION | UNIT MASS (KG) | QTY PER STILLAGE | TOTAL MASS PER STILLAGE (KG) | ACROW STILLAGE TYPE |
|---|---|---|---|---|
| Brace Adapter | 14.7 | 30 | 480 | MEP |
| End Plate Adapter | 17.0 | 25 | 465 | MEP |
| Soldier Adapter | 10.4 | 40 | 450 | MEP |
| Jack Brace Adapter | 54.9 | 8 | 475 | MEP |
| Turnbuckle Adapter | 12.9 | 35 | 500 | MEP |
| Tie Bar Adapter | 5.1 | 100 | 510 | MEP |
| Tie Bar Adapter Fixed | 1 | 300 | 300 | MEP |

# 7. MAINTENANCE & INSPECTION

## 7. Maintenance & Inspection

### Props



# 7. Maintenance & Inspection

## Props Inspection

NAME: _____ CHECKED DATE: _____

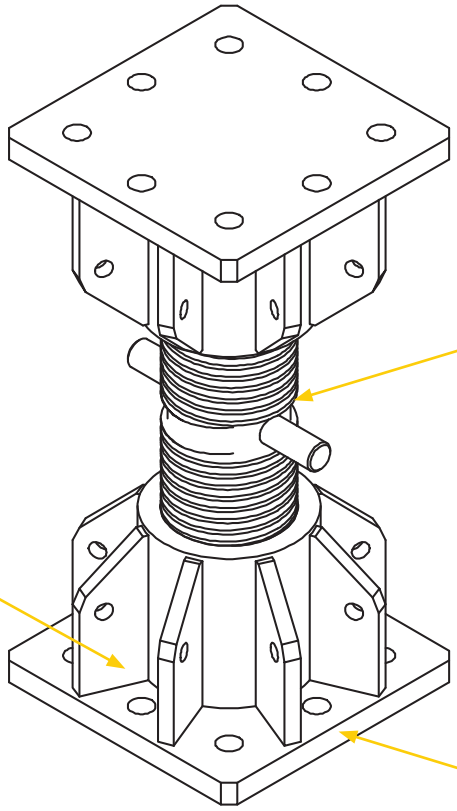
Generally, visual inspection checking for the possible faults listed below. Please tick or cross the checked box.

| POSSIBLE FAULTS | DAMAGE LIMITS FOR REPAIR | RECOMMENDED ACTION | CHECKED |
|---|---|---|---|
| Body bent, buckled or twisted | Prop must be straight with no twists or buckles | Straighten on flypress and/or panel beat to remove buckle. If twisted unit must be scrapped. Units with a damaged end may be cut back to smaller size. See Work Instruction "Converting to smaller size" | |
| Internal spacer missing | All spacers must be in place | Replace by welding on new spacer | |
| Cracked or broken weld on spacer | No broken or cracked welds permitted | Grind back and reweld* (* See WI –GE-103) | |
| Cracked or broken weld around end plate | No broken or cracked welds permitted | Grind back and reweld* (* See WI –GE-103) | |
| Unit badly rusted | Rusty appearance gives customer impression of unit being not up to strength. | Clean and repaint | |
| Concrete deposits | Edges of Prop must be free of concrete deposits. End plates must also be free of concrete | Remove any deposits from edges and end plates and any deposits which will cause other problems | |
| Note: When re-welding cracked welds Work Instruction WI-GE-100 details must be followed | | | |

Issues / Notes:

