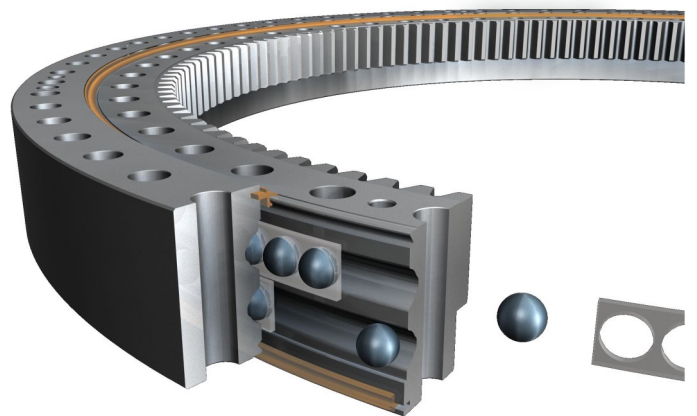




HYDROCAM

**Bolt
Tensioning
for Slewing
Bearings**



Who Are Pilgrim?

Pilgrim International Limited is a wholly owned SKF Group Company, registered in Oldham, a town seven miles from Manchester City Centre (UK).

In one way or another Pilgrim has been trading since the 1950's, however it's SKF story started in 1995, when SKF acquired Pilgrim to compliment its Couplings offer.

Pilgrim is a high integrity joint specialist company focusing on high performing bolting and fixing solutions, primarily for the Power Generation and Marine sectors.

In 2018 the HYDROCAM brand joined Pilgrim as part of an acquisition from SKF France to enable further growth of the bolt tensioning business.

To learn more please scan the QR Code or visit us at:

www.pilgrim-international.co.uk



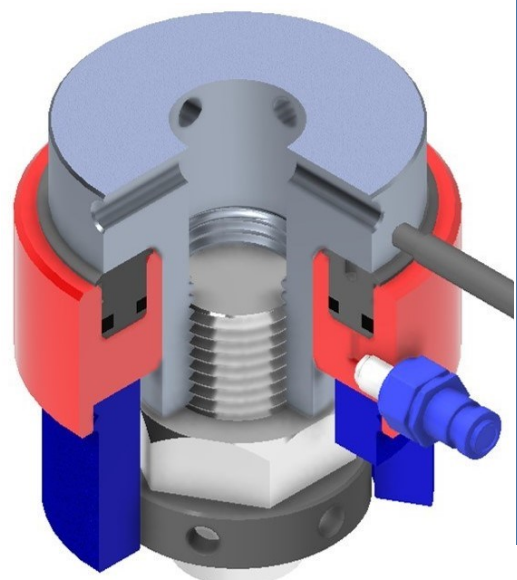
What is a Bolt Tensioning Device?

A bolt tensioner is a specialised tool, which offers key advantages over traditional torque tightening to apply a precise and controlled amount of tension to bolts during assembly or maintenance of mechanical structures, equipment, or machinery.

It is commonly used in industries such as construction, automotive, aerospace, and heavy machinery with the following benefits:

- Accuracy
- Speed
- Safety
- Consistency

By inducing a hydraulic pressure within the tensioner itself, the bolt is stretched allowing for easy and controlled tightening of a nut. Upon release of the hydraulic pressure the nut becomes secure.



Why Bolt Tension Slewing Bearings?

Correct tightening of slewing bearings is crucial for ensuring their proper operation and longevity. Slewing bearings are large bearings that facilitate rotational movement in heavy machinery, such as cranes, excavators, wind turbines, and more. Bolt tensioning is essential for several reasons:

- **Load Distribution:** Slewing bearings are subjected to significant loads and forces during operation. Proper bolt tension ensures that the load is evenly distributed across all the bolts securing the slewing bearing. This helps prevent localized stress concentrations that could lead to premature failure or damage to the bearing.
- **Security and Stability:** Adequate bolt tensioning enhances the stability and security of the slewing bearing assembly. Properly tensioned bolts help maintain the integrity of the connection between the bearing and its mounting structure, reducing the risk of loosening or detachment during operation.
- **Reduced Wear and Fatigue:** Insufficient bolt tension can result in relative movement between the bearing and its mounting structure, leading to wear and fatigue of both components. Proper tensioning minimises such movements, thereby reducing wear and extending the service life of the slewing bearing.
- **Optimized Performance:** Maintaining the correct bolt tension ensures that the slewing bearing operates as intended, providing smooth and efficient rotational movement. Improper tensioning can result in increased friction, reduced efficiency, and compromised performance of the machinery.
- **Safety:** In industrial applications where slewing bearings are employed, safety is paramount. Bolts that are not properly tensioned pose a safety risk as they could loosen or fail under load, potentially causing accidents, equipment damage, or injury to personnel.

