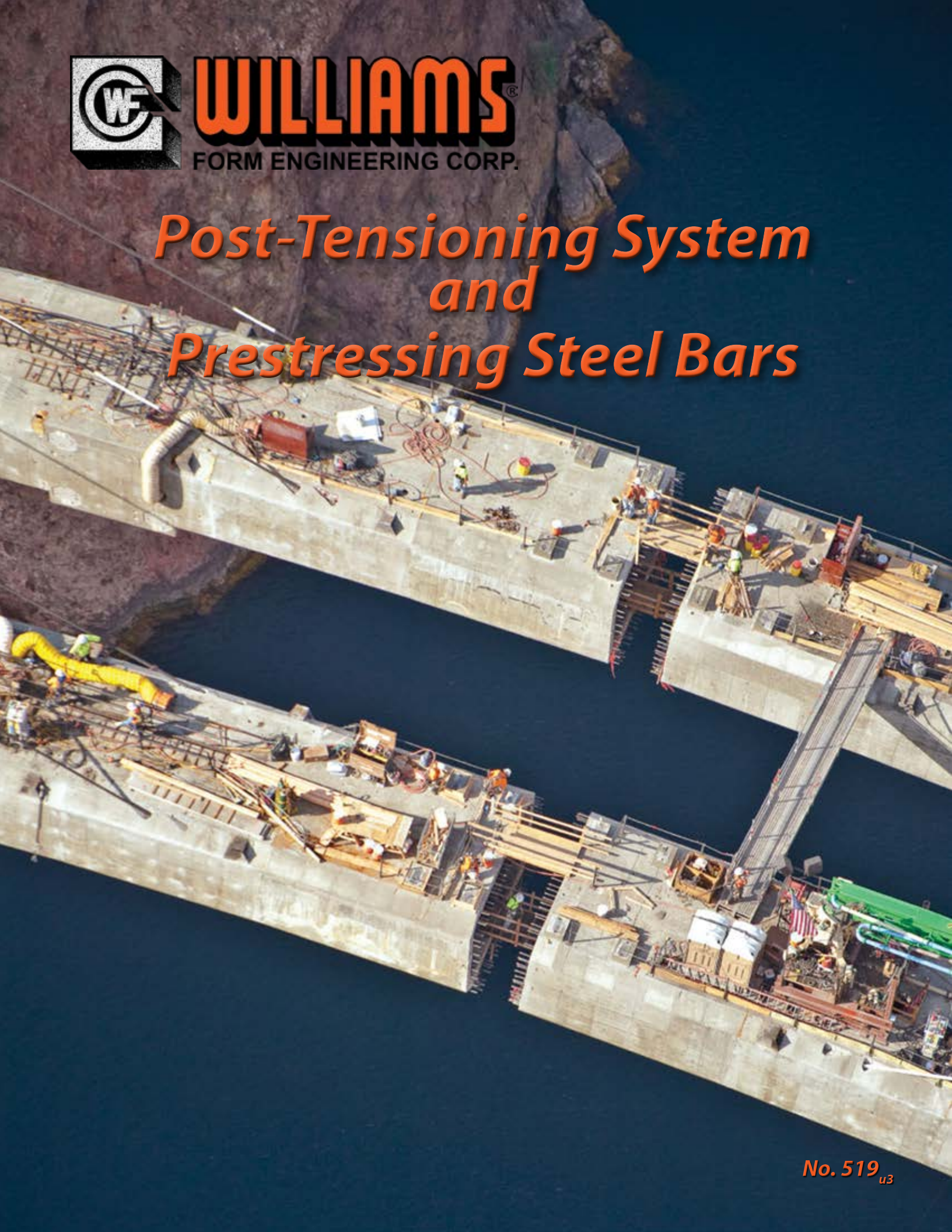
WILLIAMS®
FORM ENGINEERING CORP.

