



Quadshore™ 50

Medium-duty propping system

Technical Data

Dec 2023 V1

Coates

ENGINEERING SOLUTIONS

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1. Preface

This document contains the technical data for the patented Quadshore 50 propping system. It includes general information about Quadshore 50, followed by technical information of main modules, various types of Screw Jacks, Flat Head, Transfer Fixing Plate, Needle Beam Clamp, Universal Connector and Four-Legged Tower. It also contains various curves depicting Working Load Limits (WLL) of Quadshore 50 under both vertical and horizontal mounting conditions.

The certified Quadshore 50 is the outcome of the research partnership between Coates Engineering Solutions and Monash University. The contribution of both organisations, in particular the following, are acknowledged:

Coates Engineering Solutions

Mr Rafi Tchopourian

Mr Sudhir Raina

Mr Rex Turner

Monash University

Assoc. Prof. Amin Heidarpour

Mr Esmail Pournamazian Najafabadi

2. General Description

The patented Quadshore 50 (Q50) was developed to create a temporary structural support system consisting of simple propping, raking struts and high-rise tower systems. The Quadshore 50 system can carry loads of up to 60 tonnes.

Main modules are made out of four high-strength steel tubes plus laces, battens and diagonal holders. The modules are available in four lengths: 250mm, 1250mm, 1500mm and 2000mm. Modules are assembled using a state-of-the-art Twistlock Boltless Connection which increases assembly efficiency and decreases usage costs.

With the help of different complementary elements designed for Q50 modules, several assemblies can be formed for different applications as shown below:



Class 1



Class 2



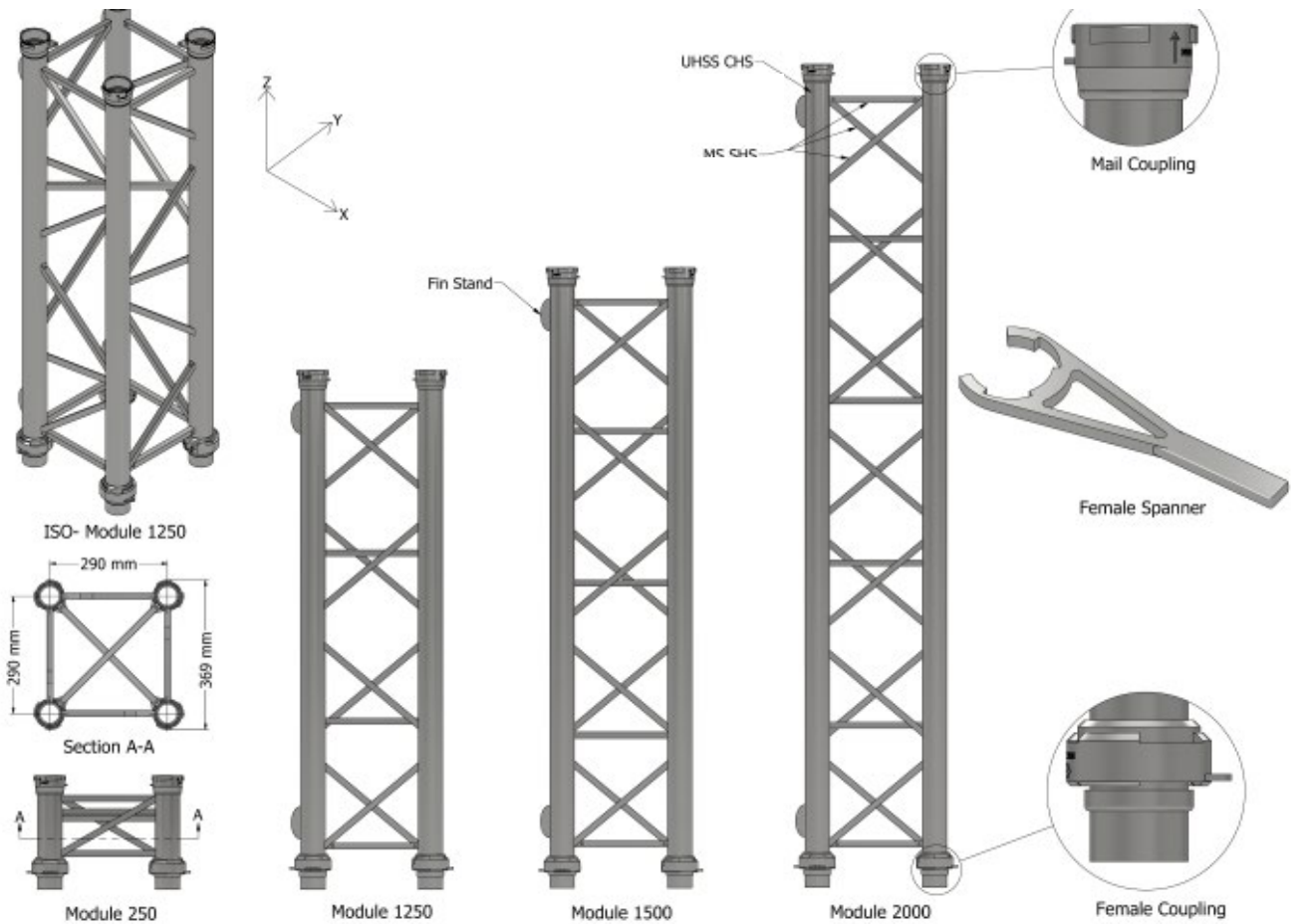
Class 3



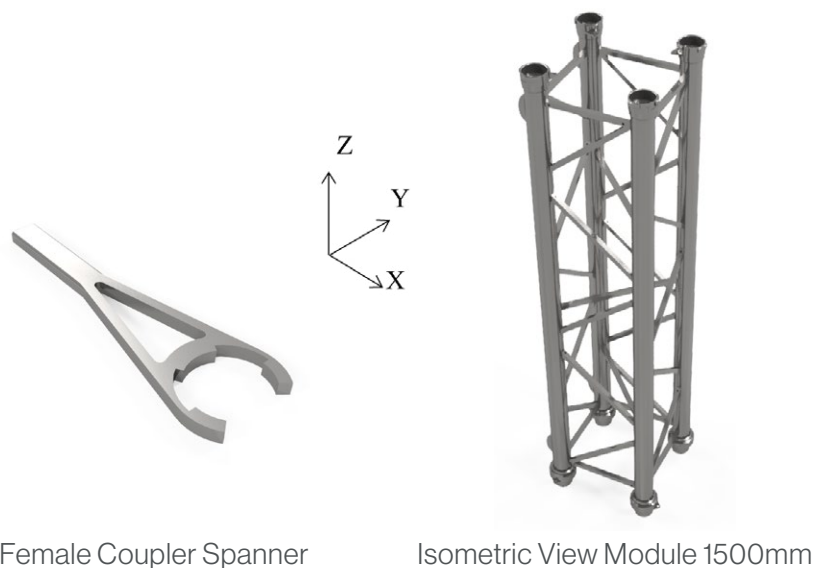
Class 4

3. Main Modules

This section outlines different Q50 modules. High-strength steel (HSS) circular hollow tubes were used as main load bearing elements of the models brought together through square hollow section laces. Modules with lengths of 250mm, 1250mm, 1500mm and 2000mm are currently available for the Q50 system. These modules can be interconnected using the Twistlock Boltless Connections. A Female Coupler spanner can be used for ease of assembly/disassembly, if required. Fin stands exist on one side of modules for ease of assembly and sliding the modules on the ground.



