

Capabilities Document



Specialists in Post-Tensioning, Pre-Stressing
Design and Contracting

Flat Jacking



What are Flat Jacks?

A flat jack is a circular mild steel capsule, formed from 2 separate steel plates that have been spun along the edges. The steel plates are then welded together to create a torus profile around the circumference and a recess in the centre of the flat jack.

An inlet and outlet pipe are then welded to the flat jack and are fitted with either a needle or ball valve depending on the fluid to be used. The outlet pipe is normally fitted with a plug. They are supplied complete with two machined thrust plates.

Uses

Flat jacks are used for hydraulically loading and lifting temporary and permanent works such as pre-loading steel beams or capping beam props. The low profile of the flat jack makes it perfect for fitting into tight gaps where a typical hydraulic cylinder couldn't fit.

The relatively low cost of the flat jack allows the jacks to be left in-situ permanently when inflated with grout or resin. The flat jack deforms under an internal hydraulic pressure to load or lift the adjacent structure.

Stroke and Closed Height

The stroke of the flat jack is equivalent to the internal recess of the flat jacks where the thrust plates are placed. This is always a maximum of 25mm stroke, where larger strokes are required flat jacks can in some instances be stacked, although it may be that using a hydraulic cylinder may be a more appropriate solution. The closed height of the jack is always 32mm and an installation gap of 35mm should be allowed for.

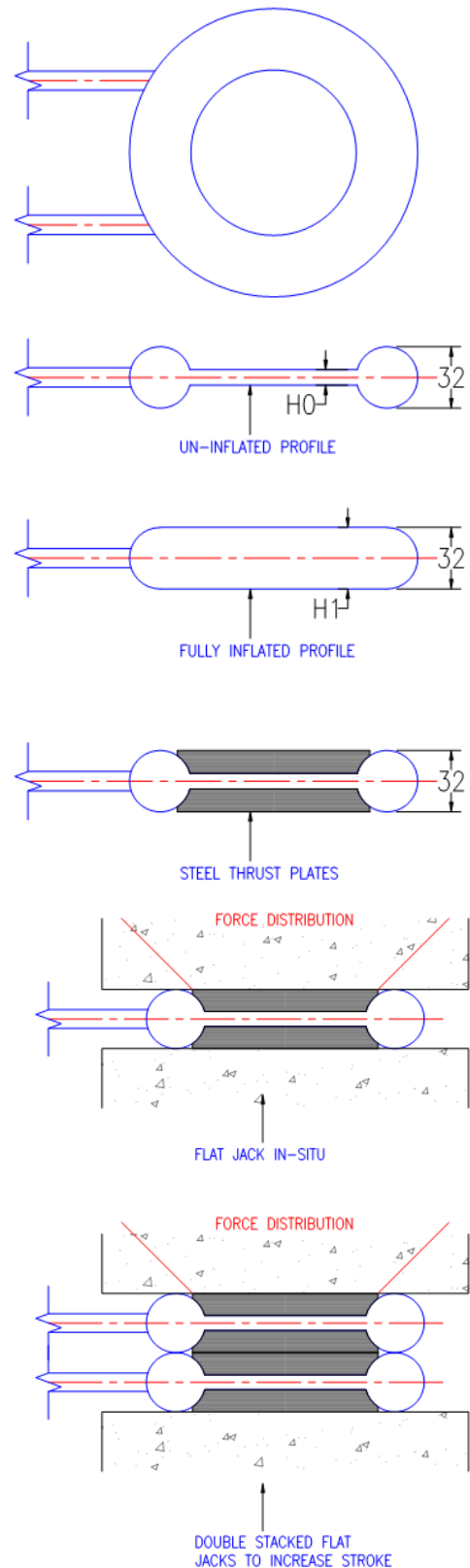
Thrust Plates

The circular steel plates that sit within the recess of the flat jack are referred to as thrust plates and are typically 12mm thick to ensure that the load is dispersed evenly over the flat jack and not on the edges. The edges of the plates in contact with the flat jack rim are profiled (rounded off) to fit within the recess without causing damage.

Pressure Testing

All of our flat jacks have a maximum working pressure of 150bar and are pressure tested up to 165bar. It is standard practice to use a minimum of 25% of the flat jacks capacity up to a maximum of 75%. If a larger capacity is required the next size up jack should be selected or further checks will be required for suitability of application.

Flat Jack Profile



Temporary Loading

Temporary loading of the flat jack will require the use of either hydraulic oil or water to inflate the jack, where the flat jack is to be left in-situ under load for an extended period, hydraulic oil should be used.

