

Your Introduction To Plate Jack®

Makes Most Other Jacking Systems
seem too heavy, too costly or too restrictive.



The jack of choice

in areas of constrained headroom
and for effective, permanent jack installation.

Compact and adaptable.

www.platejacks.com

Plate Jack®



Plate Jacks® are low cost, light weight, jacking devices having general application in load transfer, lifting, lowering, or leveling structures or equipment, and are uniquely suited for limited headroom situations, permanent installations, or buried or submerged applications.

3 Getting Started — Plate Jack®, less is more

6 Configuration

7 Materials

8 Quality Control

8 Installation

10 Applications

- Correction of settlements in existing structures
- Load transfer to new footings in existing buildings
- Leveling new construction on foundation soils having variable compressibility
- Load transfer to seismic isolators
- Optimizing reactions to supports in redundant structures
- Load shoring, and soil or rock anchors
- Low headroom temporary lifting or lowering jacks
- Load cells
- Millwright work

13 Equipment and Engineering Support — Planning, training and site support.

15-16 Appendix — Size and load capacity data sheets



Getting Started

Welcome to Plate Jack®, less really is more.

Plate Jack® is the all in one solution for lifting, leveling, weighing, and more. Think of Plate Jack® as doing everything that a hydraulic cylinder jack can do, but with less weight, less headroom and less cost. Plus Plate Jack® can be permanently installed. There are more than 5,000 Plate Jacks® permanently installed worldwide.

Plate Jack® will give you more flexibility in new and retrofit construction, repair, and renovation.

Plate Jack® is backed by RPS Engineering support to help you plan and complete your project.

Use Plate Jacks when you—

have limited headroom, need permanent installation, have nonparallel bearing surfaces, have limited bearing pressure allowable, have need for light weight for handling, or are working in a corrosive environment.

• **Correction of settlements in existing structures** • **Load transfer to new footings in existing buildings** • **Leveling new construction on foundation soils having variable compressibility** • **Load transfer to seismic isolators** • **Optimizing reactions to supports in redundant structures** • **Load shoring, and soil or rock anchors** • **Low headroom temporary lifting or lowering jacks** • **Load cells** • **Millwright work**

For additional information, you may contact us through our website, www.platejack.com.

Plate Jack®

Makes Most Other Jacking Systems seem too heavy, too costly or too restrictive.



The advantages of Plate Jack® are size and cost.

Lifts 200 tons,
weighs 60 lbs.



Lifts 200 tons, weighs 295 lbs.

The added pluses—

Adaptable, and capable of being permanently installed, or installed, adjusted over time, then made permanent using a process called Transfusion.

For all sizes and capacities, the configuration of Plate Jacks® is essentially the same.

Bearing Plate

Vent Port



Injection Port

Jack Shell (Bellows)

Injection and Vent Ports—

are easily configured for your application.



Transfusion configuration—

for adjustment of load or settlement over time, then solidified for permanent installation

Standard configuration—





The operation configuration for any Plate Jack® application is essentially the same.