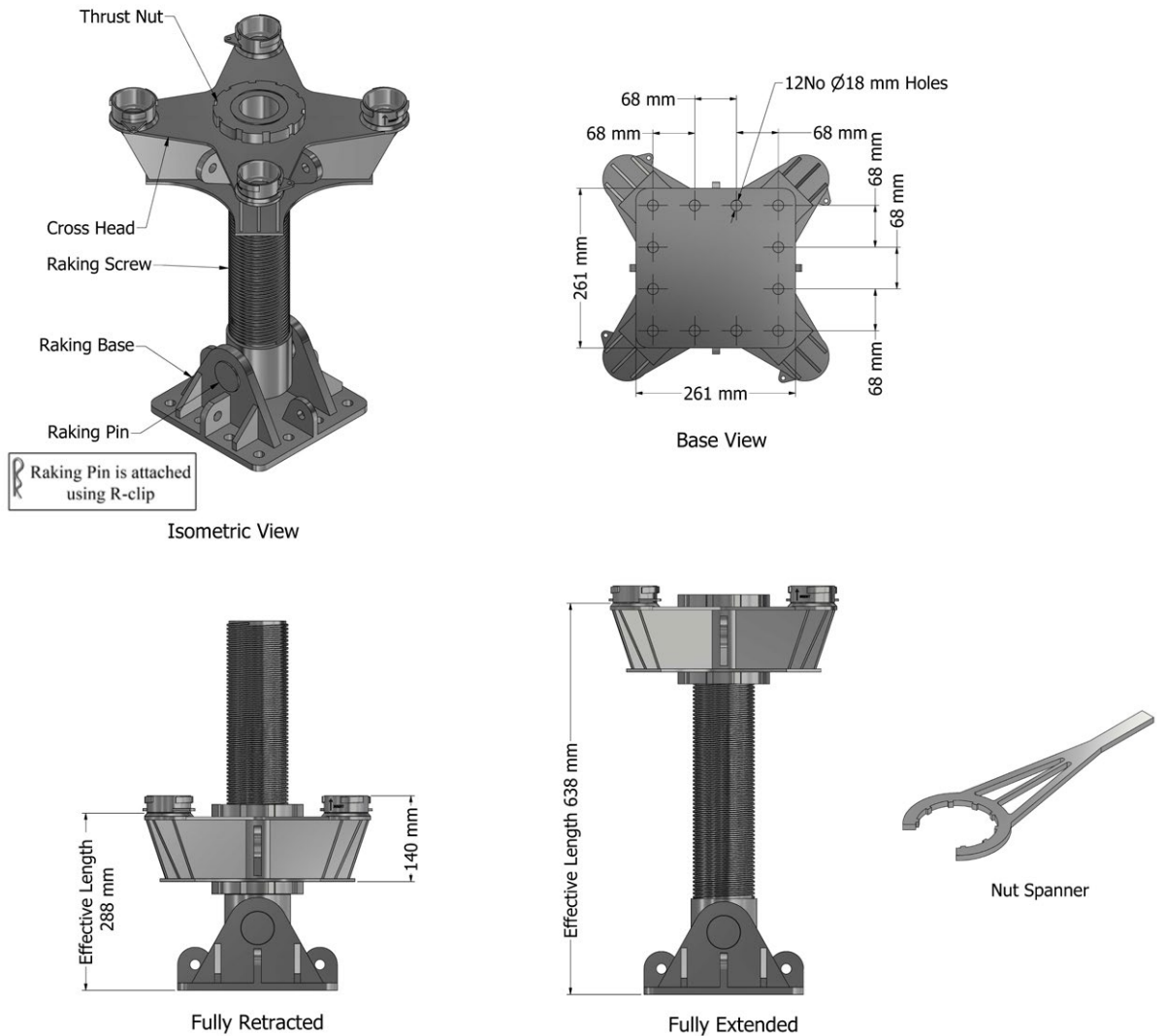
Module	Weight
2000mm	35 kg
1500mm	27 kg
1250mm	23 kg
250mm	8.9 kg



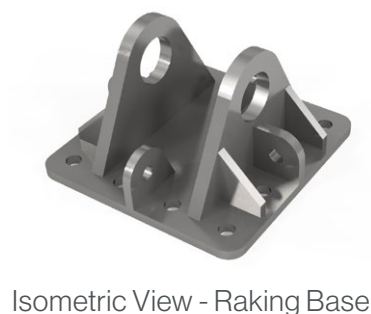
4. Raking Base Jack

Raking Base Jack (WLL = 60 tonne-force) is a medium-duty screw jack used for adjusting Q50 props. Adjustment starts from 288mm to a maximum allowable extension of 638mm. The Base Jack is connected to prop modules and supporting substrate using the Cross Head and the Raking Base respectively. Fine length adjustment is done using the screw and 2 x thrust nuts. Thrust Nuts can be tightened using the Nut Spanner.

Raking Base can be connected to substrate through up to 12 x M16 bolts or anchors. The grade and number of bolts should be specified by a structural engineer experienced in design of temporary works based on loading and properties of bolts/anchors and substrate materials. The bolts or anchors should be evenly distributed and on all four sides. Prop assembly can be laterally braced using brace points on Cross Head and Raking Base.



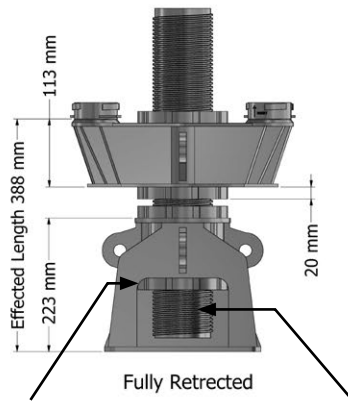
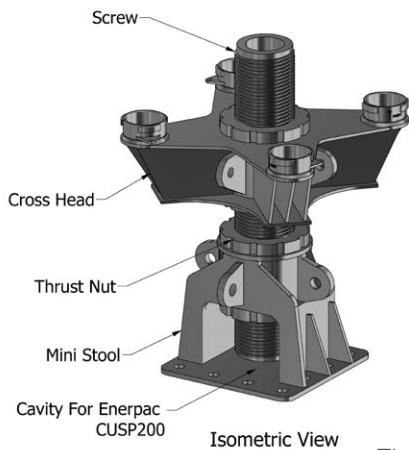
Component	Weight	Required to Build Raking Base Jack
Cross Head	16.8 kg	1
Thrust Nut	3 kg	2
Raking Screw	17 kg	1
Raking Base	11.9 kg	1
Raking Pin	2.9 kg	1



5. Base Jack with Mini-Stool

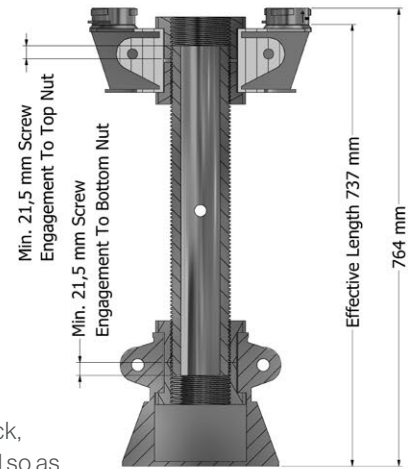
Base Jack with Mini-Stool (WLL = 60 tonne-force) is a medium-duty screw jack used for adjusting Q50 props. Adjustment starts from 388mm to a maximum allowable extension of 737mm. The Base Jack is connected to prop modules and supporting substrate using the Cross Head and the Mini-Stool respectively. Fine length adjustment is done using the screw and 4 x thrust nuts. Thrust nuts can be tightened using the Nut Spanner.

Mini-Stool can be connected to the main structure substrate through up to 12 x M16 bolts or anchors. The grade and number of bolts should be specified by a structural engineer experienced in design of temporary works based on loading and properties of bolts/anchors and substrate materials. The bolts or anchors should be evenly distributed and on all four sides. The prop assembly can be unloaded with minimum effort using the unloading Mini-Stool and RSM750 Enerpac Hydraulic Cylinder. Prop assembly can be laterally braced using brace points on Cross Head and Mini-Stool.

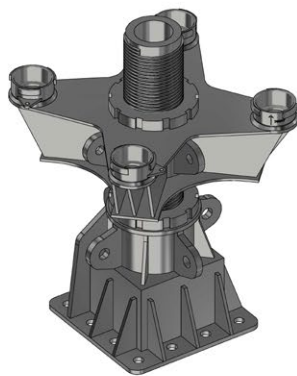


Thrust Nut has to be removed before attempting any lift.

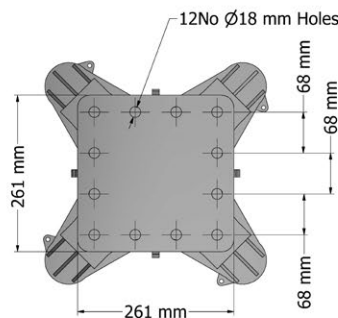
Note: Before loading Screw Jack, Screw should be fully extended so as to allow space for Hydraulic Cylinder.