The flat jack will be installed with a gauge or pressure transducer to allow any required changes in loading to be monitored visually or digitally. The benefits are;

- The force can be altered to suit current loadings
- Live monitoring via pressure transducers or gauges
- The jack can be transfused at a later date with resin/grout for permanent load transfer

Permanent Loading

Permanent loading of the flat jack will require the use of either an epoxy resin or non-shrink cementitious grout to inflate the jack, once hardened the flat jack loading cannot be adjusted. The benefits are;

- The force is permanently transferred into the structure
- Jacks can be left in-situ so no further works to remove them are required
- Not susceptible to damage on site

Transfusion

Transfusion of the flat jack allows the jack loading to become locked-in as part of the permanent structure after any live loading changes have been made. The process replaces the hydraulic fluid or water with a resin or cementitious grout that will harden over a set period. Transfusion can also be carefully carried out when the flat jack is under load in special circumstances.

Jack Installation Safety & Force

The jack should be installed to ensure that the loading onto the flat jacks will always be perpendicular to the thrust plates. The flat jacks cannot take significant side loading and as such this should be taken into account when designing. The area adjacent to the flat jacks should always be shimmed along the supporting member in case of leak or failure of the flat jack.

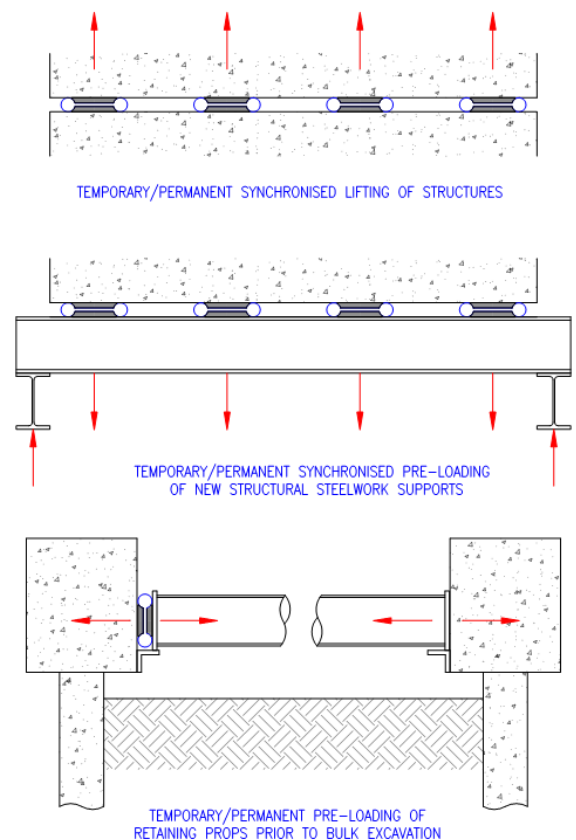
Design, Supply and Install

Praeter Engineering Ltd are equipped to carry out the full design, supply and installation of a fully bespoke flat jack system along with any live monitoring required. Our installation will be carried out by our trained specialist operatives.

Flat Jack Setup (Transfusion)