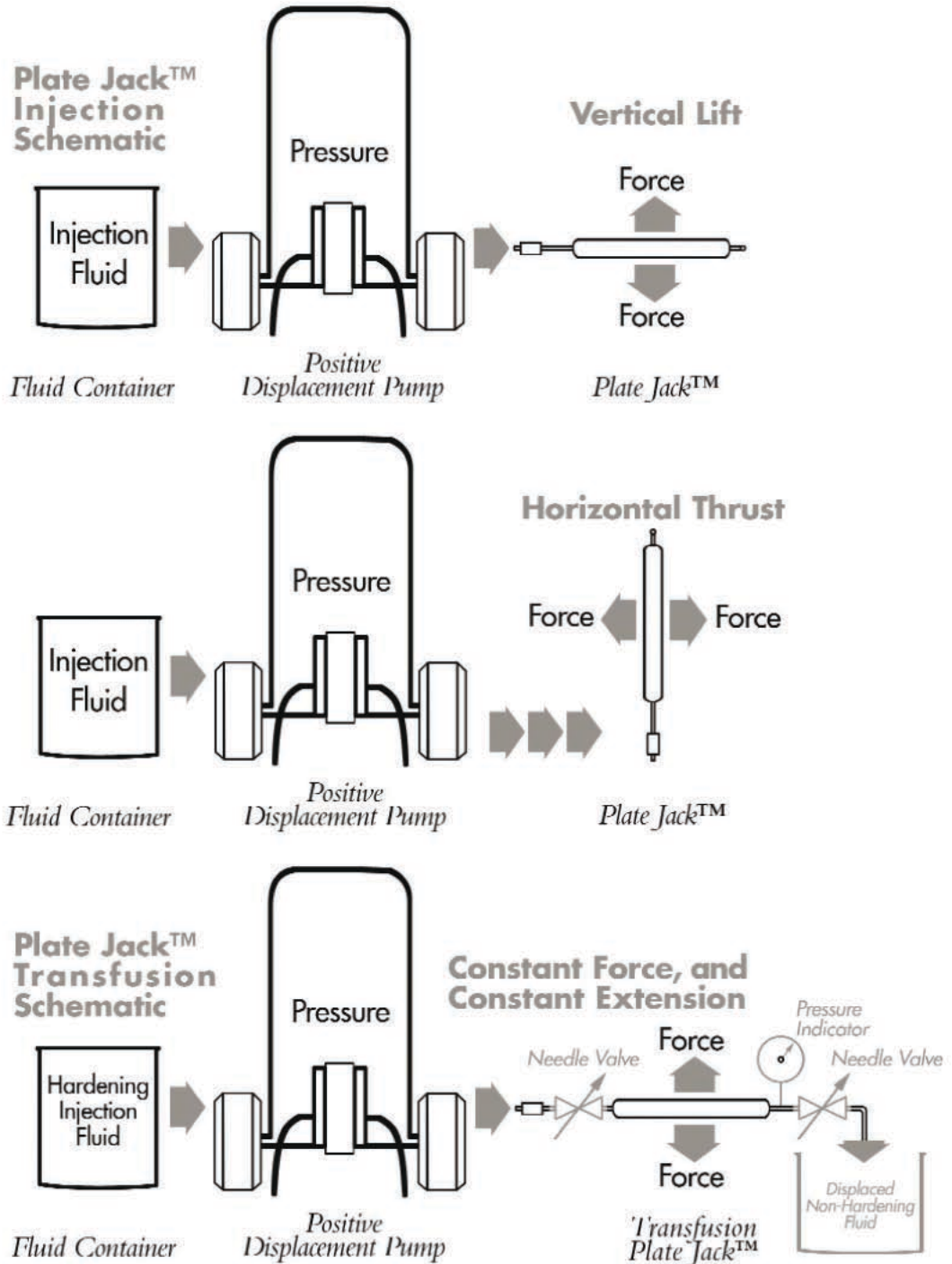
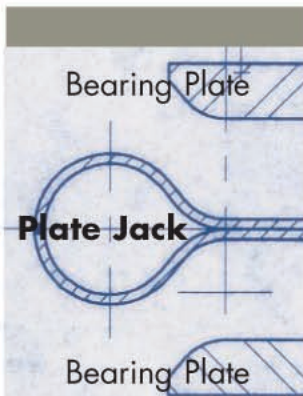


Plate Jack®

Makes Most Other Jacking Systems seem too heavy, too costly or too restrictive.



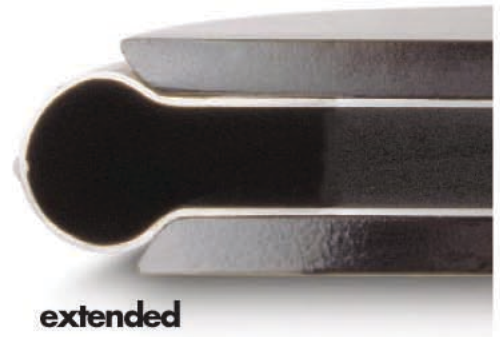
The San Francisco City hall sits on 542 Plate Jacks®.