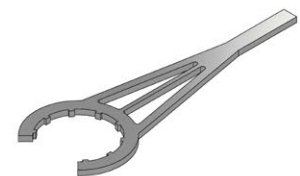
Section Fully Extended



Rear Isometric View

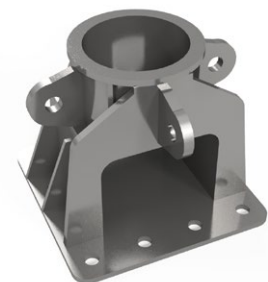


Base View



Nut Spanner

Component	Weight	Required to Build Raking Base Jack
Cross Head	16.8 kg	1
Thrust Nut	3 kg	4
Simple Screw	16.7 kg	1
Mini-Stool	14.8 kg	1
Raking Pin	2.9 kg	1

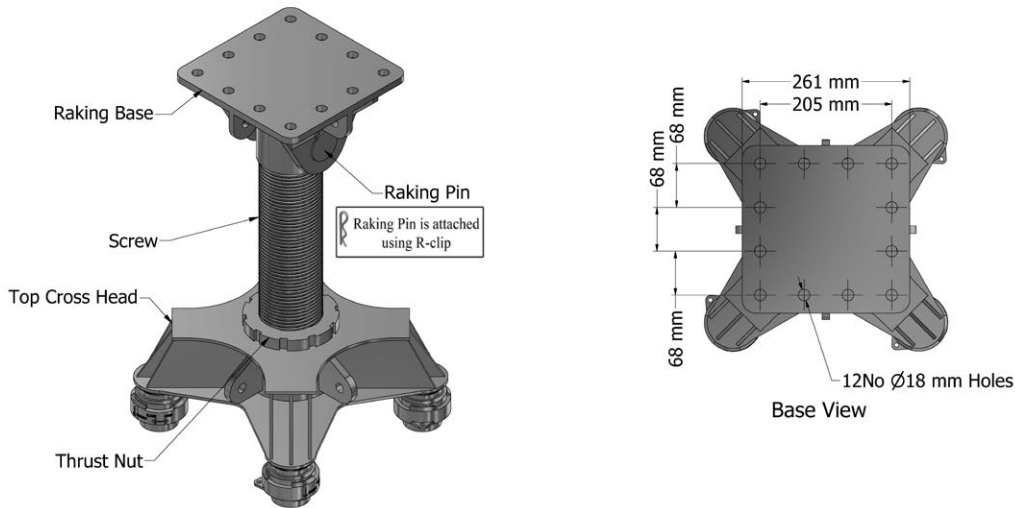


Isometric View - Mini-Stool

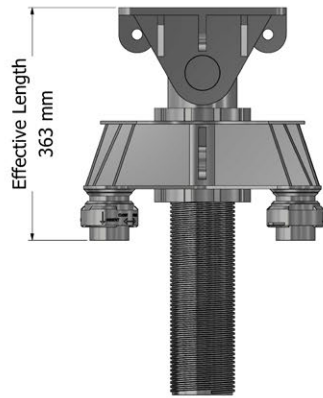
6. Top Jack

Top Jack (WLL = 60 tonne-force) is a medium-duty jack used for fine-tuning of Q50 props. Top Jack is connected to prop modules and supporting structure using Top Cross Head and Raking Base respectively. Fine length adjustment is done using the screw and 2 x thrust nuts. Adjustment starts from 363mm to a maximum allowable extension of 713mm. Nuts can be tightened using the Nut Spanner.

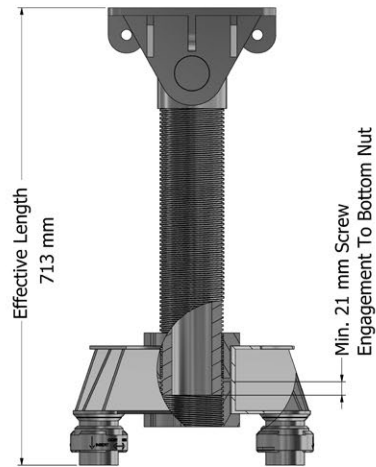
Raking Base can be connected to substrate through up to 12 x M16 bolts or anchors. The grade and number of bolts should be specified by a structural engineer experienced in design of temporary works based on loading and properties of bolts/anchors and propped structure materials. Number of bolts or anchors should be even and on all four sides. Prop assembly can be laterally braced using brace points on Top Cross Head and Raking Base.



Isometric View - Mini-Stool

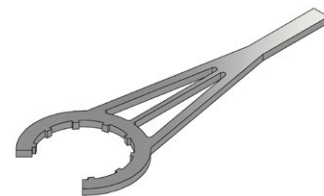


Fully Retracted



Fully Extended

Component	Weight	Required to Build Top Jack
Top Crosshead	19 kg	1
Thrust Nut	3 kg	2
Raking Screw	17 kg	1
Raking Base	11.9 kg	1
Raking Pin	2.9 kg	1

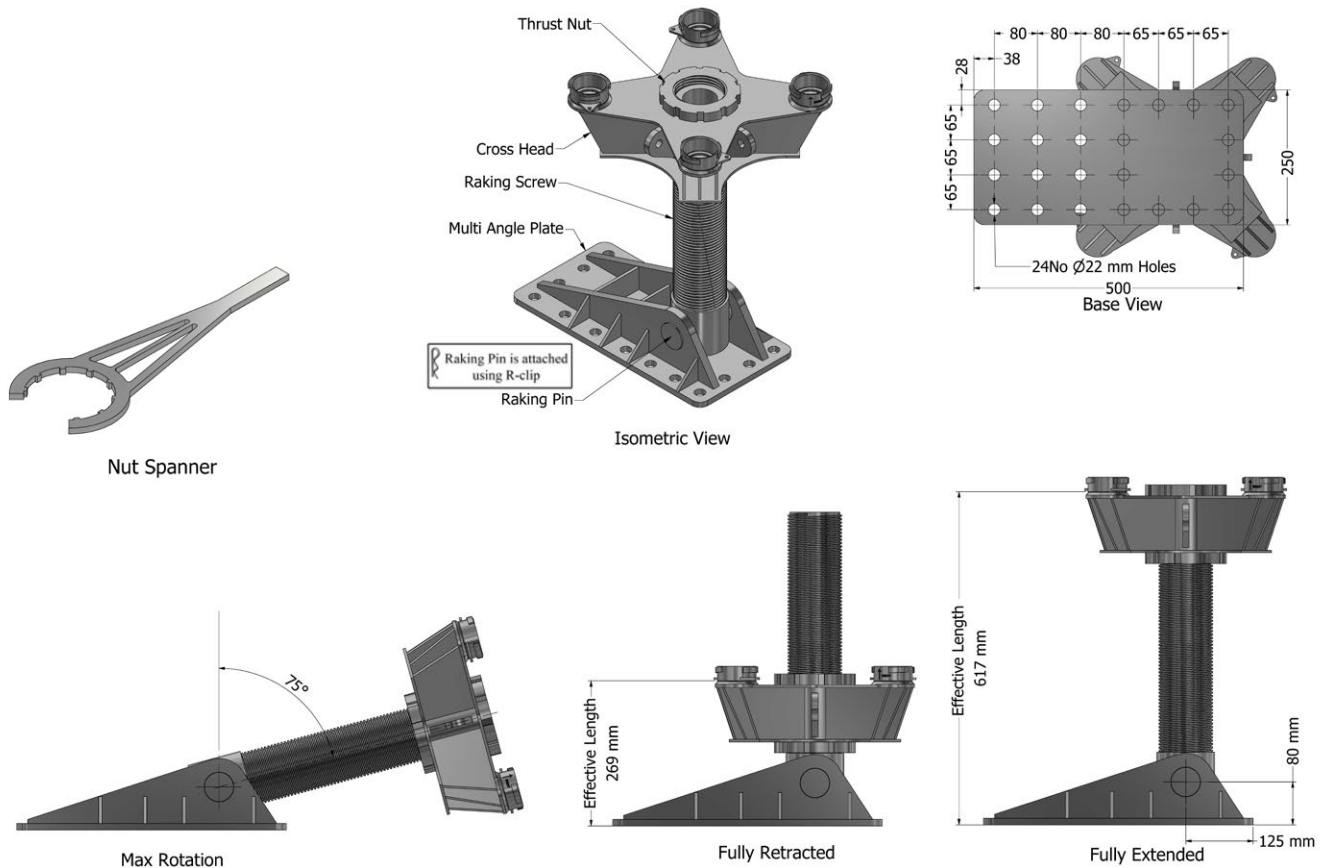


Nut Spanner

7. Multi-Angle Jack

Multi-Angle Jack (WLL = 60 tonne-force) is a medium-duty jack used for installing Q50 props in angles up to 75 degrees from vertical. Multi-Angle Jack is connected to prop modules and supporting substrate using Cross Heads and Multi Angle Plates respectively. Fine length adjustment is done using the screw and 2 x thrust nuts. Adjustment starts from 269mm to a maximum allowable extension of 617mm. Nuts can be tightened using the Nut Spanner.