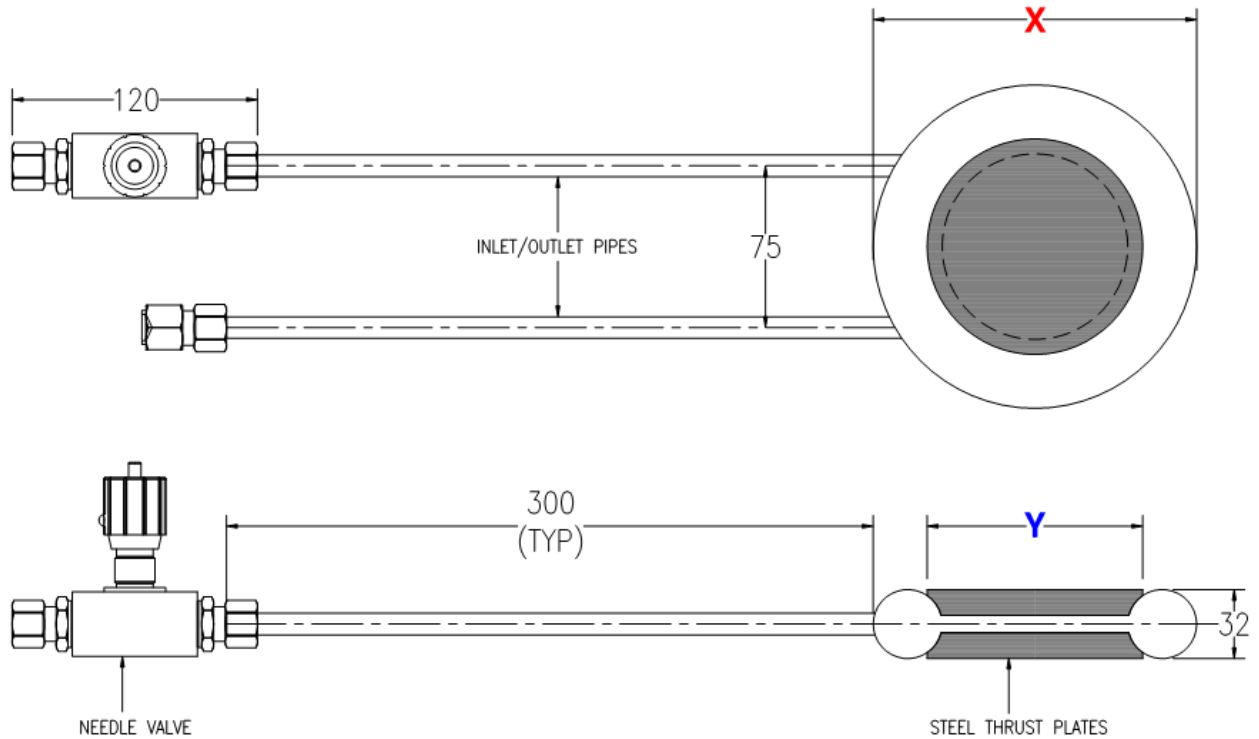


Model shown **PEL-FJ30** c/w Transfusion



Flat Jack Data Sheet

The standard sizes are stated below with a diagram referring to the dimensions of the flat jacks and the thrust plates. The 300mm inlet/outlet tubes can be modified on request to suit the application. Inlet and outlet valves will vary depending on fluid used to inflate the flat jack.



Flat Jack Properties

Reference	Size	Max Load (kN)	X FJ Diameter (mm)	Y Thrust Plate Diameter (mm)	Closed Height (mm)	Max Stroke (mm)	Req'd Installation Gap (mm)
PEL-FJ12	12	79	120	70	32	25	35
PEL-FJ15	15	151	150	100	32	25	35
PEL-FJ19.5	19.5	310	195	145	32	25	35
PEL-FJ22	22	386	220	170	32	25	35
PEL-FJ25	25	521	250	200	32	25	35
PEL-FJ27	27	632	270	220	32	25	35
PEL-FJ30	30	800	300	250	32	25	35
PEL-FJ35	35	1111	350	300	32	25	35
PEL-FJ42	42	1710	420	370	32	25	35
PEL-FJ45	45	1923	450	400	32	25	35
PEL-FJ48	48	2274	480	430	32	25	35
PEL-FJ52	52	2708	520	470	32	25	35
PEL-FJ56	56	3139	560	510	32	25	35
PEL-FJ60	60	3732	600	550	32	25	35
PEL-FJ69	69	4895	690	640	32	25	35
PEL-FJ75	75	5494	750	700	32	25	35
PEL-FJ87	87	7495	870	820	32	25	35
PEL-FJ92	92	8515	920	870	32	25	35

PEL-FJSPECIAL - Note that variations on the above diameters/loads can be produced on request.

Note: Jack utilisation should be between 25-75% of Max Load, higher loading of flat jacks can be achieved with further checks.

Full Design, Supply & Install Site Services



PEL-FJ25
(c/w gauge for live load monitoring)



Online Displacement Sensor
(to monitor movements)



Channel	Unit	Average	Maximum	Minimum	Timestamp
Mains	V	29.616	29.669	29.572	2018-03-06 15:18:12
Battery	V	26.968	27.037	26.887	2018-03-06 15:18:12
External Temp	C	8.100	8.100	8.100	2018-03-06 15:18:12
Internal Temp	C	13.900	14.500	13.400	2018-03-06 15:18:12
421A	KN	866.913	869.714	865.555	2018-03-06 15:18:12
421B	KN	869.799	872.430	868.696	2018-03-06 15:18:12
422A Not Installed		0.000	0.000	0.000	2018-03-06 15:18:12
422B Not Installed		0.000	0.000	0.000	2018-03-06 15:18:12
423A	KN	716.160	717.110	715.448	2018-03-06 15:18:12
423B	KN	716.698	718.066	715.652	2018-03-06 15:18:12
424A	KN	720.688	721.906	719.713	2018-03-06 15:18:12
424B	KN	719.059	719.905	718.466	2018-03-06 15:18:12
425A	KN	875.788	877.423	872.518	2018-03-06 15:18:12
425B	KN	891.138	892.033	889.510	2018-03-06 15:18:12

Bespoke live load monitoring
(via website and email alerts)



Flat Jacking (pre-loading temporary works)

Contact Information

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