Configuration

Plate Jacks are metallic bellows, sandwiched between two bearing plates, and having ports for injection and venting of the fluid to be used to extend the jack. The metallic bellows have flat bearing surfaces which provide thrust against the bearing plates, and a toroidal perimeter which allows expansion up to the rated extension of the jack with a uniform pressure/thrust relationship.



unextended



extended

With load capacities from 18 kips to 6,000 kips, all standard jacks have an unexpanded thickness of $1\frac{1}{4}$ ".



Injection Port



Vent Port

Plate Jacks are manufactured in two operating pressure ranges.

The "Standard" series uses a maximum operating pressure of 2,500 psi. The "5" series is rated at an internal pressure of 5,000 psi (see appendix)



The South Carolina State House is supported by 123 Plate Jacks®.

Plate Jacks are manufactured in a large range of load capacities.

From the RS 020, 4 $\frac{3}{4}$ " diameter and 18 kip capacity, up to the RS 6100, 58" diameter, providing a thrust of over 6,000 kips, all standard jacks, from the smallest to the largest, have an unexpanded thickness of 1 $\frac{1}{4}$ " and an allowable extension, or lift, of 1". Special Plate Jacks having greater extension capability are available, or jacks can be stacked to provide greater extension.



Materials are suitable for your specific application—

The bellows, or shell of the jack, is normally manufactured from low carbon steel; however, for applications in a corrosive environment, or where extended active use in conditions of high humidity or spray is desired, the shell of the jack may be manufactured from stainless steel, Monel, or various copper alloys, as may suit the particular application.

The bearing plates are usually manufactured from mild steel, but may be provided in a variety of metallic or polymeric materials to meet specific applications. Polymeric materials are often utilized to minimize weight of assembled jacks in the larger sizes. The bearing plates are usually shipped as loose items, but may be permanently bonded to the shell of the jack if desired. Bonded bearing plates are employed if the jack will be utilized in any position other than horizontal, or if the jack is to be used as a load cell.

Injection and vent ports are stainless steel tubing, and are configured and outfitted with valving, gauges, and other fittings to suit a particular application.



Bayshore Blvd. Bridge, San Francisco, sits on RS 500 Plate Jacks®.

Quality Control—

Plate Jacks® are subjected to close inspection throughout all phases of manufacture. Each jack is proof tested to 120% of the rated pressure prior to being packaged for delivery, and is tagged with a unique identifier, ensuring traceability to production and test lot numbers.

Plate Jacks® can be expanded with a variety of fluids.

Plate Jacks® may be extended using oil or water for temporary installation, or using injectable epoxy or cementitious grout for permanent installation.

Installation may be temporary or permanent.

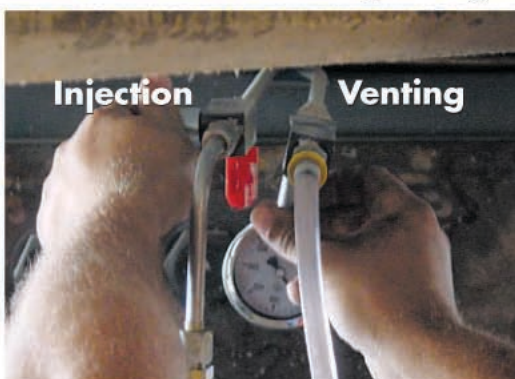
In many applications, it is desirable to extend (load) a jack, adjust the load or extension over a period of time to adjust for settlement or load redistribution, and then later solidify the jack to lock in that load or displacement. In these applications, the jacks are initially extended and adjusted using a non hardening fluid; then, when it is desired to solidify the jack, that fluid is displaced with epoxy while holding load and extension constant. This procedure, known as "transfusion", requires a special port and valving arrangement.



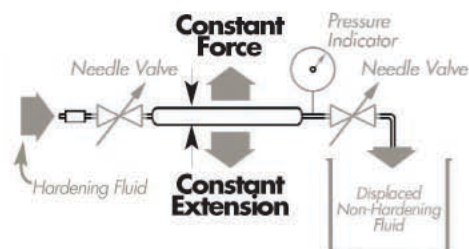
Transfusion hardware package



Configured for transfusion



Transfusion process



Balancing injection and vent flow to maintain constant load and lift during the transfusion process.