Multi Angle Plate can be connected to substrate through up to 24 x M20 bolts or anchors. The grade and number of bolts should be specified by a structural engineer experienced in design of temporary works based on loading and properties of bolts/anchors and substrate materials.



Component	Weight	Required to Build Multi Angle Base Jack
Cross Head	16.8 kg	1
Thrust Nut	3 kg	2
Raking Screw	17 kg	1
Multi Angle Plate	20 kg	1
Raking Pin	2.9 kg	1

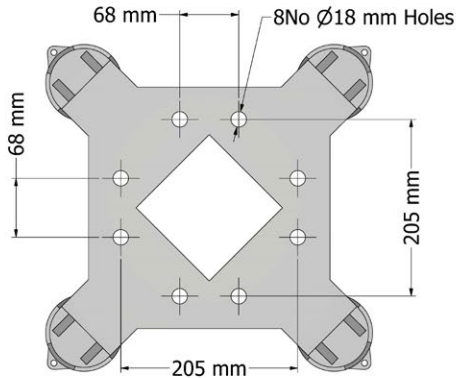


Isometric View - Multi-Angle Plate

Note: Multi Angle Top Jack can be built by replacing Cross Head with Top Cross Head in above Table

8. Flat Head

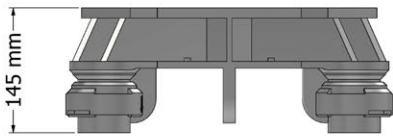
Flat Head (WLL = 60 tonne-force) is used to connect top of prop assembly to main structure using 8 x M16 anchors or bolts (see Assembly Class 1). The grade and number of bolts should be specified by a structural engineer experienced in design of temporary works based on loading and properties of bolts/anchors and materials of main structure. Bolts or anchors should be evenly distributed and on all four sides.



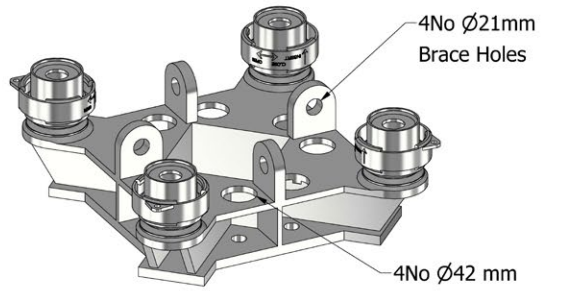
Top View



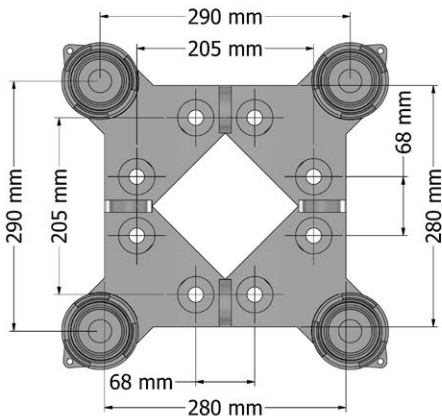
Isometric View



Side View



Bottom Isometric View

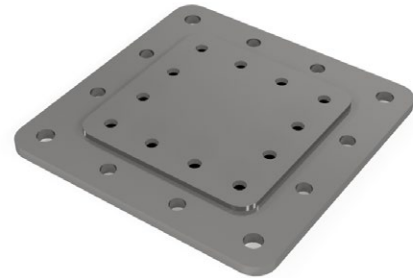
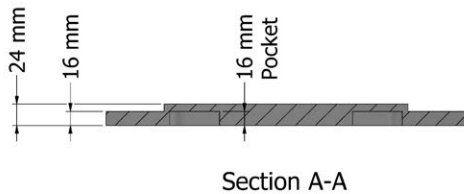


Bottom View

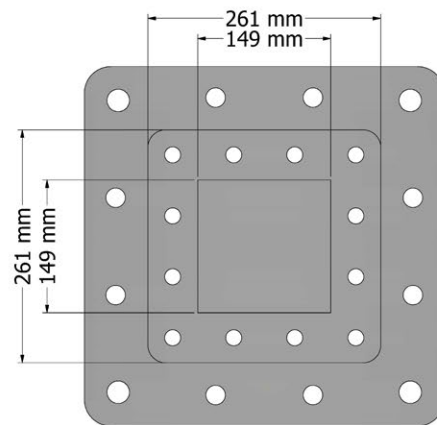
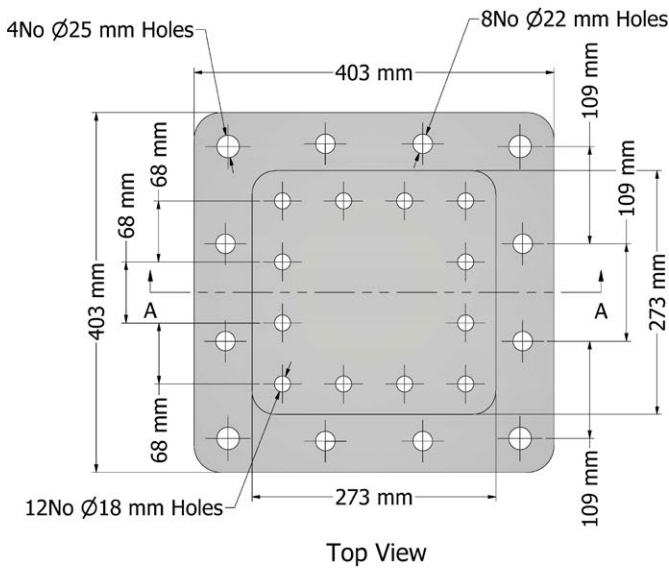
Component	Weight
Flat Head	21 kg

9. Transfer Fixing Plate

The Transfer Fixing Plate (WLL = 60 tonne-force) is used to connect Q50 end plates to substrate structures for ease of anchoring and better load transfer. It is designed to be compatible with Mini-Stool, Flat Head and Raking Base, through 12 x M16 bolts. The bracket can be connected to substrate through up to 8 x M20 plus 4 x M24 bolts or anchors. The grade and number of bolts, as well as actual working load, should be specified by a structural engineer experienced in design of temporary works based on loading and properties of bolts/anchors and substrate materials. Bolts or anchors should be evenly distributed and on all four sides.



Isometric View

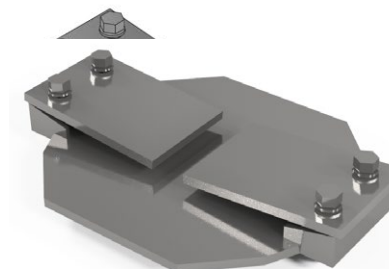
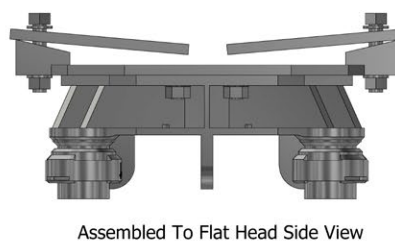
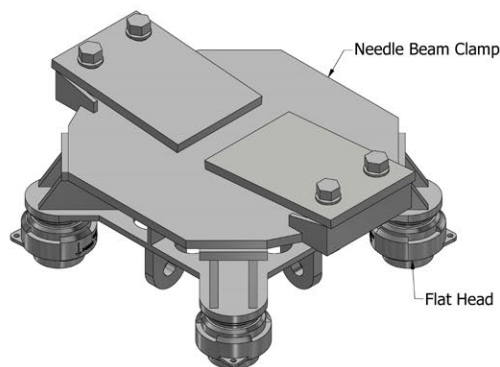
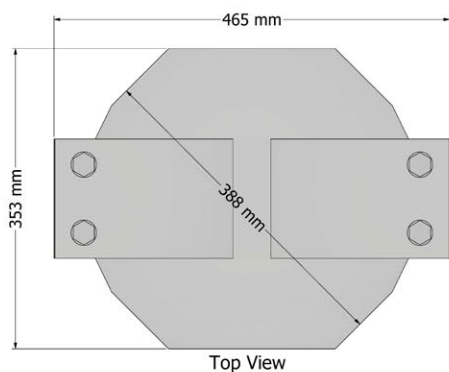
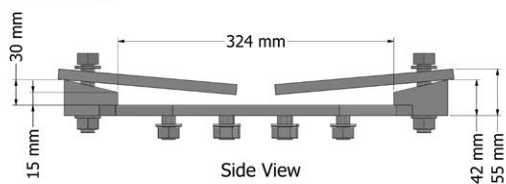
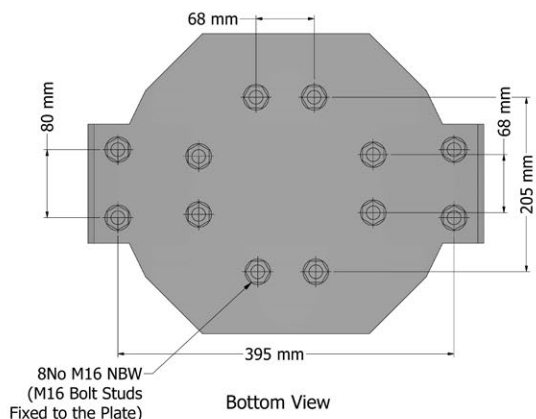


Component	Weight
Transfer Fixing Plate	19 kg

10. Needle Beam Fixing Clamp

The Q50 Needle Beam Fixing Clamp is designed to connect to the Flat Head through 8 x M16 bolts. This part is designated to grip to the flange of I-shaped beams with a flange width up to 324mm via 4 x M16 bolts tightening bolts. All 8 x M16 bolts should be used for suitable load distribution. Washers are based on AS1237 and AS1252.