Post-Tensioning System and Prestressing Steel Bars



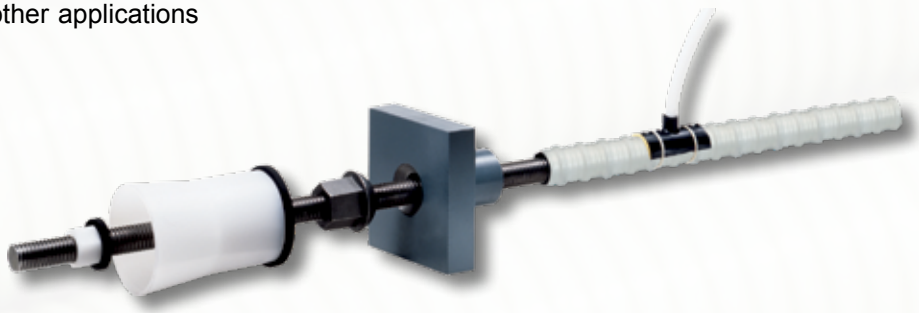
No. 519 u3

The Williams System

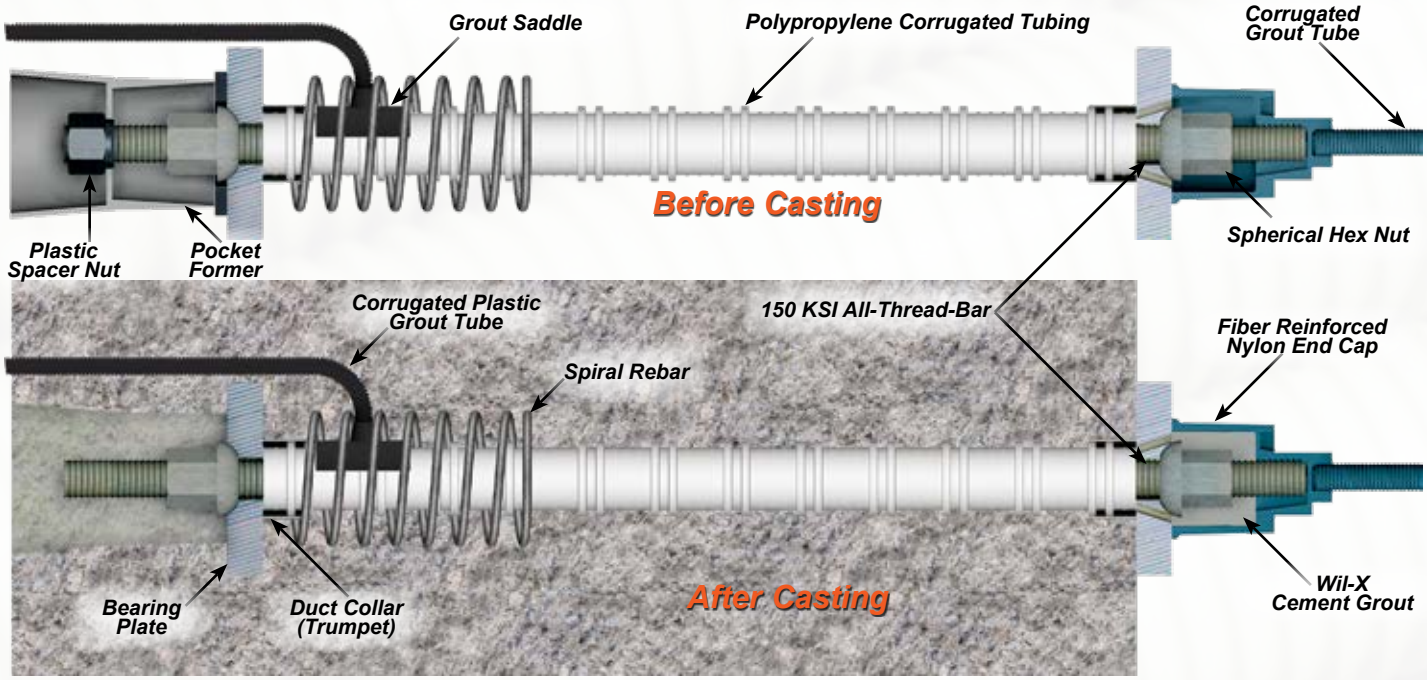
Williams Prestressing / Post-Tensioning Systems consist of high tensile steel bars available in seven diameters from 1" (26 mm) to 3" (75 mm) with guaranteed tensile strengths to 1027 kips (4568 kN). They are provided with cold rolled threads over all or a portion of the bar's length. All tension components for the systems are designed to develop 100% of the bar strength. All components of the systems are designed and manufactured in the United States. Williams All-Thread-Bar systems have been field proven around the world.

Applications

Williams All-Thread-Bars were developed for use as Prestressing bars. Over the years many other applications have been adopted such as:



- Transverse Post Tensioning
- Longitudinal Post Tensioning
- Pile Test Anchors
- Rock Anchors
- Concrete Ties
- Hanger Bolts
- Jacks
- Structural Steel Frame Ties
- Shear Pins
- Bridge Retrofit Applications
- Prestressed Block and Brick Construction
- Seismic (earthquake) Restrainer Systems
- Ground Anchors and Soil Nails
- Wood Structure Post-Tension Bars
- Temporary High Strength Connections
- Tower Base Plate Anchor Bolts
- Sheet Pile Ties and Tie-backs
- High Strength Concrete Reinforcement Bars
- Multiple Corrosion Protection Anchors
- Wind Generator Foundation Anchor Bolts



150 KSI All-Thread-Bar

R71 150 KSI All-Thread-Bar

ASTM A722*

Nominal Bar Diameter & Pitch	Minimum Net Area Thru Threads	Minimum Ultimate Strength	Prestressing Force			Nominal Weight	Approx. Thread Major Dia.	Part Number
			0.80*f* pu A	0.70*f* pu A	0.60*f* pu A			
1" - 4 (26 mm)	0.85 in² (549 mm²)	128 kips (567 kN)	102 kips (454 kN)	89.3 kips (397 kN)	76.5 kips (340 kN)	3.09 lbs/ft (4.6 kg/m)	1-1/8" (29 mm)	R71-08
1-1/4" - 4 (32 mm)	1.25 in² (807 mm²)	188 kips (834 kN)	150 kips (667 kN)	131 kips (584 kN)	113 kips (500 kN)	4.51 lbs/ft (6.7 kg/m)	1-7/16" (37 mm)	R71-10
1-3/8" - 4 (36 mm)	1.58 in² (1019 mm²)	237 kips (1054 kN)	190 kips (843 kN)	166 kips (738 kN)	142 kips (633 kN)	5.71 lbs/ft (8.5 kg/m)	1-9/16" (40 mm)	R71-11
1-3/4" - 3-1/2 (46 mm)	2.60 in² (1664 mm²)	390 kips (1734 kN)	312 kips (1388 kN)	273 kips (1214 kN)	234 kips (1041 kN)	9.06 lbs/ft (13.5 kg/m)	2" (51 mm)	R71-14
2-1/4" - 3-1/2 (57 mm) *	4.08 in² (2632 mm²)	613 kips (2727 kN)	490 kips (2181 kN)	429 kips (1909 kN)	368 kips (1636 kN)	14.1 lbs/ft (20.8 kg/m)	2-1/2" (64 mm)	R71-18
2-1/2" - 3 (65 mm)	5.19 in² (3350 mm²)	778 kips (3457 kN)	622 kips (2766 kN)	545 kips (2422 kN)	467 kips (2074 kN)	18.2 lbs/ft (27.1 kg/m)	2-3/4" (70 mm)	R71-20
3" - 3 (75 mm)	6.85 in² (4419 mm²)	1027 kips (4568 kN)	822 kips (3656 kN)	719 kips (3198 kN)	616 kips (2740 kN)	24.1 lbs/ft (35.8 kg/m)	3-1/8" (80 mm)	R71-24

* The 2-1/4" diameter bar is not covered under ASTM A722.