Plate Jack®

Makes Most Other Jacking Systems seem too heavy, too costly or too restrictive.



RS 400 Plate Jacks® support the Bank of New Zealand Chambers Bldg.

Horizontally, vertically and at angles —

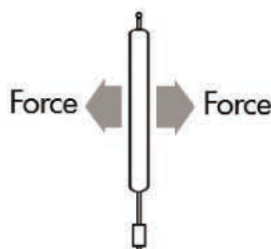
Plate Jacks® are usually used to provide a vertical lift or load transfer; however, they are often installed vertically to provide horizontal thrust, or at some angle.



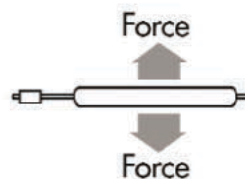
Plate Jacks® are flexible, versatile and forgiving.

Plate Jacks® do not require the faces which are to be jacked to be parallel, or even exactly planar. The jack will conform to non-parallel and slightly deformed jacking surfaces during extension, and will exert uniform pressure across the jacking face in spite of that non-parallelism.

Horizontal Thrust



Vertical Lift



unextended

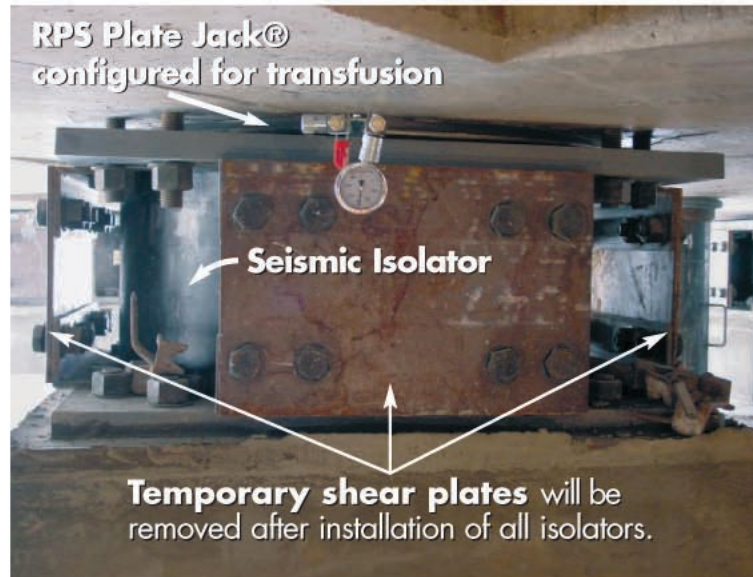


extended





Plate Jacks® are backed by RPS application engineering, on site assistance, and training.



295 Plate Jacks® are being used to transfer the weight of the building to seismic isolators and sliding bearings on this project at the Utah State Capitol.

Optimizing reactions to supports in redundant structures—

Plate Jacks® are used to optimize reactions at supports of redundant structures or structural elements, by floating the structure on Plate Jacks placed at each reaction, extending or retracting each jack as necessary to achieve the desired reactions, then solidifying the jacks by transfusing with epoxy.

Loading shoring, and soil or rock anchors—

Plate Jacks® used to pre-load shoring, or soil or rock anchors (tie-backs) are extended with epoxy or cementitious grout to permanently lock in load, or, extended with a non-hardening fluid to exert variable load. An accumulator placed in the hydraulic circuit with Plate Jacks can be utilized to provide constant load on shoring or anchors in an expansive or consolidating soil deposit.

Plate Jacks® as temporary shoring jacks—



Approximately 400 Plate Jacks® are used as temporary shoring jacks on this project. These jacks will be re-formed and re-used multiple times during the life of the project.



Plate Jacks® are used for load transfer in major marine oil storage and processing facilities

Applications

Can I correct for settlement in existing structures?

Plate Jacks® are inserted between foundation elements and extended with epoxy or cementitious grout to correct settlement. Jacks are stacked as necessary to correct settlements exceeding 1".

Can I transfer load to new footings in existing buildings?