## 7. Maintenance & Inspection

Screw Jack



# 7. Maintenance & Inspection

## Screw Jack Inspection

NAME: _____ CHECKED DATE: _____

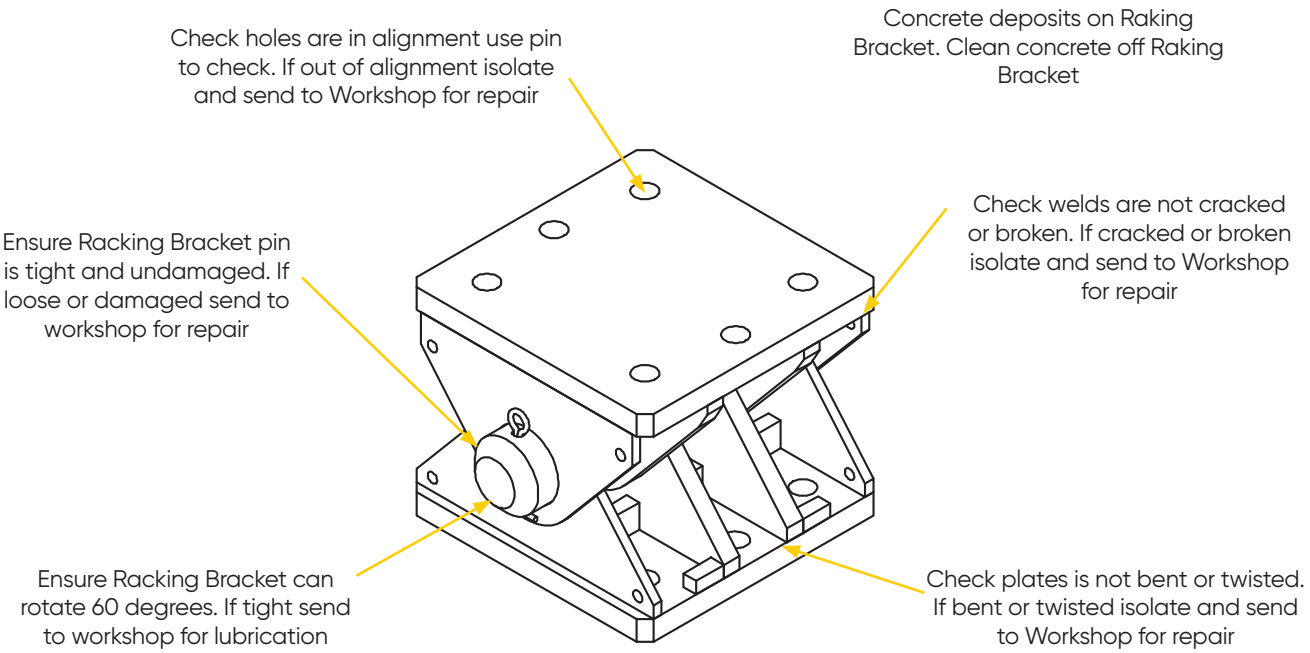
Generally, visual inspection checking for the possible faults listed below. Please tick or cross the checked box.

| POSSIBLE FAULTS | DAMAGE LIMITS FOR REPAIR | RECOMMENDED ACTION | CHECKED |
|---|---|---|---|
| Base plate bent or twisted | Base plate must be straight and free of twist | Straighten if possible otherwise scrap* (*See WI-GE-103) | |
| Welds broken or cracked | All welds must be intact | Grind back & re-weld* (* See WI-GE-100) | |
| Shaft does not run freely | Shaft must run freely in both units | Find problem and rectify oil thread | |
| Concrete deposits on jack | Jack must be free of all concrete | Clean off all concrete with scraper or wire brush | |
| Note: When re-welding cracked welds Work Instruction WI-GE-100 details must be followed | | | |

Issues / Notes:

## 7. Maintenance & Inspection

### Raking Bracket



# 7. Maintenance & Inspection

## Raking Bracket Inspection

NAME: _____ CHECKED DATE: _____

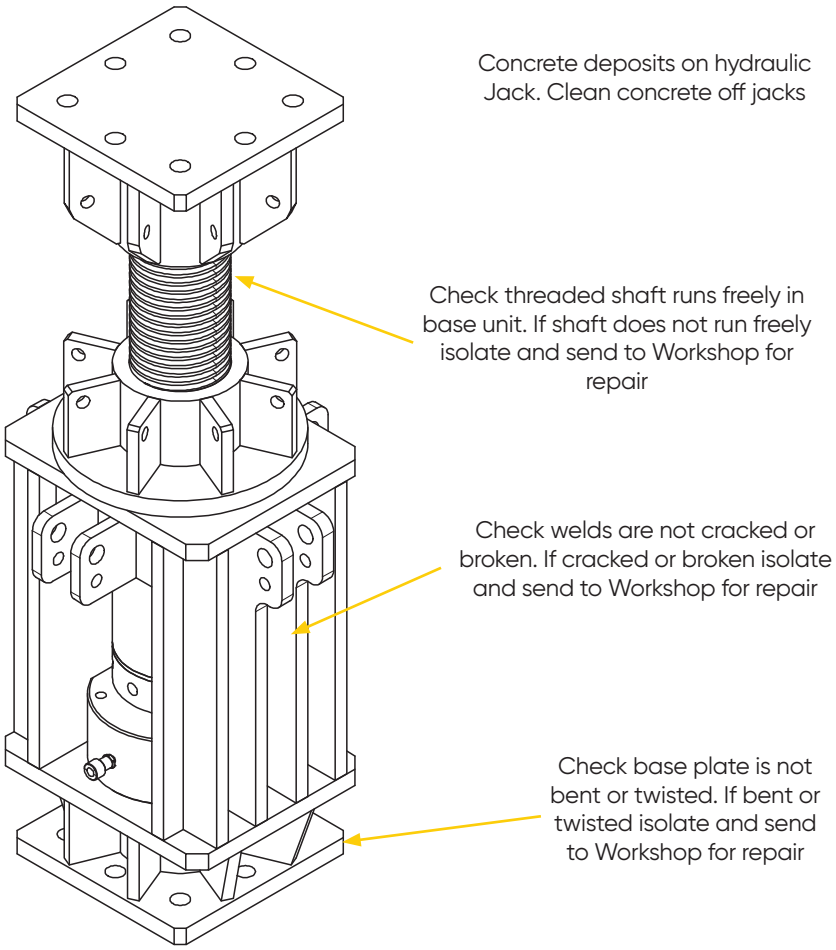
Generally, visual inspection checking for the possible faults listed below. Please tick or cross the checked box.