Note: Needle Beam Fixing Clamp is designed as a clamping device and is not suitable for transferring loads other than compression between the overhead I - shaped steel beam and Q50 prop.



Component	Weight
Needle Beam Clamp	20 kg

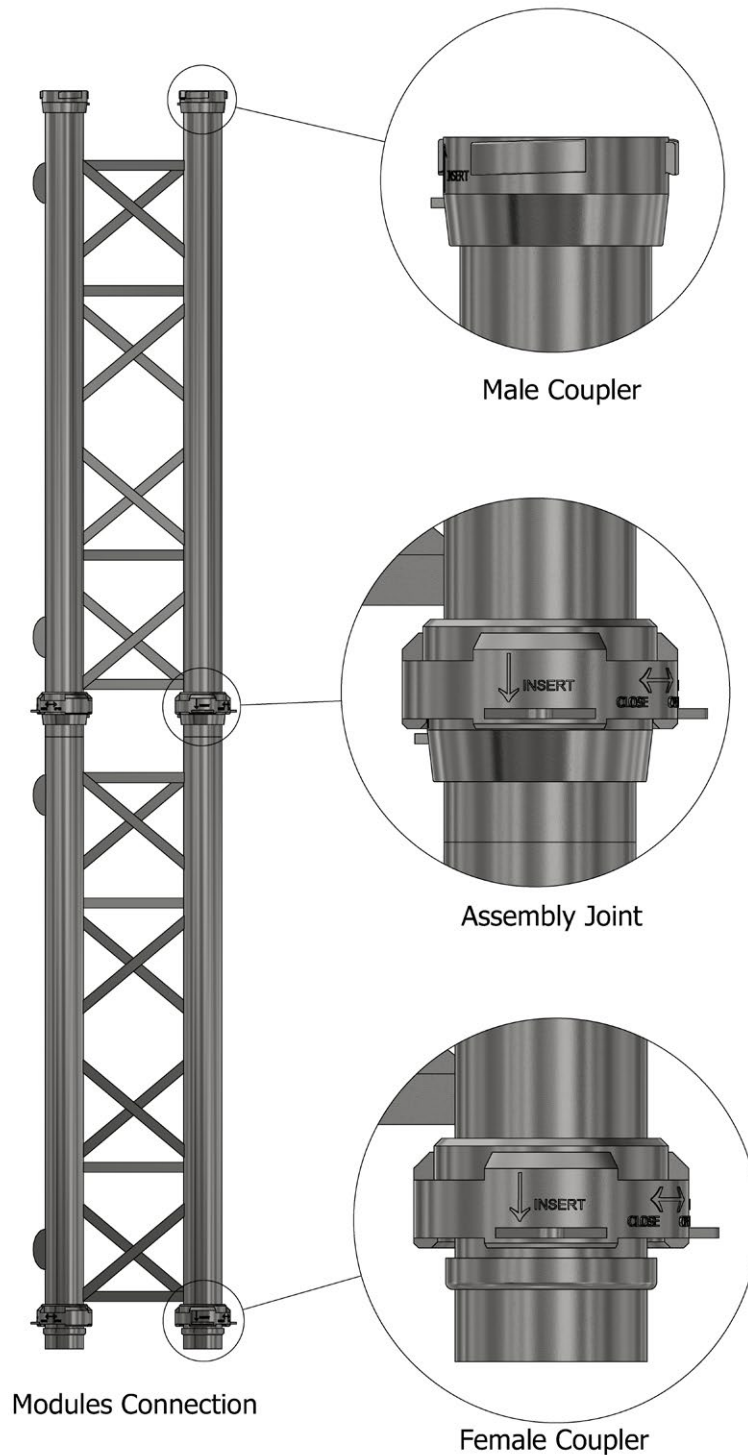
(Flat Head is shown for illustration purpose only)

Note: Needle Beam Clamp needs a Flat Head for enabling connection with other modules.

11. Twistlock Boltless Connection Capacity

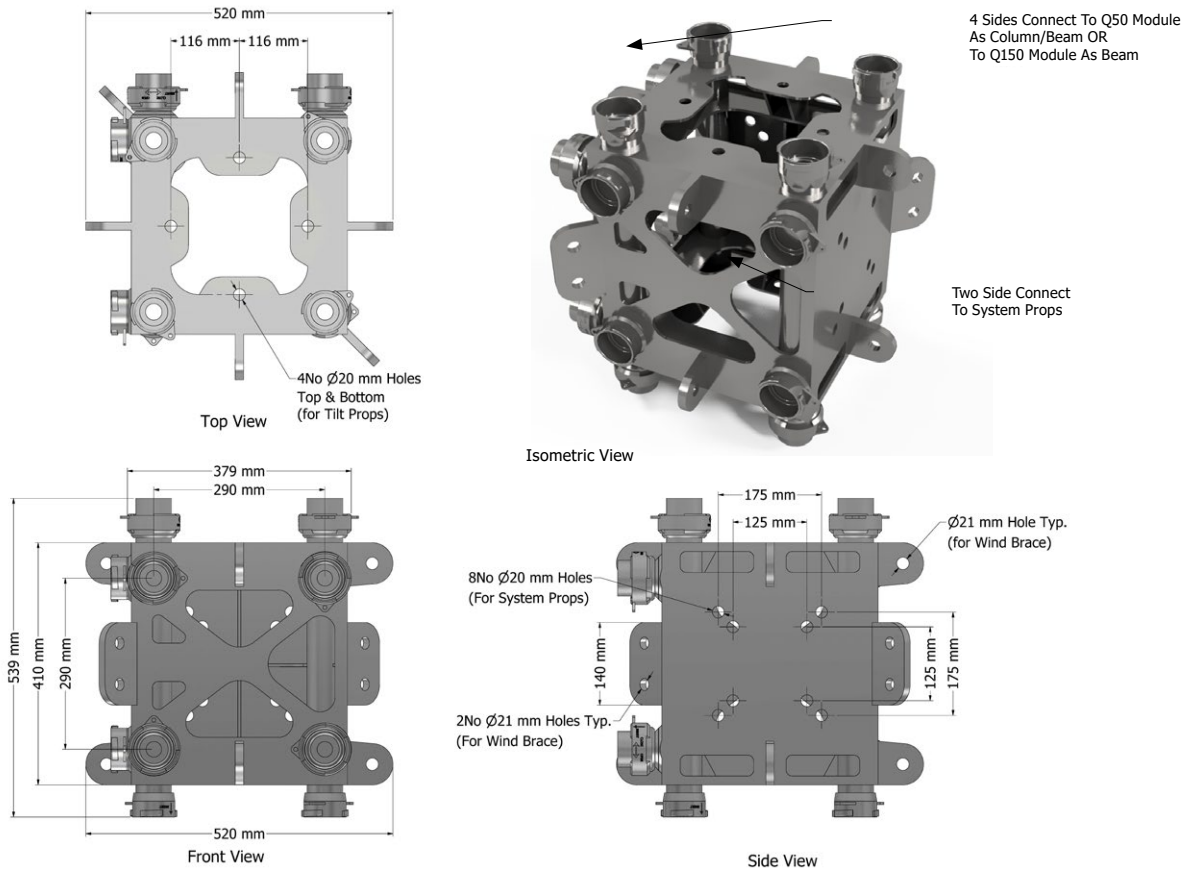
Q50 prop modules are connected to each other through four Twistlock Boltless Connections. Tensile working load limit of each connection is 84.5 kN, as a result, the tensile working load of the Q50 props is up to 338 kN. Each connection contains a male and a female coupler.