- ACI 318-14, Section 17.5.1.2 indicates that the nominal shear strength of an anchor not exceed 0.60 x area of steel x the ultimate stress of the steel. Designers should utilize appropriate resistance factors for shear based on the condition of use.
- Per PTI recommendations for anchoring, anchors should be designed so that:
  - The design load is not more than 60% of the specified minimum tensile strength of the prestressing steel.
  - The lock-off load should not exceed 70% of the specified minimum tensile strength of the prestressing steel.
  - The maximum test load should not exceed 80% of the specified minimum tensile strength of the prestressing steel.
  - Maximum test load and maximum factored design load must not exceed the yield strength of ANY steel element.

Sizes

Williams 150 KSI bars are manufactured in 7 diameters from 1" (26 mm) through 3" (75 mm). All diameters are available in continuous lengths up to 50' (15.2 m).

Steel Quality

Williams 1" through 1-3/8" 150 KSI bars are smooth, hot rolled, high strength prestressing steel. The bars are cold-stressed and stress relieved in strict compliance with ASTM A722 and AASHTO M275 Highway Specifications. The 1-3/4" through 3" 150 KSI bars are made from alloy steel that is hot rolled, quenched and tempered to meet to the prescribed mechanical properties of ASTM A722.

Thorough inspection and traceability are carried out during all phases of manufacturing to assure the highest standards of quality.

Properties

Williams 150 KSI bars are high in strength yet ductile enough to exceed the specified elongation and reduction of area requirements. Selected heats can also pass the 135° supplemental bend test when required. Testing has shown Williams 150 KSI All-Thread-Bars to meet or exceed post tensioning bar and rock anchoring criteria as set by the Post Tensioning Institute including dynamic test requirements beyond 500,000 cycles of loading.

Williams 360° continuous thread deformation pattern has the ideal relative rib area configuration to provide excellent bond strength capability to grout or concrete, far better than traditional reinforcing deformation patterns.

Cutting (No Welding)

Williams 150 KSI All-Thread-Bar should not be subjected to the heat of a torch, welding or used as a ground. Field cutting should be done with an abrasive wheel or band saw.

Threads

All-Thread-Bars are cold rolled threaded to close tolerances under continuous monitoring procedures for quality control. Threads for Williams 150 KSI bar are specially designed with a rugged thread pitch wide enough to be fast under job site conditions and easy to assemble. They also have a smooth, wide, concentric, surface suitable for torque tensioning. This combination offers tremendous installation savings over inefficient, hot rolled, non-concentric thread forms. Threads are available in both right and left hand.

Williams All-Thread-Bars are threaded around the full circumference enabling the load transfer from the bar to the fasteners to occur efficiently without eccentric point loading. Williams fasteners easily meet the allowable load transfer limitations set forth by the Post Tensioning Institute. Williams 150 KSI All-Thread-Bars and fasteners are machined to tight tolerances for superior performance and mechanical lock. Precision machining greatly reduces concern of fastener loosening or detensioning. Williams 150 KSI bars exceed the deformation requirements of ASTM A722. Williams special thread deformation pattern projects ultra high relative rib area, much greater than conventional rebar. This provides for superior bond performance in concrete.

Tensile Strength & Working Loads

Williams 150 KSI bars are available with ultimate tensile strengths and working loads as displayed above. Safety factors and functional working loads are at the discretion of the project design engineer, however test loads should never exceed 80% of the published ultimate bar strength.

150 KSI All-Thread-Bar Accessories

Williams All-Thread-Bar fasteners are machine threaded (no cast threads) to specific tolerances for precision adjustments. The All-Thread-Bar fasteners below are designed to develop 100% of the All-Thread Bar ultimate strength meeting all criteria set forth for anchorages by the Post-Tensioning Institute and ASTM A-722 specifications. Standard hex nuts and spherical base hex nuts are available to be used with standard or dished plates, respectively.

Standard All-Thread-Bar couplings are stop-type having both ends tapped equal distance with an untapped section in the center. Stop-type couplings allow for proper engagement of each All-Thread-Bar. Couplings tapped completely through are available by special request.

Hex Nut

Round Collar Nut

All Couplings and Hex/Collar Nuts exceed 100% of the bar's published ultimate strength and couplings will meet ACI 318 Section 25.5.7.1 for mechanical rebar connections.

R73 Hex Nuts & R74 Collar Nuts

Bar Diameter	Across Flats	OD/Across Corners	Thickness	Part Number
1" (26 mm)	1-3/4" (44 mm)	2.0" (51 mm)	1-5/8" (41 mm)	R73-08
1-1/4" (32 mm)	2-1/4" (57 mm)	2.6" (66 mm)	1-7/8" (48 mm)	R73-10
1-3/8" (36 mm)	2-1/2" (64 mm)	2.9" (73 mm)	2-1/8" (54 mm)	R73-11
1-3/4" (46 mm)	3" (76 mm)	3.5" (88 mm)	3-1/2" (89 mm)	R73-14
2-1/4" (57 mm)	3-3/4" (95 mm)	4.3" (109 mm)	3-3/4" (95 mm)	R73-18
2-1/2" (65 mm)	4-1/4" (108 mm)	4.9" (124 mm)	3-3/4" (95 mm)	R73-20
3" * (75 mm)	4-1/2" (114 mm)	OD 5" (127 mm)	5-1/2" (140 mm)	R74-24

* Rounded Collar Nut

R72 Stop-Type Couplings

Bar Diameter	Outside Diameter	Overall Length	Part Number
1" (26 mm)	1-3/4" (44 mm)	4" (102 mm)	R72-08
1-1/4" (32 mm)	2-1/8" (54 mm)	4-1/2" (114 mm)	R72-10
1-3/8" (36 mm)	2-3/8" (60 mm)	5" (127 mm)	R72-11
1-3/4" (46 mm)	3" (76 mm)	8-1/2" (216 mm)	R72-14
2-1/4" (57 mm)	3-1/2" (89 mm)	8-1/2" (216 mm)	R72-18
2-1/2" (65 mm)	4-1/4" (108 mm)	8-5/8" (219 mm)	R72-20
3" (75 mm)	5" (127 mm)	11-7/8" (302 mm)	R72-24