| POSSIBLE FAULTS | DAMAGE LIMITS FOR REPAIR | RECOMMENDED ACTION | CHECKED |
|---|---|---|---|
| Holes are out of alignment | Holes must be in alignment | Find source of problem and rectify or re drill | |
| Concrete deposits on Bracket | Bracket must be free of all concrete | Clean off all concrete with scraper or wire brush | |
| Plates bent or twisted | Plates must be straight and free of twist | Straighten if possible otherwise scrap* (*See WI-GE-103) | |
| Welds broken or cracked | All welds must be intact | Grind back & re-weld* (* See WI-GE-100) | |
| Bracket pin is missing or damaged | Pin must be in place | Replace or fix pin | |
| Bracket cannot rotate 60 Degrees | Bracket must be able to move | Find issue and lubricate Axel | |
| Note: When re-welding cracked welds Work Instruction WI-GE-100 details must be followed | | | |

Issues / Notes:

## 7. Maintenance & Inspection

Hydraulic Jack



## 7. Maintenance & Inspection

### Hydraulic Jack Inspection

NAME: _____ CHECKED DATE: _____

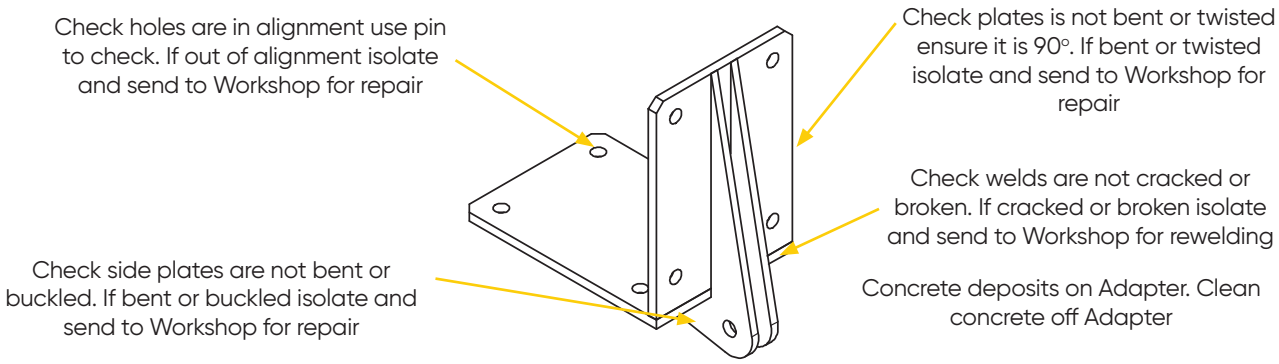
Generally, visual inspection checking for the possible faults listed below. Please tick or cross the checked box.

| POSSIBLE FAULTS | DAMAGE LIMITS FOR REPAIR | RECOMMENDED ACTION | CHECKED |
|---|---|---|---|
| Base plate bent or twisted | Base plate must be straight and free of twist | Straighten if possible otherwise scrap* (*See WI-GE-103) | |
| Welds broken or cracked | All welds must be intact | Grind back & re-weld* (* See WI-GE-100) | |
| Shaft does not run freely | Shaft must run freely in both units | Find problem and rectify oil thread | |
| Concrete deposits on jack | Jack must be free of all concrete | Clean off all concrete with scraper or wire brush | |
| Note: When re-welding cracked welds Work Instruction WI-GE-100 details must be followed | | | |

Issues / Notes:

# 7. Maintenance & Inspection

## Brace Adapter




## Brace Adapter Inspection

NAME: _____ CHECKED DATE: _____

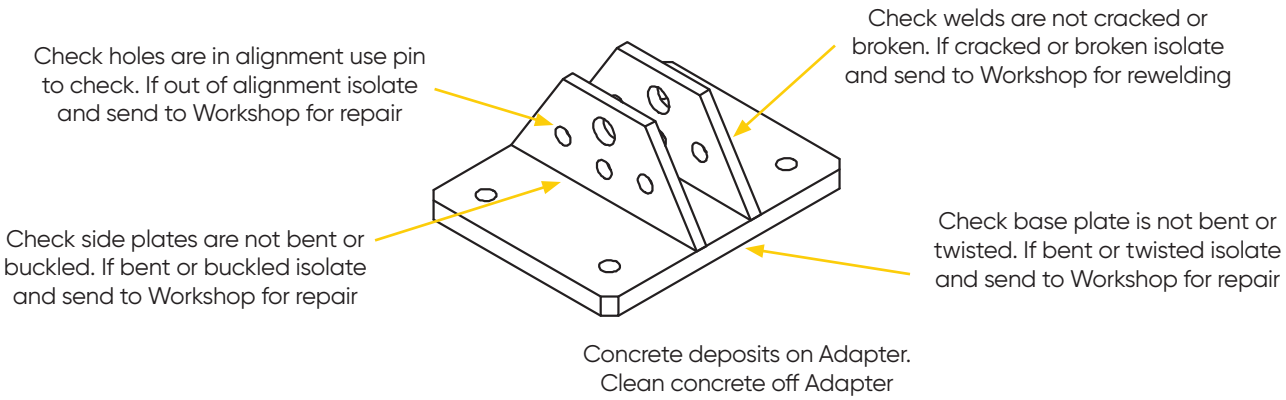
Generally, visual inspection checking for the possible faults listed below. Please tick or cross the checked box.

| POSSIBLE FAULTS | DAMAGE LIMITS FOR REPAIR | RECOMMENDED ACTION | CHECKED |
|---|---|---|---|
| Side plates bent or buckled | Side plate must be straight and parallel | Straighten, if not possible then scrap | |
| Welds broken or cracked | All welds must be intact | Grind back & reweld | |
| Plate bent or buckled | Plate must be 90 Degrees | Straighten, if not possible then scrap | |
| Concrete deposits on Adapter | Adapter must be free of all concrete | Clean off all concrete with scraper, chisel or wire brush | |
| Holes are out of alignment | Holes must be in alignment | Find source of problem and rectify or re drill | |
| Note: When re-welding cracked welds Work Instruction WI-GE-100 details must be followed | | | |

Issues / Notes:

# 7. Maintenance & Inspection

## Turnbuckle Adapter




## Turnbuckle Adapter Inspection

NAME: _____ CHECKED DATE: _____

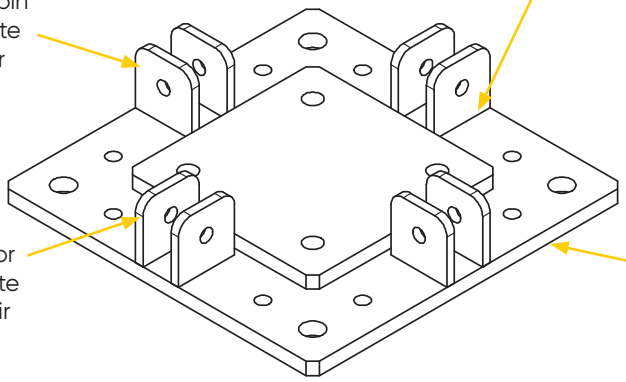
Generally, visual inspection checking for the possible faults listed below. Please tick or cross the checked box.

| POSSIBLE FAULTS | DAMAGE LIMITS FOR REPAIR | RECOMMENDED ACTION | CHECKED |
|---|---|---|---|
| Side plates bent or buckled | Side plate must be straight and parallel | Straighten, if not possible then scrap | |
| Welds broken or cracked | All welds must be intact | Grind back & reweld* (* See W.I. 146) | |
| Base plate bent or buckled | Bass plate must be straight | Straighten, if not possible then scrap | |
| Concrete deposits on Adapter | Adapter must be free of all concrete | Clean off all concrete with scraper, chisel or wire brush | |
| Holes are out of alignment | Holes must be in alignment | Find source of problem and rectify or re drill | |
| Note: When re-welding cracked welds Work Instruction WI-GE-100 details must be followed | | | |

Issues / Notes:

# 7. Maintenance & Inspection

## Jack Brace Adapter




## Jack Brace Adapter

NAME: _____ CHECKED DATE: _____

Generally, visual inspection checking for the possible faults listed below. Please tick or cross the checked box.

| POSSIBLE FAULTS | DAMAGE LIMITS FOR REPAIR | RECOMMENDED ACTION | CHECKED |
|---|---|---|---|
| Base plates bent or buckled | Base plate must be straight | Straighten, if not possible then scrap | |
| Welds broken or cracked | All welds must be intact | Grind back & reweld | |
| Tab plates bent or buckled | Sides plate must be straight and parallel | Straighten, if not possible then scrap | |
| Concrete deposits on Adapter | Adapter must be free of all concrete | Clean off all concrete with scraper, chisel or wire brush | |
| Holes are out of alignment | Holes must be in alignment | Find source of problem and rectify or re drill | |
| Note: When re-welding cracked welds Work Instruction WI-GE-100 details must be followed | | | |

Issues / Notes:

# LOCATIONS

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St Marys NSW 2760
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ENGINEERING & CONSTRUCTION

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