Note: It is not recommended to apply transverse point or uniformly distributed load on Q50 modules. Q50 modules are designed as axial load bearing elements with axial load eccentricities creating induced bending moments.



12. Quadshore 50 Universal Connector

The Q50 Universal Connector is designed to work as the panel zone of the tower formed using Q50 props modules as columns. Tower beams can be System 30 or 60 props or Q50. Braces up to M20 can be used to transfer lateral loads. The panel zone is designed in most critical scenario considering simultaneous extreme loadings of beam and brace added to a loading combination for Q50 tower legs (see table). For Q50 towers, an extensive structural analysis should be conducted considering second order effects, lateral loading, wind loading, etc. For any specific compressive capacity of Q50 towers, the number of bolts and their grade for connecting System 30/60 as beams and tilt props or DonoBrace as braces should be defined based on these detailed analyses.



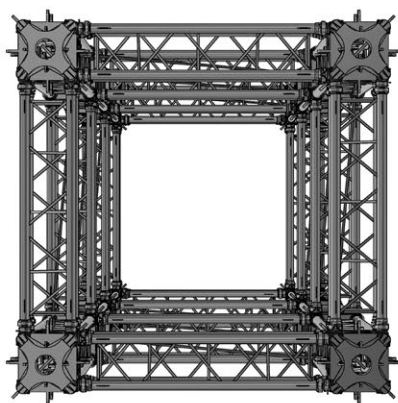
Component	Weight
Universal Connector	59 kg

Universal Connector working load combinations:

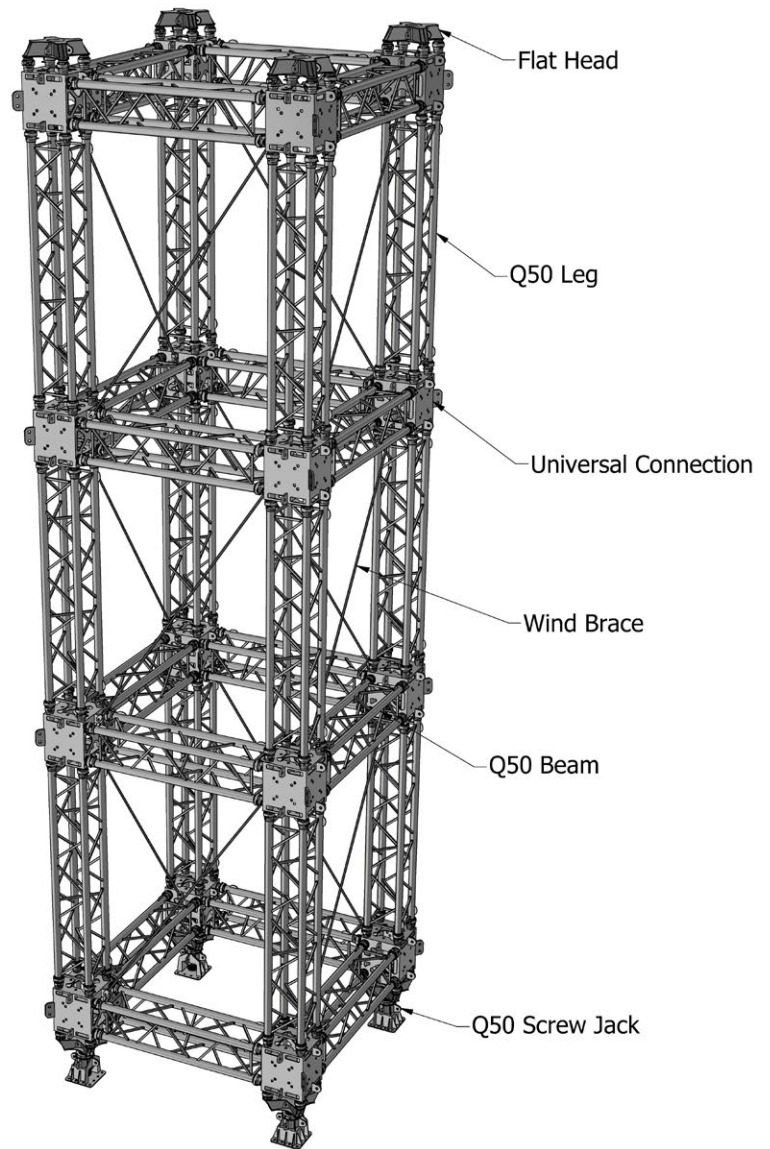
Allowable load combination for Q50 tower legs		Considered extremes for secondary elements		
		Beam		Brace
Axial Load (kN)	Bending Moment (kN.m)	Bending Moment (kN.m)	Axial Force (kN)	Axial Force (kN)
500	0	40	120 (Compressive)	110 (Tensile)
430	12			
350	24			
250	40			

13. Four-Legged Tower

In addition to different single leg propping assemblies, tower forming capabilities are available for Q50 props. The Q50 towers are formed using Q50 modules as vertical elements and Q50 (or System 30/60 prop sections) as horizontal elements. Lateral forces are resisted using wind-braces or tilt props. The compressive capacity of the towers should be designed by a structural engineer experienced in the design of temporary works considering side load, wind loads, second order effects, etc.



Top View - Perspective

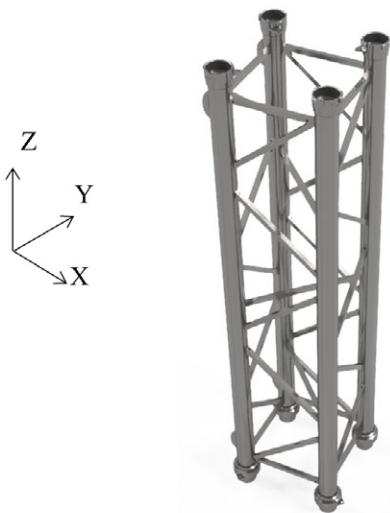


Q50 Tower - Isometric

14. Working Load Limits

The working load limit (WLL) of Q50 assembly classes shown in graphs over page were determined through extensive experimental testing in addition to finite element modelling.

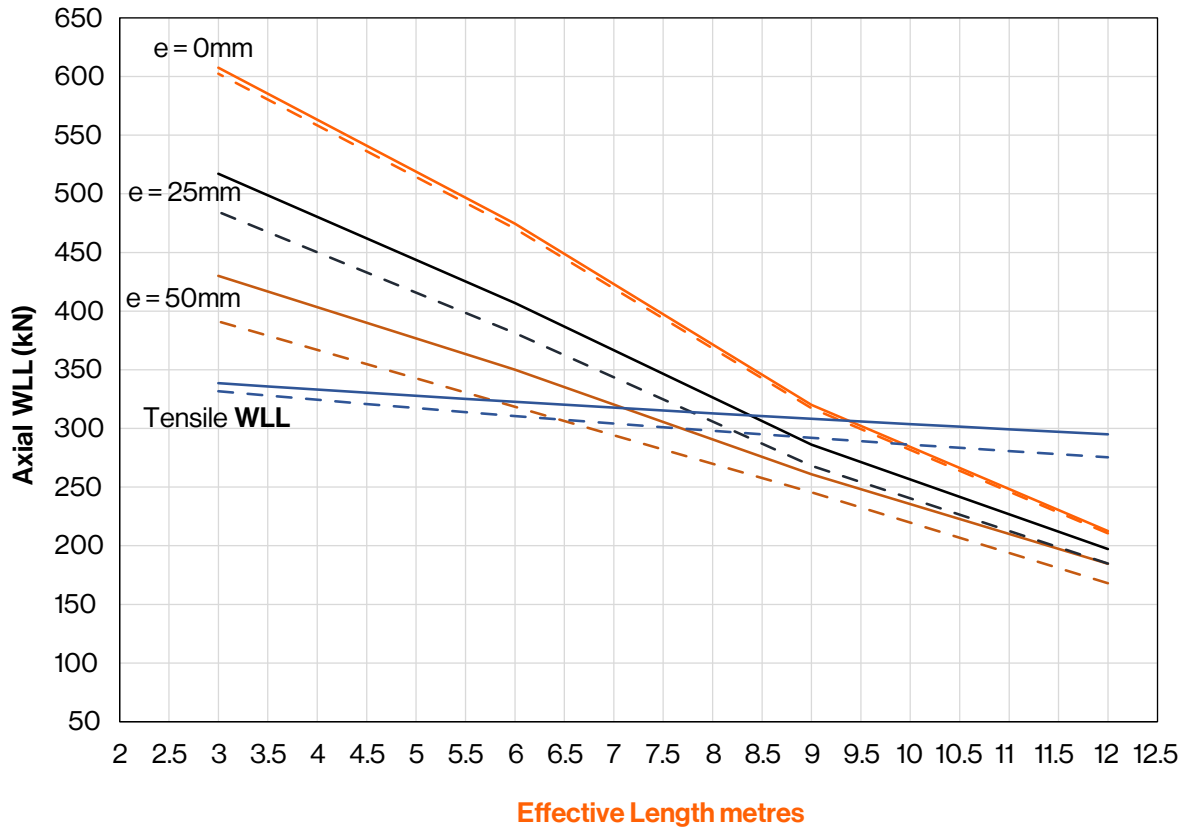
1. When Q50 props are used in an angle through Raking Base or Multi-Angle Plate, the anchors or properties of the substrate might be the limiting link. Therefore, anchor design and validation should be conducted by a structural designer.
2. Fixing at the base and top plates to be suitably capable of transferring loads. Theoretical model is pinned at each end.
3. Maximum capacity is with Q50 components in sound condition. Refer to Coates Engineering Solutions if components are damaged during site use.
4. Initial eccentricity due to the possibility of the strut being set L/400 out of plumb has been considered for all eccentricities of load.
5. Solid lines in the curves over page indicate the compressive WLL values when the eccentricity occurs in X-X or Y-Y axis. For the eccentricity in the diagonal direction (i.e. 45° respect to X-X or Y-Y) the WLL values obtained from broken lines should be used.