R9F Hardened Washers

Bar Diameter	Outside Diameter	Inside Diameter	Thickness	Part Number
1" (26 mm)	2-1/4" (57 mm)	1-3/16" (30 mm)	5/32" (4 mm)	R9F-09-436
1-1/4" (32 mm)	2-3/4" (70 mm)	1-1/2" (38 mm)	5/32" (4 mm)	R9F-11-436
1-3/8" (36 mm)	3" (76 mm)	1-5/8" (41 mm)	5/32" (4 mm)	R9F-12-436
1-3/4" (46 mm)	3-3/4" (95 mm)	2-1/8" (54 mm)	7/32" (6 mm)	R9F-16-436
2-1/4" (57 mm)	4-1/2" (114 mm)	2-5/8" (67 mm)	9/32" (7 mm)	R9F-20-436
2-1/2" (65 mm)	5" (127 mm)	2-7/8" (73 mm)	9/32" (7 mm)	R9F-22-436
3" (75 mm)	6" (152 mm)	3-3/8" (86 mm)	9/32" (7 mm)	R9F-26-436

To achieve full strength of the system, hardened washers must be used with R73 hex nuts

Provides up to 5° angle when used with a dished plate.

R88 Spherical Hex Nuts

Bar Diameter	Across Flats	Thickness	Outside Dome	Part Number
1" (26 mm)	1-3/4" (44 mm)	2-1/4" (57 mm)	2-1/2" (64 mm)	R88-08
1-1/4" (32 mm)	2-1/4" (57 mm)	2-3/4" (70 mm)	3-1/8" (80 mm)	R88-10
1-3/8" (36 mm)	2-1/2" (64 mm)	3-1/4" (83 mm)	3-5/8" (90 mm)	R88-11
1-3/4" (46 mm)	3" (76 mm)	3-1/2" (89 mm)	4" (102 mm)	R88-14
2-1/4" * (57 mm)	3-3/4" (95 mm)	5-1/4" (133 mm)	5-1/2" (140 mm)	R73-18 R81-18
2-1/2" * (65 mm)	4-1/4" (108 mm)	5-1/2" (140 mm)	6" (152 mm)	R73-20 R81-20
3" ** (75 mm)	4-1/4" (108 mm)	7-1/2" (191 mm)	7" (178 mm)	R74-24 R81-24

* Standard Nut with Spherical Washer assembly
** Rounded Collar Nut with Spherical Washer assembly.

Placing Bars

Williams All-Thread-Bars can be placed prior to the concrete pour or assembled through ducting in cast concrete. Care should be taken not to impact the bars or subject them to excessive bending. When coupled bars are used in precast concrete, upset ducting may be used on one end when casting the concrete to allow the coupled bar to slide into place. Stop-type couplings are provided with Williams All-Thread-Bars to assure proper engagement of each bar. As a safety measure, it is always a good idea to mark the end of each All-Thread-Bar to be coupled with the proper engagement length. A grease pencil or similar tool can be used.

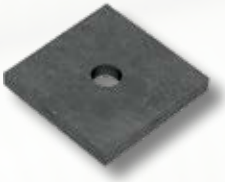
Other Accessories

Steel Bearing Plates

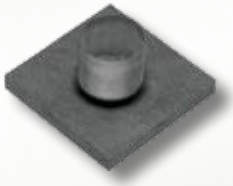
ASTM A36 or A572

Williams steel bearing plates, available in Grades 36 or 50, are standard with a round hole or dished plates for use with spherical hex nuts. They can be drilled to provide free access for grout tube entry. Bearing plates are customized for each application. Plate dimensions should be specified around the parameters of the project. In addition, corrosion protection should be considered along with specifying hole diameter, bar angle and duct size.

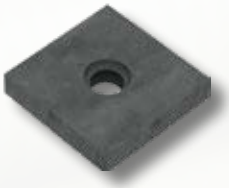
S1K - with Round Hole



S3K - Plate with Welded Trumpet



R80 - with Dished Hole

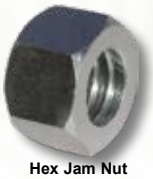


Pocket Formers

Nominal Bar Diameter Range	Minimum Diameter	Maximum Diameter	Length	Part Number
1" to 1-3/8" (26 to 36 mm)	5-5/16" (135 mm)	6-1/4" (159 mm)	8-1/2" (216 mm)	R85-K
1-3/4" (46 mm)	7" (178 mm)	8-1/4" (210 mm)	10-1/2" (267 mm)	R85-2K

Spacer Nut for Pocket Formers

Bar Diameter	Part Number
1" (26 mm)	R8608
1-1/4" (32 mm)	R8610
1-3/8" (36 mm)	R8611
1-3/4" (46 mm)	R73-14JN



Hex Jam Nut

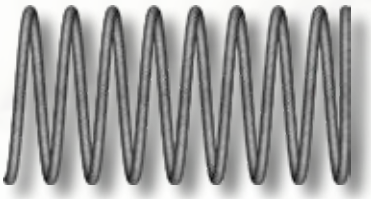
Round Collar Jam Nut

Jam Nuts can not be substituted for full strength nuts. Larger diameters will be a rounded collar jam nut, with special order machined hex available.

R73/R74-JN Jam Nuts

Bar Diameter	Across Flats	OD/Across Corners	Thickness	Part Number
1" (26 mm)	1-3/4" (44 mm)	2.0" (51 mm)	0.41" (10 mm)	R73-08JN
1-1/4" * (32 mm)	1-7/8" (48 mm)	OD 2-1/8" (54 mm)	0.47" (12 mm)	R74-10JN
1-3/8" * (36 mm)	2-1/8" (54 mm)	OD 2-3/8" (60 mm)	0.53" (14 mm)	R74-11JN
1-3/4" * (46 mm)	2-3/4" (70 mm)	OD 3" (76 mm)	0.88" (22 mm)	R74-14JN
2-1/4" * (57 mm)	3-1/4" (83 mm)	OD 3-1/2" (89 mm)	0.94" (24 mm)	R74-18JN
2-1/2" * (65 mm)	4" (102 mm)	OD 4-1/4" (108 mm)	0.94" (24 mm)	R74-20JN
3" * (75 mm)	4-1/4" (108 mm)	OD 5" (127 mm)	2" (51 mm)	R74-24JN

*Round Collar Jam Nut



Local Zone Reinforcing

The compressive strength of the concrete in the local zone (area directly under the bearing plate) can be enhanced when necessary by use of lateral confinement of spiral reinforcement. The rebar spirals are available in #3 through #5 diameters of Grade 60 Rebar and made to the project design requirements for diameter, pitch, and length. They are also available with or without a deformation pattern.