When new footings are required, Plate Jacks® are inserted above the new footings, and extended to take up the elastic deflection of the structure resulting from the new load path, and to accommodate elastic and inelastic soil deformation. Where time dependent soil consolidation is anticipated, jacks are initially extended and then adjusted as consolidation progresses using non-hardening fluid, then solidified by transfusion with epoxy when consolidation stabilizes.

What about maintaining level in new construction on foundation soils having variable compressibility?

When constructing structures founded in soils having variable compressibility within the footprint of the structure, differential settlement of the various footings may occur as the weight of the structure increases during construction. Plate Jacks, extended with non-hardening fluid to correct differential settlement as load increases, then solidified after stabilization by transfusion with epoxy, solve this problem.

Plate Jacks® are perfect for load transfer to seismic isolators.

To insert a seismic isolator into an existing column, it is necessary to unload the segment of the column which will receive the isolator using temporary shoring jacks, cut the column and insert the isolation device. If the temporary shoring jacks were then unloaded to transfer load back into the column, the column length would shorten by the amount of deflection in the isolation device, plus the elastic shortening in the previously unloaded section of the column, possibly causing undesirable load transfer to adjacent columns, and distress to architectural detailing in floors above. This can be prevented by extending, with epoxy, or cementitious grout, a Plate Jack® placed in line with the isolation device to essentially "steal" the load away from the temporary shoring—absorbing the elastic deflection of the column and isolator without deflecting the structure above.

Plate Jack®

Makes Most Other Jacking Systems seem too heavy, too costly or too restrictive.



Plate Jack® load cells are often used to weigh heavy machinery and refinery vessels

Plate Jacks® are useful as general jacking devices in such tight headroom situations as encountered in the replacement of bridge bearings. With proper care, jacks may be re-formed and re-used for a limited number of cycles.

Can Plate Jack® be used as Load Cells?

Plate Jacks® to be used as pressure indicators are provided with bonded bearing plates and digital or analog pressure gauges or transducers, and are pre-expanded, sealed, and calibrated against NIST reference instruments. Such units provide highly accurate and robust service in a variety of demanding field applications, including use underwater or embedded in structures.



Plate Jacks for load cells—

are outfitted with a transducer or gauge and bonded bearing plates, expanded to a set extension, sealed, and calibrated against a load cell bearing NIST traceability.

Plate Jack®—
Versatile, light,
and powerful.
Your solution is
assured with
RPS Engineering
Support.



**RS 180
Load Cell**



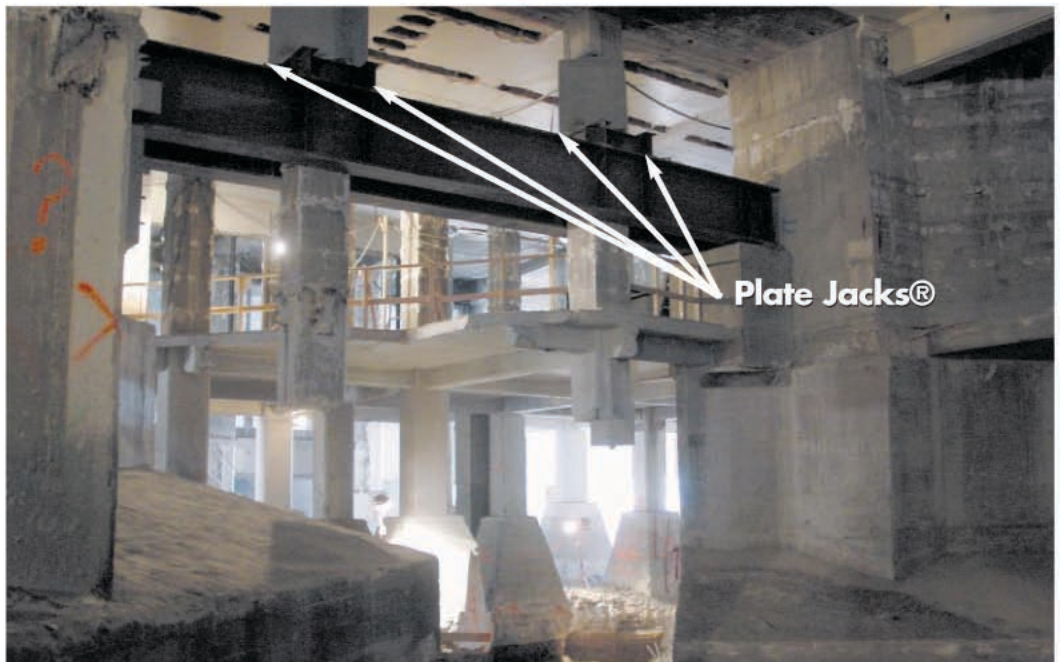
Precast segments of the Braddock Dam were positioned and leveled with Plate Jacks®