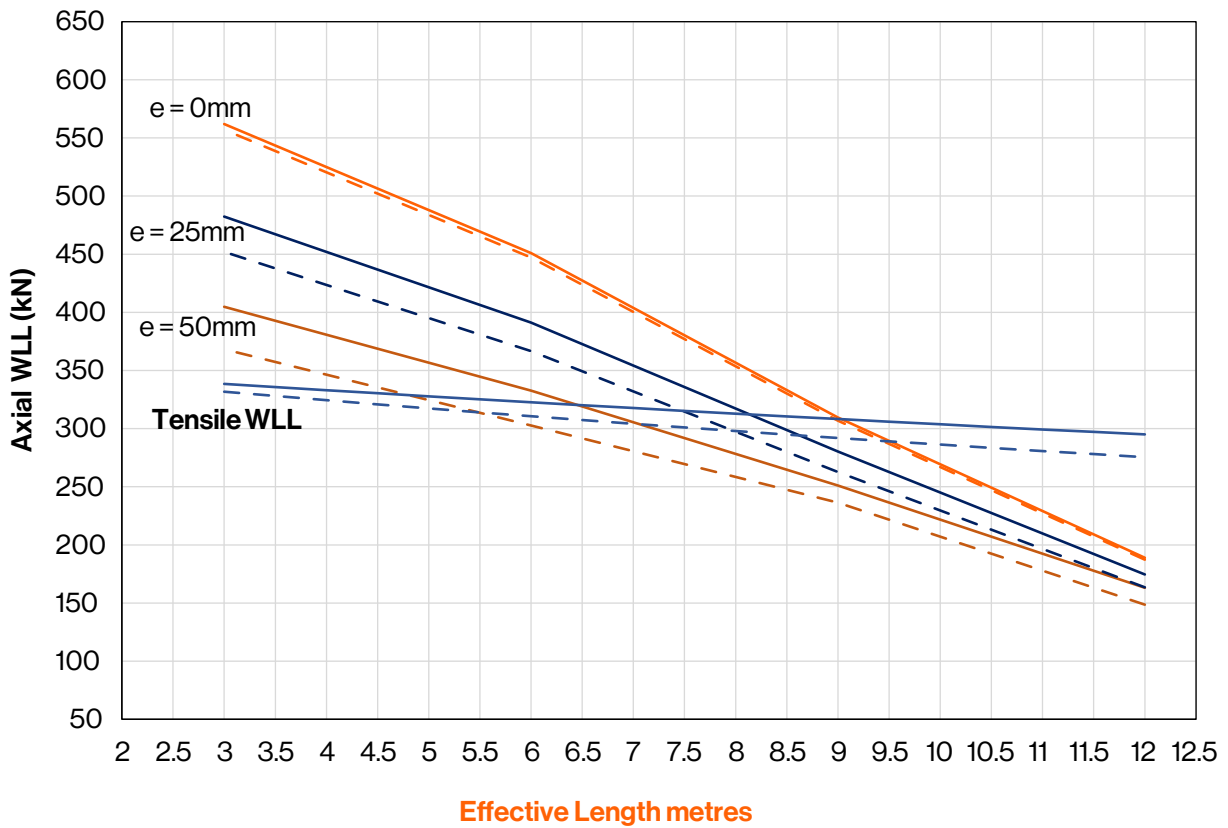
Isometric View Module 1500mm

6. Added imperfection due to weight deflection is zero for vertically mounted props.
7. Designed in accordance with AS4600, AS4100, AS1170.0, AS1170.1, AS3610 and AS3850.
8. Limit State Conversion Factor of 1.5 is considered to obtain Working Load Limit capacities. Capacities based on theoretical values and destructive testing.
9. Tension capacity of up to 338 kN is based on 4 engaging male and female couplers of Twistlock Boltless Connection.
10. This document may be revised without notice. Contact Coates Engineering Solutions for the latest information or for project specific enquiries.
11. Refer to Terms and Conditions of use within this document.

Compressive and tensile WLL for vertically mounted Q50 props



Compressive and tensile WLL for horizontally mounted Q50 props



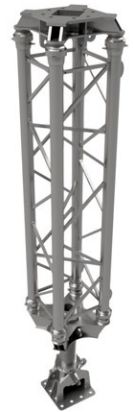
15. Components for Assembly Class 1

Prop Length (mm)		Required components										Total weight (kg)
min	max	Module 250mm	Module 1250mm	Module 1500mm	Module 2000mm	Raking Base Jack						
						Screw	Nut	Cross Head	Raking base and pin	Linch Pin	Flat Head	
2683	3033	1	0	0	1	1	2	1	1	12	1	116
2933	3283	0	2	0	0	1	2	1	1	12	1	118
3183	3533	0	1	1	0	1	2	1	1	12	1	122
3433	3783	0	0	2	0	1	2	1	1	12	1	126
3683	4033	0	1	0	1	1	2	1	1	12	1	130
3933	4283	0	0	1	1	1	2	1	1	12	1	134
4183	4533	0	3	0	0	1	2	1	1	16	1	141
4433	4783	0	2	1	0	1	2	1	1	16	1	145
4683	5033	0	1	2	0	1	2	1	1	16	1	149
4933	5283	0	0	3	0	1	2	1	1	16	1	153
5183	5533	0	1	1	1	1	2	1	1	16	1	157
5433	5783	0	0	2	1	1	2	1	1	16	1	161
5683	6033	0	1	0	2	1	2	1	1	16	1	165
5933	6283	0	0	1	2	1	2	1	1	16	1	169
6183	6533	0	1	3	0	1	2	1	1	20	1	176
6433	6783	0	0	4	0	1	2	1	1	20	1	180
6683	7033	1	0	0	3	1	2	1	1	20	1	186
6933	7283	0	0	3	1	1	2	1	1	20	1	188
7183	7533	0	1	1	2	1	2	1	1	20	1	192
7433	7783	0	0	2	2	1	2	1	1	20	1	196
7683	8033	0	1	0	3	1	2	1	1	20	1	200
7933	8283	0	0	1	3	1	2	1	1	20	1	204
8183	8533	1	0	1	3	1	2	1	1	24	1	213
8433	8783	0	0	0	4	1	2	1	1	20	1	212
8683	9033	0	1	2	2	1	2	1	1	24	1	219
8933	9283	0	0	3	2	1	2	1	1	24	1	223
9183	9533	0	1	1	3	1	2	1	1	24	1	227
9433	9783	0	0	2	3	1	2	1	1	24	1	231
9683	10033	0	1	4	1	1	2	1	1	28	1	238
9933	10283	0	0	5	1	1	2	1	1	28	1	242
10183	10533	0	1	3	2	1	2	1	1	28	1	246
10433	10783	0	0	4	2	1	2	1	1	28	1	250
10683	11033	0	1	2	3	1	2	1	1	28	1	254
10933	11283	0	0	3	3	1	2	1	1	28	1	258
11183	11533	0	1	1	4	1	2	1	1	28	1	262
11433	11783	0	0	2	4	1	2	1	1	28	1	266
11683	12033	0	1	0	5	1	2	1	1	28	1	270