To achieve proper bolt tensioning, specialised tools and techniques such as torque wrenches or hydraulic tensioning equipment may be used. Additionally, manufacturers often provide specific guidelines and torque specifications for bolt tightening to ensure the optimal performance and safety of slewing bearing assemblies. More and more we witness Slewing Bearing manufacturers offer turn-key packages including Regular inspection and maintenance of bolted connections are also recommended to detect and address any issues promptly.

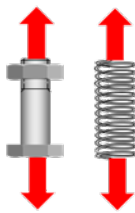
4 Reasons to Package Bolt Tensioning with your order:

1. Streamline the procurement process with one-stop shop.
2. Potential cost savings.
3. Peace of mind: integrated solution
4. Simplified logistics

What is Tightening?

Bolted assemblies are joints made of screws and nuts, or studs with nuts on one end, or studs with nuts on both ends. Aim of the assemblies is to compress the structure in order to ensure the rigidity of the whole assembly, prevent leakage at seals, etc. Whatever the assemblies, it behaves like a spring:

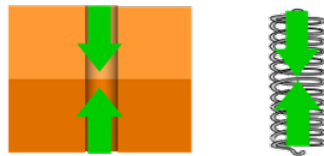
Bolts: Tension Load



During the tightening process, it exerts an axial pre-load tension in the bolts. Steel is elastic meaning that the bolts will extend within its 'elastic limit'. The elongation is proportional to the load.

Structure: Compression

Load



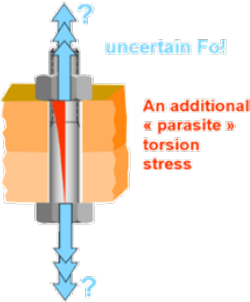
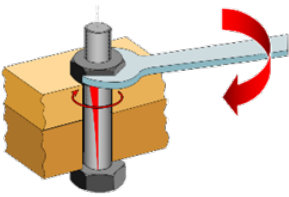

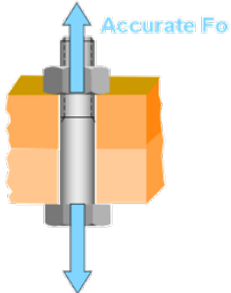

This tension load is of course equal and opposite to the compression force applied on the structure.

Tension Load = Compression

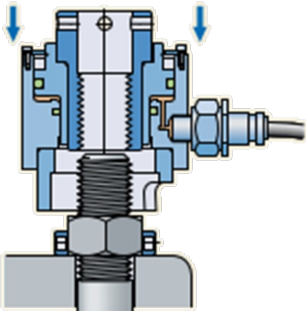
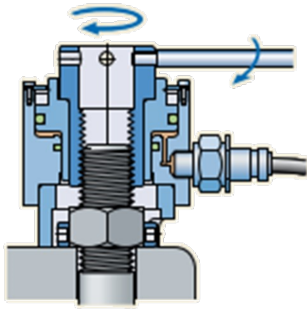
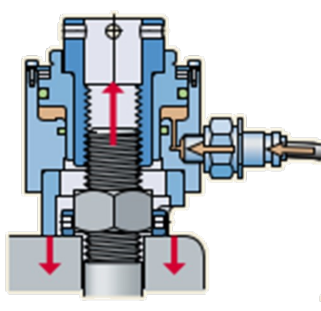
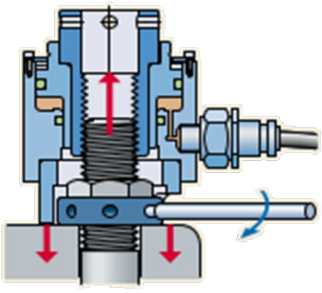
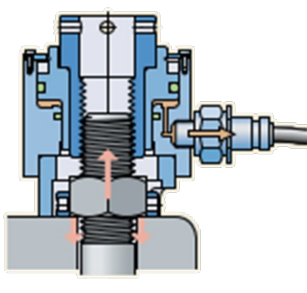
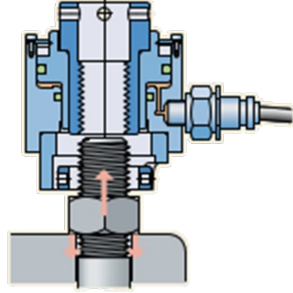
Load






Bolts and Structure must resist to the tightening load while remaining below the yield point of their respective materials.