Can Plate Jack® be used for shims in Millwright work?

Plate Jacks®, particularly in the smaller sizes, are useful tool box items in lifting, lowering, or leveling heavy equipment and machinery, refinery vessels, and similar items.

What about transferring load between structural elements in the renovation of existing structures ?

Plate Jacks® are used to transfer load between structural elements avoiding undesirable deflection or distress to architectural details in renovation of existing buildings, as shown here, where Plate Jacks® are used to transfer load from existing columns to adjacent structure, permitting removal of the columns .



Four Plate Jacks®—

Used to transfer load from two columns to the steel girder permitting the removal of columns, and the floor below.

Equipment and Engineering support—

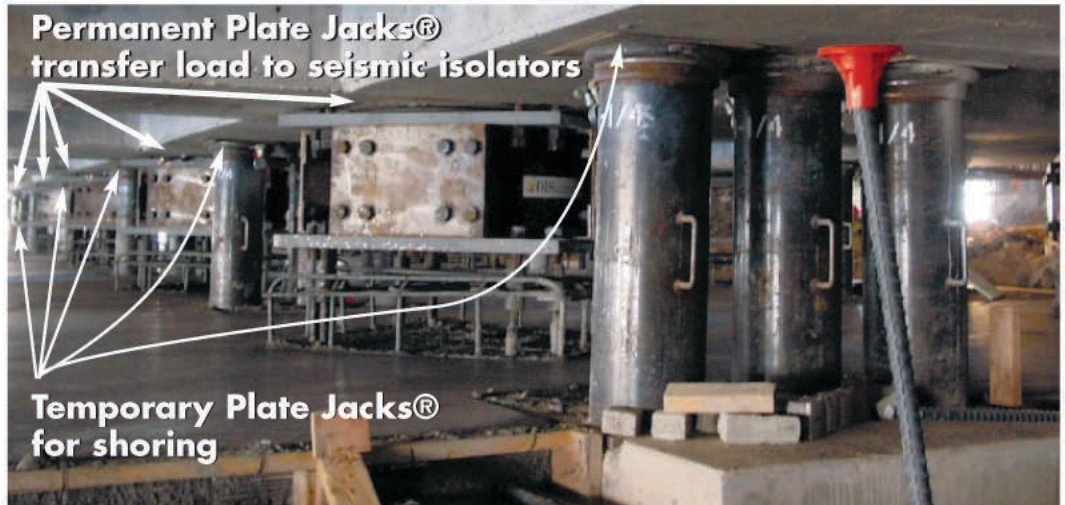
R.P. Stagg & Co., Inc. provides complete injection systems for use with hydraulic oil, water, epoxy or cementitious grouts, complete with digital or analog pressure monitoring and recording devices. Plate Jacks® and injection systems are backed by our provision of application engineering services and on-site assistance or training. Additionally, RPS designs and manufactures construction appurtenances, such as column clamps, shoring devices, transfer beams, and other load transfer devices.

Plate Jack®

Makes Most Other Jacking Systems seem too heavy, too costly or too restrictive.



There are over 5,000 Plate Jacks® permanently installed worldwide.



Rows of temporary Plate Jacks®, and permanent Plate Jacks®—
Approximately 700 Plate Jacks® will be used in temporary and permanent installations in the Utah State Capitol renovation.



Utah State Capitol—



Makes Most Other Jacking Systems
seem too heavy, too costly or too restrictive.