Galvanized Metal Corrugated Duct

ASTM A653

Williams Galvanized Spiral Metal Duct is typically used for internal PT tendons, and meets all physical and structural recommendations for post-tensioning duct as indicated by the Post-Tensioning Institute. The Duct is available in 2", 3", and 4" diameter with couplings and reducer couplings for all sizes.

Polypropylene Corrugated Duct

ASTM F405

Polyethylene Corrugated Duct

ASTM D4104

The stable characteristics of Williams polypropylene & polyethylene duct are normally preferred where additional corrosion protection is desirable. Polypropylene Duct has been approved by the Florida DOT for internal tendons and is available in 2-3/8" internal diameter. Polyethylene Duct is available in 2", 3", and 4" diameters. Couplings are available for all sizes.

Project Photos

Project: SR 520 Evergreen Point Floating Bridge
General Contractor: Kiewit/General/Manson, JV
Post-Tensioning Supplier: Schwager Davis, Inc.
Location: Seattle, WA

Project: Spaghetti Bowl
Contractor: Walter & SCI Construction
Location: Las Vegas, NV

Project: Memorial Causeway Bridge
Contractor: PCL / VSL
Location: Clearwater, FL

Project: Muskegon River Bridge
Contractor: Freyssinet USA
Location: Big Rapids, MI

Project: Sunshine Skyway High Level Approach Column Repair
Contractor: Delta Construction Specialties / VSL
Location: St. Petersburg, FL

Project: Belleair Beach Causeway
Contractor: Johnson Brothers Corporation &
Misner Marine Construction / VSL
Location: Pinellas County, FL

Project Photos

Project: 4 Bears Bridge
PT Contractor: VStructural
Location: New Town, ND

Project: Astronomical Observatory Tower
Contractor: Narum Concrete Construction
Location: Central Washington University, Ellensburg, WA

Project: Devil's Slide Bridge
Contractor: Disney Construction
Post-Tensioning Supplier: Schwager Davis, Inc.
Location: Pacifica, CA

Project: Colorado River Bridge
General Contractor: Obayashi / PSM, JV
Post-Tensioning Supplier: Schwager Davis, Inc.
Location: Hoover Dam, NV

Project Name: San Francisco - Oakland East Bay Skyway Bridge
Designer: T.Y. Lin / Moffet & Nichol, JV
Contractor: Kiewit / FCI /Manson, JV
Post-Tensioning Supplier: Schwager Davis, Inc.

Project: Precast Post-Tensioned Panel Wall
Contractor: Morgan & Oswood
Location: Hoback Junction, WY

Corrosion Protection

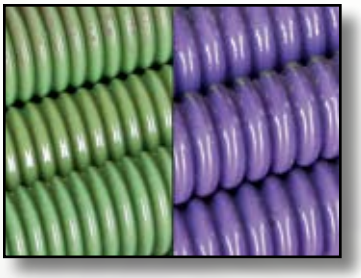
Cement Grout

A contributing layer of corrosion protection for prestressed concrete anchors is complete encapsulation in cement grout of the steel tendon from the base of the concrete anchor to the anchorage. Portland cement grouts are alkaline in nature, render encased steel into a passive state, and eliminate any contact with the steel to air or water. Intelligent design, followed by thorough grouting operations performed by trained technicians provides a competent layer of corrosion protection for Williams prestressed concrete anchors. Cement grout should not be considered a contributing means of corrosion protection if used with a passive concrete anchor application as the grout will be prone to cracking when elongation occurs due to the dynamic loading of the passive anchor.

Williams recommends a portland cement based, shrinkage compensated, or expansive grout as the cement grout corrosion protection for prestressed concrete anchor applications. Grout should be injected after prestress forces are locked off by the use of grout tubes, de-air holes, or grout attachments to fill the remaining drill hole annulus around Williams concrete anchors.

Hot Dip Galvanizing

Zinc serves as a sacrificial metal corroding preferentially to the steel. Galvanized bars have excellent bond characteristics to grout or concrete and do not require as much care in handling as epoxy coated bars. However, galvanization of anchor rods is more expensive than epoxy coating and often has greater lead time. Hot dip galvanizing bars and fasteners should be done in accordance with ASTM A153. Typical galvanized coating thickness for steel bars and components is between 3 and 4 mils. 150 KSI high strength steel bars shall require special cleaning procedures to avoid problems associated with hydrogen embrittlement in compliance with ASTM A143.



Epoxy Coating

Fusion bonded epoxy coating of steel bars to help prevent corrosion has been successfully employed in many applications because of the chemical stability of epoxy resins. Epoxy coated bars and fasteners should be done in accordance with ASTM A775 or ASTM A934. Epoxy coated bars and components are subject to damage if dragged on the ground or mishandled. Heavy plates and nuts are often galvanized even though the bar may be epoxy coated since they are difficult to protect against abrasion in the field. Epoxy coating patch kits are often used in the field for repairing nicked or scratched epoxy surfaces.

Corrosion Inhibiting Grease, Gel or Wax with Sheath

Williams corrosion inhibiting compounds can be placed in the free stressing sleeves, in the end caps, or in the trumpet areas. Most commonly bars are greased and PVC is slipped over the grease bar prior to shipping. Each of the options Williams offers are of an organic compound that provide the appropriate moisture displacement and have corrosion inhibiting additives with self- healing properties. They can be pumped or applied manually. Grease and Gel stay permanently viscous, while wax is solid at normal temperatures and must be heated to liquify and facilitate pumping. Each compound is chemically stable, and non-reactive with the prestressing steel, duct materials, or grout, and all meet PTI standards for Corrosion Inhibiting compounds.