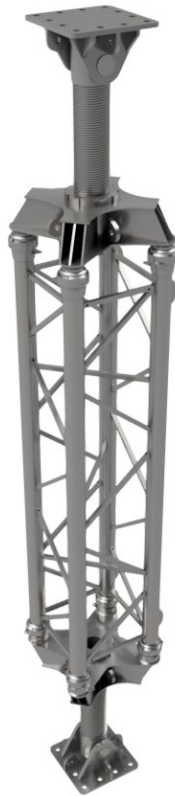
16. Components for Assembly Class 2

Prop Length (mm)		Required components										Total weight (kg)
min	max	Module 250mm	Module 1250mm	Module 1500mm	Module 2000mm	Base Jack with Mini Stool					Flat Head	
						Screw	Nut	Cross Head	Mini stool	Linch Pin		
2765	3115	1	0	0	1	1	4	1	1	12	1	122
3015	3365	0	2	0	0	1	4	1	1	12	1	124
3265	3615	0	1	1	0	1	4	1	1	12	1	128
3515	3865	0	0	2	0	1	4	1	1	12	1	132
3765	4115	0	1	0	1	1	4	1	1	12	1	136
4015	4365	0	0	1	1	1	4	1	1	12	1	140
4265	4615	0	3	0	0	1	4	1	1	16	1	147
4515	4865	0	2	1	0	1	4	1	1	16	1	151
4765	5115	0	1	2	0	1	4	1	1	16	1	155
5015	5365	0	0	3	0	1	4	1	1	16	1	159
5265	5615	0	1	1	1	1	4	1	1	16	1	163
5515	5865	0	0	2	1	1	4	1	1	16	1	167
5765	6115	0	1	0	2	1	4	1	1	16	1	171
6015	6365	0	0	1	2	1	4	1	1	16	1	175
6265	6615	0	1	3	0	1	4	1	1	20	1	182
6515	6865	0	0	4	0	1	4	1	1	20	1	186
6765	7115	1	0	0	3	1	4	1	1	20	1	192
7015	7365	0	0	3	1	1	4	1	1	20	1	194
7265	7615	0	1	1	2	1	4	1	1	20	1	198
7515	7865	0	0	2	2	1	4	1	1	20	1	202
7765	8115	0	1	0	3	1	4	1	1	20	1	206
8015	8365	0	0	1	3	1	4	1	1	20	1	210
8265	8615	1	0	1	3	1	4	1	1	24	1	219
8515	8865	0	0	0	4	1	4	1	1	20	1	218
8765	9115	0	1	2	2	1	4	1	1	24	1	225
9015	9365	0	0	3	2	1	4	1	1	24	1	229
9265	9615	0	1	1	3	1	4	1	1	24	1	233
9515	9865	0	0	2	3	1	4	1	1	24	1	237
9765	10115	0	1	4	1	1	4	1	1	28	1	244
10015	10365	0	0	5	1	1	4	1	1	28	1	248
10265	10615	0	1	3	2	1	4	1	1	28	1	252
10515	10865	0	0	4	2	1	4	1	1	28	1	256
10765	11115	0	1	2	3	1	4	1	1	28	1	260
11015	11365	0	0	3	3	1	4	1	1	28	1	264
11265	11615	0	1	1	4	1	4	1	1	28	1	268
11515	11865	0	0	2	4	1	4	1	1	28	1	272
11765	12115	0	1	0	5	1	4	1	1	28	1	276



17. Components for Assembly Class 3

Prop Length (mm)		Required components										Total weight (kg)
min	max	Module 250mm	Module 1250mm	Module 1500mm	Module 2000mm	Screw	Nut	Cross Head	Raking base & pin	Top Cross Head	Linch Pin	
2401	3101	1	0	1	0	2	4	1	2	1	12	141
3151	3851	0	2	0	0	2	4	1	2	1	12	151
3901	4601	0	1	0	1	2	4	1	2	1	12	163
4651	5351	0	2	1	0	2	4	1	2	1	16	178
5401	6101	0	1	1	1	2	4	1	2	1	16	190
6151	6851	0	0	1	2	2	4	1	2	1	16	202
6901	7601	1	0	0	3	2	4	1	2	1	20	219
7651	8351	0	0	2	2	2	4	1	2	1	20	229
8401	9101	1	0	1	3	2	4	1	2	1	24	246
9151	9851	0	0	3	2	2	4	1	2	1	24	256
9901	10601	0	1	4	1	2	4	1	2	1	28	271
10651	11351	0	0	4	2	2	4	1	2	1	28	283
11401	12101	0	1	1	4	2	4	1	2	1	28	295



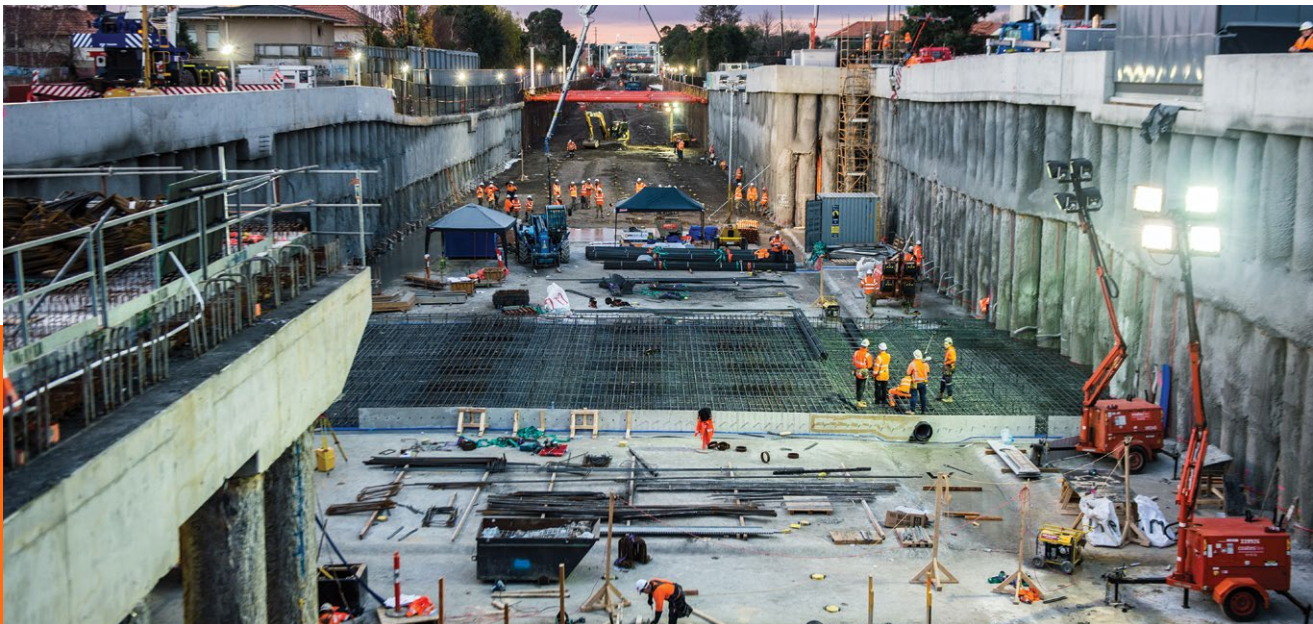
18. Components for Assembly Class 4

Prop Length (mm)		Required components										Total weight (kg)
min	max	Module 250mm	Module 1250mm	Module 1500mm	Module 2000mm	Screw	Nut	Cross Head	Multi Angle Plate and Pin	Top Cross Head	Linch Pin	
2457	3045	1	0	1	0	2	4	1	2	1	12	157
3207	3795	0	2	0	0	2	4	1	2	1	12	167
3957	4545	0	1	0	1	2	4	1	2	1	12	179
4707	5295	0	2	1	0	2	4	1	2	1	16	194
5457	6045	0	1	1	1	2	4	1	2	1	16	206
6207	6795	0	0	1	2	2	4	1	2	1	16	218
6957	7545	1	0	0	3	2	4	1	2	1	20	235
7707	8295	0	0	2	2	2	4	1	2	1	20	245
8457	9045	1	0	1	3	2	4	1	2	1	24	262
9207	9795	0	0	3	2	2	4	1	2	1	24	272
9957	10545	0	1	4	1	2	4	1	2	1	28	287
10707	11295	0	0	4	2	2	4	1	2	1	28	299
11457	12045	0	1	1	4	2	4	1	2	1	28	311



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