Plate Jack®—the jack of choice

in areas of constrained headroom and for effective permanent jack installation

Standard Plate Jacks®—2,500 psi allowable working pressure—technical data

Jack Size	Rated Load, kips	Diameters		Fluid Volumes, cu.in.		Dry Weight, lbs.	
		Jack	Bearing Plate	Unextended	1" Extension	Jack and Fitting	With Bearing Plates
RS 020	18	4.75"	2.79"	9	18	3	5
RS 030	30	6.00"	4.04"	12	34	4	7
RS 080	89	8.75"	6.79"	19	69	5	16
RS 110	118	9.88"	7.92"	22	86	6	20
RS 130	140	10.63"	8.67"	24	99	7	24
RS 180	180	11.88"	9.92"	27	123	8	30
RS 240	280	13.88"	11.92"	32	165	10	41
RS 400	420	16.50"	14.54"	38	231	13	60
RS 500	570	19.00"	17.04"	44	303	16	81
RS 800	930	23.63"	21.67"	55	463	24	128
RS 1000	1,160	26.00"	24.04"	62	558	28	156
RS 1400	1,500	29.50"	27.54"	70	714	35	204
RS 1900	2,060	34.25"	32.29"	82	957	46	278
RS 2100	2,320	36.25"	34.29"	87	1070	51	312
RS 2500	2,680	38.22"	36.26"	92	1188	54	347
RS 2900	2,970	40.86"	38.90"	98	1355	59	396
RS 3800	3,860	46.29"	44.33"	112	1732	75	512
RS 4500	4,530	50.00"	48.04"	121	2017	87	601
RS 5300	5,300	53.93"	51.97"	131	2342	100	701
RS 6100	6,135	57.86"	55.90"	140	2691	115	810



Notes:

1. Maximum rated extension (lift) of all listed jacks is 1".
2. Rated load is thrust with 2,500 psi hydraulic pressure and at 1" extension. Thrust is slightly greater at lesser extensions. Where jacks are extended with a hardening material, such as epoxy, the permanent long term compressive capacity is the bearing area of the jack times the allowable compressive strength of the injection material.
3. Divide fluid volumes by 231 to obtain U.S. gallons.
4. Weight of fittings includes 3/8" needle valve on injection nozzle and plug on vent.
5. Weight with bearing plates assumes 1/2" steel plates. Nylon or UHMW-PE plates may be used to reduce weight.
6. The RS 1900 is available in a 1 3/4" extension capability. Specify as RS 1915.

Specially sized jacks can be manufactured to your project requirements



Plate Jack®—the jack of choice
in areas of constrained headroom and for effective permanent jack installation



"5" Series Plate Jacks®—technical data

5,000 psi allowable working pressure

Jack Size	Rated Load, kips	Diameters		Fluid Volumes, cu.in.		Dry Weight, lbs.	
		Jack	Bearing Plate	Unextended	1" Extension	Jack and Fitting	With Bearing Plates
5-14	591	14.00"	11.90"	31	182	16	48
5-16.5	899	16.50"	14.40"	38	247	21	67
5-23.75	2020	23.75"	21.65"	56	493	40	144
5-28	2847	28.00"	25.90"	66	676	54	204
5-38	5561	38.00"	35.90"	91	1217	95	385

The **"5" Series Plate Jacks®** were developed for applications in which the available foot print is too small to permit use of a standard Plate Jack®



Specially sized jacks can be manufactured to your project requirements

- Notes:**
1. Maximum rated extension (lift) of "5" series jacks is 1".
 2. Unextended thickness of "5" series jacks is 15/16".
 3. Rated load is thrust with 5,000 psi hydraulic pressure and at 1" extension. Thrust is slightly greater at lesser extensions. Where jacks are extended with a hardening material, such as epoxy, the permanent long term compressive capacity is the bearing area of the jack times the allowable compressive strength of the injection material.
 4. Divide fluid volumes by 231 to obtain U.S. gallons.
 5. Weight of fittings includes 3/8" needle valve on injection nozzle and plug on vent.
 6. Weight with bearing plates assumes 1/2" steel plates. Other materials may be used to reduce weight.