Adhesive Backed Heat Shrink

Provides a corrosion protected seal when connecting smooth or corrugated segments.

End Caps

Williams offers several different types of end caps to provide corrosion protection at otherwise exposed anchor ends. Most often the caps are packed with corrosion inhibiting grease. Caps made from steel are used in exposed impact areas. The Fiber Reinforced Nylon End Cap meets the Florida DOT standards for *New Directions of Post-Tensioned Bridges.*

Screw-on Fiber Reinforced Nylon Cap

Steel Tube welded on Flange with Threaded Screw Connections

Steel Tube with Jam Nut

Grouting Accessories

Conforms to ASTM C845 Type K

Wil-X is chemically compensated for shrinkage. It has a high bond value and is crack resistant for permanent installations. Wil-X can be used safely with most concrete admixtures. Wil-X grout will be thicker than a Portland cement grout with the same water to cement ratio. Therefore, use of a high-range water reducing admixture (super plasticizer) is recommended if grout will be pumped or if higher fluidity is desired. Because it is a cement-based grout, it is non-explosive and has a six-month shelf life when stored properly in a dry location and out of direct sunlight.

50 lbs. bag

5 gallon, resealable, moisture proof, polypropylene pails

Compressive Strength
Wil-X Cement Grout & Water
(74° F Dry Environment)
0.44 w/c ratio

Time	PSI	MPa
1 Day	2,800	19.3
3 Days	6,400	44.1
7 Days	7,700	53.1
28 Days	9,500	65.5

Wil-X may be used to build up leveling pads by simply mixing with sand or pea gravel. This mixture should not be run through the grout pump.

Setting Time: Gilmore Needles (ASTM C266). Initial set 45 minutes; final set 10 hours.

Comparative compressive strength test in PSI (modified ASTM C109) Actual strengths as mixed according to Williams Instructions range from 6,000 to 9,500 PSI depending on water content. Copy of ASTM Modification available upon request.

Results based on a controlled laboratory environment (see product data for details). Jobsite results may vary.

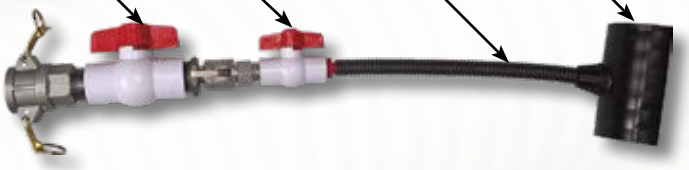
T3P Heavy Duty Plastic Grout Tube

Furnished in product lengths for the rockbolts or in rolls.

O.D.	I.D.	Part No.
3/8" (10 mm)	1/4" (6 mm)	T3P03002
1/2" (13 mm)	3/8" (10 mm)	T3P04003
5/8" (16 mm)	1/2" (13 mm)	T3P05004
3/4" (19 mm)	5/8" (16 mm)	T3P06005
1" Nom. (25 mm)	3/4" Nom. (19 mm)	T3P06

Grout Saddle System

For quick attachment and release of tendons to grout hose.



Super Plasticizer

Plasticizer is available and is used as a water reducer for ease of pumping grout through tubes at lower water to cement ratios.

Colloidal Grout Plant

The heavy duty, high volume Colloidal Grout Plant is favored for precision post-tension grouting. The unit features a high speed shear mixer that thoroughly wets each particle and discharges the mixed material into a 13 cubic foot capacity agitating holding tank. A direct coupled progressing cavity pump delivers slurries at a rate of up to 20 gpm and pressures of up to 261 psi. The unit easily mixes and pumps slurries of Portland cement, fly ash, bentonite, and lime flour. All controls are conveniently located on the operator platform for easy one-man control.

Pump

Pump Type: Progressing cavity
Output/Pressure: Variable up to 20 gpm, 261 psi

Colloidal Mixer

Mix Tank: 13 CF with bottom clean out
Mixing Pump: High Shear Colloidal
Holding Tank: 13 CF paddle agitating

Drive Power

Air: 300 CFM, 100 psi

Physical Specifications

Dimensions: 96"L x 60"W x 74"H
Weight: 1,550 lbs

Grouting

Grouting equipment shall be capable of properly mixing a low water to portland cement mix ratio. Equipment shall be capable of pumping at pressures up to 261 PSI. Standby equipment for flushing must be available. Grouting procedures should always assure the duct is grouted from the lowest gravitational point and vented to the highest.

Torque Tensioning

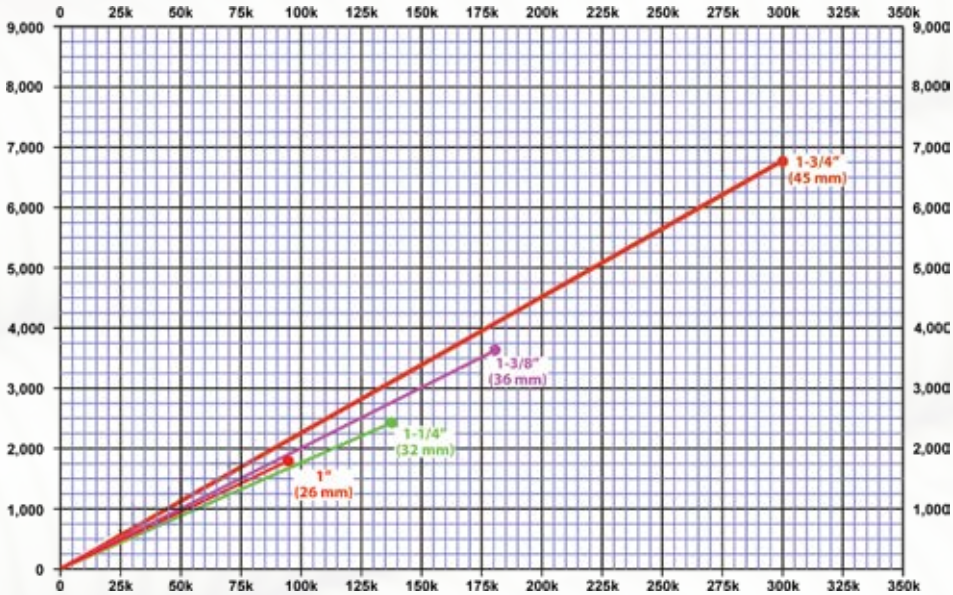
The high quality rolled thread of Post-Tensioning Bars can be torque tensioned in limited situations up to 60% of the bar's ultimate strength. This eliminates the costly and time-consuming process of lifting heavy jacking equipment on and off with a crane. The entire process takes only minutes by workers already in place and relieves expensive crane equipment to be utilized elsewhere on the project. Due to many variables of a torque tension relationship, Williams does not recommend the torque method of applying the load as an accurate substitute for direct tensioning with a hydraulic jack.

