

Flat jacks



FREYSSINET
SUSTAINABLE TECHNOLOGY

- Easy to use
- Cost-effective
- Large range of movement or high force developed for a small footprint

Structural Accessories

Technical data sheet reference: FT En C V 7

Aim

The flat jack, invented by Freyssinet, is a simple, cost-effective thin hydraulic device used to create movement and/or apply forces, which can be very high in a relatively small envelope.

Description

Flat jacks take the form of a deformable capsule made up of two cold-worked steel half-sections and an annular rim. Two pipe connections, one acting as a vent, are used to inject a pressurised liquid to deploy the jack over the available stroke.

- Different shapes:

The wide range of flat jacks is partly due to the great variety of possible shapes. The standard flat jack is circular, but rectangular, square or oblong jacks are available on request.



Oblong flat jack

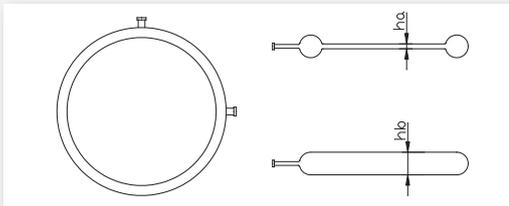
- Nozzle

Standard nozzles are made up of 6 x 8 tubes 60 mm in length. They comprise a sealing ring and a female clamp nut. Their position depends on the shape of the flat jack and can be adapted in some cases.

Nozzles are designed to withstand the maximum operating pressure of the flat jack.

- Stroke:

The stroke of the flat jack is equal to the distance ($h_b - h_a$) between the two steel plates, as shown in the diagram below:



If a large stroke is required, several jacks can be stacked on top of each other under specific operating conditions.



Abu Simbel/Egypt

Performance

The force exerted by a flat jack varies depending on the maximum stroke (i.e. the inner diameter of the bead), pressure and effective area of the jack, which decreases as the stroke increases.

The maximum force values for standard circular flat jacks are given below:

External diameter (mm)	Maximum stroke (mm)	Maximum force (kN)	Maximum permissible pressure (bar)
70	9	25	200
120	14	100	200
120	18	77	200
150	18	155	200
220	18	455	200
250	18	630	200
250	23	540	190
270	18	760	200
270	23	660	190
300	18	980	200
300	28	665	160
350	18	1,415	200
350	33	785	140
420	18	2,150	200
420	38	1,035	120
480	18	2,905	200
500	38	1,600	120
600	28	3,530	160
600	43	2,100	110
700	43	3,025	110
750	28	5,810	160
750	43	3,550	110
870	28	8,040	160
920	28	9,080	160
1016	48	6,255	100

The force/pressure ratio given in the table is accurate to $\pm 5\%$.

Laboratory calibration is performed when greater accuracy is required.

If jacks are used for strokes smaller than the maximum values given above, the permissible force can be greater. Specific studies must be performed in this case.

Flat jacks are designed to apply vertical load. Transverse forces are controlled out with the parameters of the flat jack.

When choosing a flat jack, it is recommended that a jack is selected with a maximum force of at least 20% greater than the required operating force (cf. NF EN 1993-4-2, Table 2.1)

Use

• Areas of application

Flat jacks can be used for a variety of applications:

- Lifting,
- Force measurement,
- Launching,
- Falsework striking,
- Load transfer,
- Underpinning.

• Filling the gap between the jack beads

The gap between the beads on the jack must be filled so that it can be used. The various solutions are as follows:

- Thin steel plates are placed in each of the hollow parts of the jack when it is recovered after use;
- The space between the beads can be filled with a medium-weight corrosion-resistant resin mortar or special low-shrinkage mortar;
- Where flat jacks are stacked, or if the flat jack is to be incorporated into the structure, it can be embedded in a banded concrete block.

• Inflating flat jacks

Flat jacks can be inflated using a variety of materials (oil, special cement grout, resin) depending on the application of the jack.

When the flat jack is being used for a limited period, it will be inflated with oil using a hydraulic pump.

For longer-term or even permanent use, a synthetic resin or special cement grout will be used. The fluid is pressurised by means of a high-pressure cylinder placed in between the flat jack and the hydraulic pump, or a grouting press.

If the jack is to be injected with a settable product and removed after use, it can be installed on a sand box so that it can be deloaded.

• Packing

Packing must be installed next to the flat jack to support the entire load in the event of a leak during or after pressurising.

If applicable, the packing must allow for the jack (open) to be removed after the operation.



Stroke monitoring instrumentation



Circular flat jack



Heron Tower/United Kingdom



Reactor building/Cadarache

Local sales contact