Plate Jack®

Plate Jack™ — the jack of choice

in areas of constrained headroom and for effective permanent jack installation

Standard Plate Jacks™ — 2,500 psi (17.24 N/mm²) allowable working pressure—technical data



Jack Size	Rated Load, kN	Diameters, mm		Fluid Volumes, liter		Dry Weight, kg	
		Jack	Bearing Plate	Unextended	25mm Extension	Jack and Fitting	With Bearing Plates
RS 020	80	121	71	0.15	0.30	1.4	2.3
RS 030	133	152	102	0.20	0.56	1.8	3.2
RS 080	396	222	172	0.31	1.13	2.3	7.3
RS 110	525	251	201	0.36	1.41	2.7	9.1
RS 130	623	270	220	0.39	1.62	3.2	11
RS 180	801	302	252	0.44	2.02	3.6	14
RS 240	1,245	352	302	0.52	2.70	4.5	19
RS 400	1,870	419	369	0.62	3.79	5.9	27
RS 500	2,540	483	433	0.72	4.97	7.3	37
RS 800	4,140	600	550	0.90	7.59	11	58
RS 1000	5,160	660	610	1.02	9.15	13	71
RS 1400	6,670	749	699	1.15	11.7	16	93
RS 1900	9,160	870	820	1.34	15.7	21	126
RS 2100	10,320	921	871	1.43	17.5	23	142
RS 2500	11,920	971	921	1.51	19.5	24	157
RS 2900	13,210	1,038	988	1.61	22.2	27	180
RS 3800	17,170	1,176	1,126	1.84	28.4	34	232
RS 4500	20,150	1,270	1,220	1.98	33.1	39	273
RS 5300	23,570	1,370	1,320	2.15	38.4	45	318
RS 6100	27,290	1,470	1,420	2.30	44.1	52	367

Notes:

1. Maximum rated extension (lift) of all listed jacks is 25 mm.
2. Rated load is thrust with 17.24 N/mm² hydraulic pressure and at 25 mm extension. Thrust is slightly greater at lesser extensions. Where jacks are extended with a hardening material, such as epoxy, the permanent long term compressive capacity is the bearing area of the jack times the allowable compressive strength of the injection material.
3. Weight of fittings includes 3/8" (9.5 mm) needle valve on injection nozzle and plug on vent.
4. Weight with bearing plates assumes 25.4 mm steel plates. Nylon or UHMW-PE plates may be used to reduce weight.
5. The RS 1900 is available in a 44 mm extension capability. Specify as RS 1915.

Specially sized jacks can be manufactured to your project requirements



Plate Jack™—the jack of choice
in areas of constrained headroom and for effective permanent jack installation



"5" Series Plate Jacks™—technical data

5,000 psi (34.48N/mm²) allowable working pressure

Jack Size	Rated Load, kN	Diameters, mm		Fluid Volumes, liter		Dry Weight, kg	
		Jack	Bearing Plate	Unextended	25mm Extension	Jack and Fitting	With Bearing Plates
5-14	2,628	36	30	0.50	2.98	7.3	22
5-16.5	3,999	42	37	0.62	4.05	9.5	30
5-23.75	8,985	60	55	0.90	8.08	18	65
5-28	12,660	71	66	1.08	11.1	25	93
5-38	24,730	97	91	1.49	19.9	43	175

The **"5" Series Plate Jacks®** were developed for applications in which the available foot print is too small to permit use of a standard Plate Jack®



Specially sized jacks can be manufactured to your project requirements

Notes:

1. Maximum rated extension (lift) of "5" series jacks is 25 mm.
2. Unextended thickness of "5" series jacks is 33 mm.
3. Rated load is thrust with 34.48 N/mm² hydraulic pressure and at 25 mm extension. Thrust is slightly greater at lesser extensions. Where jacks are extended with a hardening material, such as epoxy, the permanent long term compressive capacity is the bearing area of the jack times the allowable compressive strength of the injection material.
4. Weight of fittings includes 3/8" (9.5 mm) needle valve on injection nozzle and plug on vent.
5. Weight with bearing plates assumes 12.7 mm steel plates. Other materials may be used to reduce weight.

Plate Jack®