Tensioning By Jacking

Tensioning by jacking can be accomplished with the various capacity tensioning jacks shown below. Williams T80 Post-Tensioning Jacks are designed to be especially helpful for recessed situations, while the T7Z Hydraulic Test Jacks are designed for open areas. Jacks are matched with electric or air pumps. Jacks may be purchased or rented as required. Rental equipment packages include ram on mounted stand, hoses, pull rod, gauges, power unit and knocker wrench for transferring the load from the jack to the anchor head.

R71 150 KSI All-Thread-Bar Torque Tension Chart

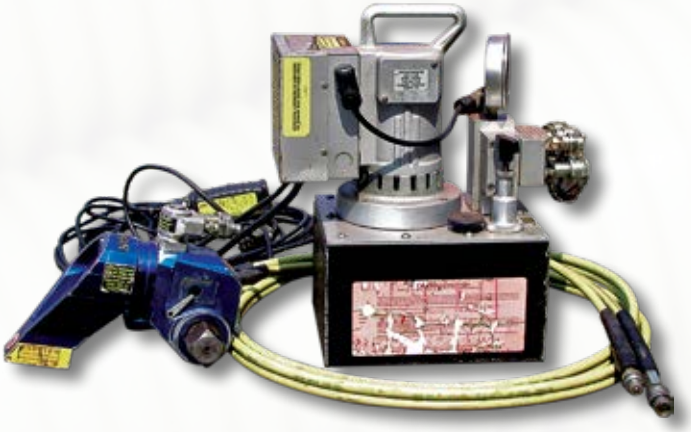
All data based on greased (MolyCoat Gn) threads and surfaces.



T8Z Hydraulic Torque Wrench

The hydraulic torque wrench is used for tensioning anchors in tight fitting locations where it would be difficult to use an hydraulic jack. The wrench is also recommended for use when setting the large diameter Spin-Lock anchors. The torque wrenches are light weight and can achieve a maximum of 7,400 ft-lbs. All Hydraulic Torque Wrenches have 1-1/2" square drive outputs.

Maximum Torque	Length	Height	Weight
5,590 ft-lbs (773 kg/M)	11.1" (279 mm)	4.5" (114 mm)	16.8 lbs (7.6 kg)
7,400 ft-lbs (1,023 kg/M)	10.7" (273 mm)	7" (178 mm)	19 lbs (11.3 kg)



T8Z Torque Wrench

For applying torque to the anchor bolt when setting the anchor.

Capacity (ft-lbs)	Square Drive Size
100-600	3/4"
200-1,000	1"

*Available with Ratchet Adapter

T3Z Hex Knocker Wrench

Hex knocker wrenches are used for safe hex nut adjustment inside of open frame jacks.

T8Z-04 Torque Multiplier (4:1)

For use with T8Z Torque Wrench. Available with 1" square drive input and 1-1/2" output for up to 4,000 ft-lbs maximum torque

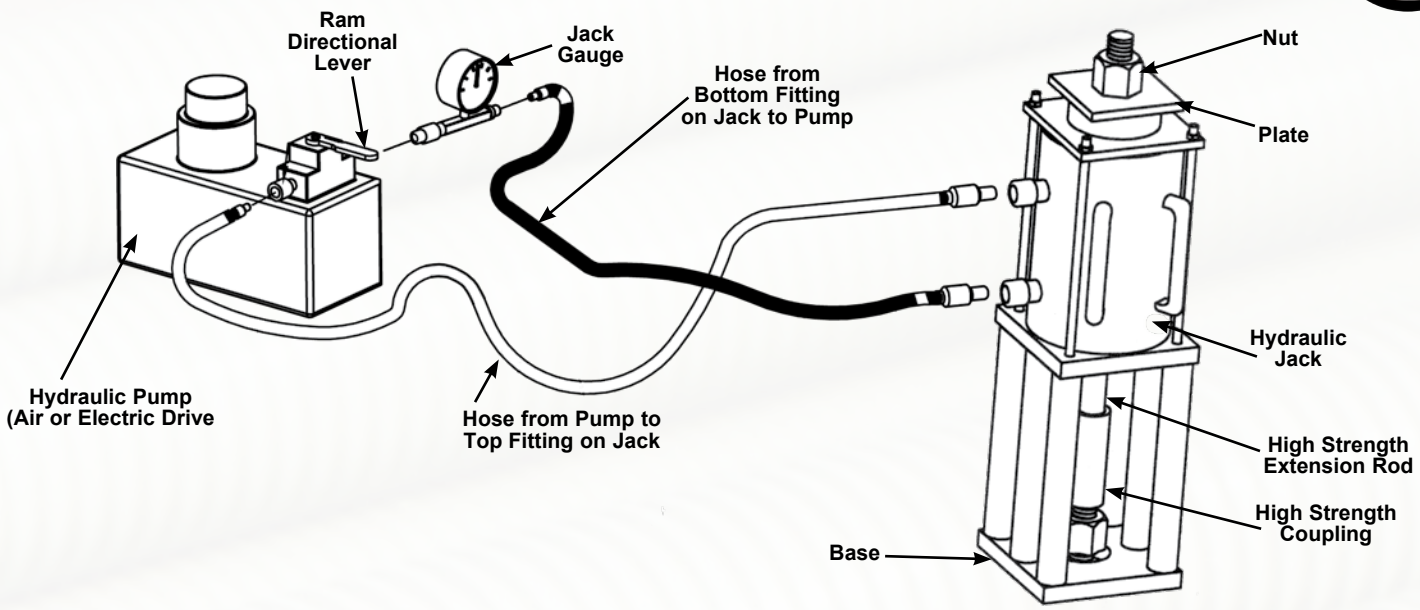
T1Z Long Fitting Tool Adapters

For torquing hex nuts, the deep socket fits over the bar's end. Works with torque wrench or impact gun.
Available with a 1" square drive.

K3F-26 Long Fitting Wrench Adapter

For applying torque to recessed rockbolt nuts that are under tension when using hydraulic jacks. Available in all rockbolt sizes.

Hydraulic Jacks



T7Z Open Frame Hydraulic Jacks

Used for testing and prestressing All-Thread-Bars. Available with up to 5-1/8" center hole. Unit comes with ram, pump, gauge, hoses, jack stand, high strength coupling, high strength test rod, plate, hex nut and knocker wrench.

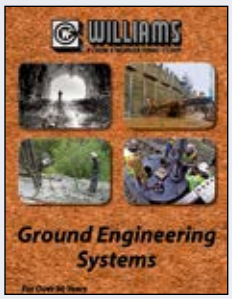
Jack Capacity	Pump Method	Ram Height	Base Size	Ram Travel	Minimum Total Ram & Frame Height	Maximum Test Rod Diameter	Ram Area	Approx. Total Ram & Frame Weight
10 tons (89 kN)	Hand Single Acting	5-5/16" (135 mm)	3" Diameter (76 mm)	2-1/2" (64 mm)	8-3/8" (213 mm)	3/4" (19 mm)	2.12 in² (14 cm²)	12 lbs (5.4 kg)
30 tons (267 kN)	Hand Double Acting	6-1/16" (154 mm)	8" x 8" (203 x 203 mm)	3" (76 mm)	19" (483 mm)	1-1/4" (32 mm)	5.89 in² (38 cm²)	80 lbs (36 kg)
60 tons (534 kN)	Hand, Air, or Electric Double Acting	9-1/2" (241 mm)	9" x 9" (228 x 228 mm)	5" (127 mm)	29" (737 mm)	2-1/8" (54 mm)	12.31 in² (79 cm²)	153 lbs (69 kg)
60 tons (534 kN)	Hand, Air, or Electric Double Acting	12-3/4" (324 mm)	9" x 9" (228 x 228 mm)	6-1/2" (165 mm)	32-1/4" (737 mm)	2-1/8" (54 mm)	12.73 in² (82 cm²)	173 lbs (78 kg)
100 tons (890 kN)	Air or Electric Double Acting	13-1/2" (343 mm)	9" x 9" (228 x 228 mm)	6" (152 mm)	29-1/8" (740 mm)	3-1/8" (79 mm)	20.63 in² (133 cm²)	198 lbs (87 kg)
100 tons (890 kN)	Air or Electric Double Acting	12-3/8" (314 mm)	9" x 9" (228 x 228 mm)	6" (152 mm)	28" (711 mm)	2" (51 mm)	20.03 in² (129 cm²)	192 lbs (87 kg)
200 tons (1779 kN)	Air or Electric Double Acting	12-1/4" (311 mm)	12" x 12" (305 x 305 mm)	8" (203 mm)	34" (864 mm)	4-1/16" (103 mm)	40.45 in² (261 cm²)	518 lbs (235 kg)
200 tons (1779 kN)	Air or Electric Double Acting	27-1/2" (699 mm)	12" x 12" (305 x 305 mm)	15" (381 mm)	49-1/4" (1250 mm)	4" (102 mm)	47.20 in² (303 cm²)	604 lbs (274 kg)
300 tons (2670 kN)	Electric Double Acting	27-1/2" (699 mm)	15" Dia. (381 mm)	15" (381 mm)	50-1/2" (1283 mm)	5-3/8" (137 mm)	78.5 in² (506 cm²)	1,400 lbs (635 kg)
400 tons (3558 kN)	Electric Double Acting	18-3/4" (476 mm)	15" Dia. (381 mm)	6" (152 mm)	45-3/4" (1162 mm)	4-1/4" (108 mm)	91.5 in² (590 cm²)	1,300 lbs (590 kg)

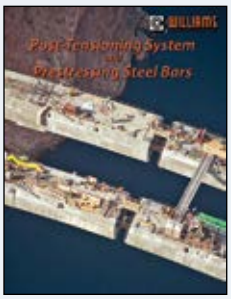
T80 Post-Tension Hydraulic Jacks

With the T80 series the enclosed bearing housing contains a geared socket drive to tighten the bolt hex nut during tensioning. Test jack housing will accommodate up to a 16" deep pocket.

Jack Capacity	Pump Method	Ram Height	Gear Box	Cylinder Diameter	Ram Travel	Minimum Total Ram & Frame Height	Maximum Test Rod Diameter	Max. 150 KSI Bar Size	Ram Area	Approx. Total Ram & Frame Weight
100 tons (890 kN)	Air or Electric Double Acting	13-1/2" (343 mm)	8.5" x 20.5" (216 x 520 mm)	4.63" (118 mm)	6" (152 mm)	39" (991 mm)	3-1/8" (79 mm)	1-3/8" (35 mm)	20.63 in² (133 cm²)	270 lbs (123 kg)

Williams offers a full line of Ground Anchors, Concrete Anchors, Post-Tensioning Systems, Wind Turbine Foundation Systems, Marine Tieback Systems and Concrete Forming Hardware Systems for whatever your needs may be. Please visit our website for the most current information.





Also available from Williams are *Rock & Soil Anchor Sample Specifications* and *High Capacity Concrete Anchor Sample Specifications*

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