Torque Tightening Method (Twist)	Tension Tightening Method (Stretch)
<p>Torque Multiplier, Hydraulic Torque / Hand Wrench</p>	<p>Hydraulic Bolt Tensioner</p>
<ul style="list-style-type: none"> • High amount of uncertainty as to the final bolt tension load. <p>Tightening load depends on the friction coefficients in the threads of the nut and the bolt and on the bearing-contact. In practical terms, it is impossible to know the value of these coefficients accurately and reliably.</p>  <p>An additional « parasite » torsion stress</p> <ul style="list-style-type: none"> • Incorporation of additional parasitetorsion stress. <p>Torque tightening introduces a "parasite". Torsion stress in the bolt can reach over 30% of the tension stress. It may also increase the risk of spontaneous loosening</p>  <ul style="list-style-type: none"> • Damage to bearing surfaces • Difficulties in un-tightening 	<ul style="list-style-type: none"> • Good accuracy. <p>The traction load is perfectly controlled through the hydraulic pressure in the tensioner.</p>  <p>Accurate Fo</p> <ul style="list-style-type: none"> • Easy implementation. <p>Easy to perform and requires no physical effort, even for very large bolts.</p> <ul style="list-style-type: none"> • No damage to components. <p>Internal stresses are controlled, and no friction is generated under heavy bearing pressure.</p> <ul style="list-style-type: none"> • Easy un-tightening • Simultaneous tightening is possible 

Step by Step: Operating a Tensioner

<p>The turndown socket is placed over the nut and the hydraulic tensioner grasps the bolt.</p>	<p>The brace/retraction unit is screwed onto the protruding end of the bolt.</p>	<p>After the hydraulic connections, the tensioner is pressurised and applies the required tractive force on the bolt.</p>
		
<p>While the pressure is maintained, the nut is turned down without loading, using the socket and the tommy bar.</p>	<p>Their pressure is released and the piston is pushed back. The tightening load is now exerted through bolt tension.</p>	<p>The tensioner and the socket can be removed.</p>
		

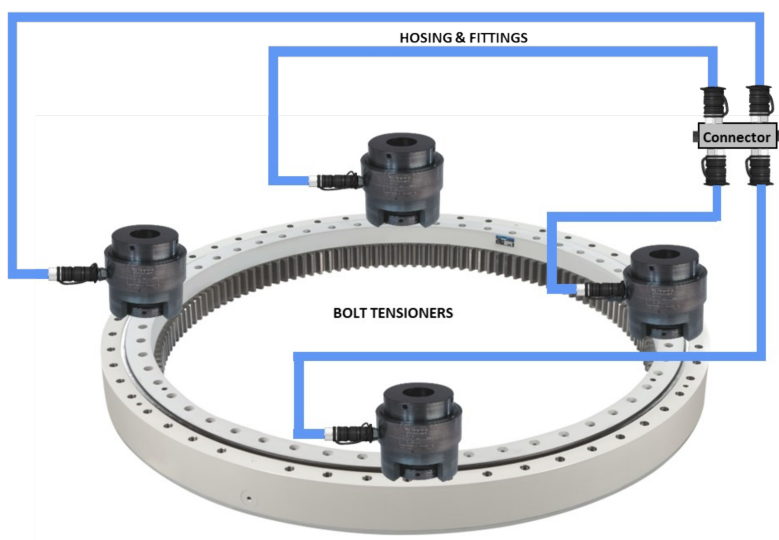
Tensioner Selector Guide

	HTA 	HTC R 	HTH R 
8.8 Bolt Material	Preferred	✓	✓
10.9 Bolt Material	Preferred	✓	✓
12.9 Bolt Material	✓	Preferred	✓
Space Restrictions	✗	✓	✓
Multiple Diameters	✓	✗	✓
Automatic Return	✗	✓	✓
Stroke Limiter	Optional	✓	✓
Adaptable	✓	✓	✓

Why HYDROCAM

- Steadfast alliance and close-knit partnership with SKF Slewing Bearings, ensuring unparalleled peace of mind .
- High performance tensioners
- Robust tensioner design.
- Over 50 years experience of designing and manufacturing tensioning
- Capabilities of handling tailored solutions specific to your needs.

Basic Packaged Offer



The Basic offer consists of Tensioners, Hydraulic Power Pack and all required Hydraulic Hoses and Fittings with the following simple steps:

1. Select: Tensioners type based upon performance and size and quantity required.
2. Choose: Hydraulic Power Pack drive method (hand, Air or Electric).
3. Select Hoses: quantity, length and pressure rating.
4. Select: Connector Block: Number of Outlets and Pressure rating.

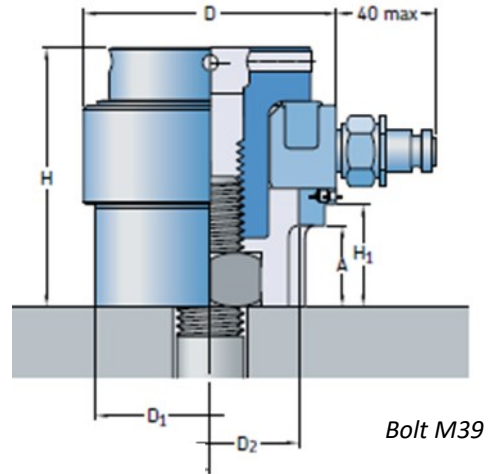
Options

- Stud and Nut Supply
- Dedicated Storage Boxes
- Measuring Devices
- Site Supervision/ Training
- Product Refurbishment

HTA

Multi-purpose

The dimensions and the traction loads suit this tensioner to many different applications.



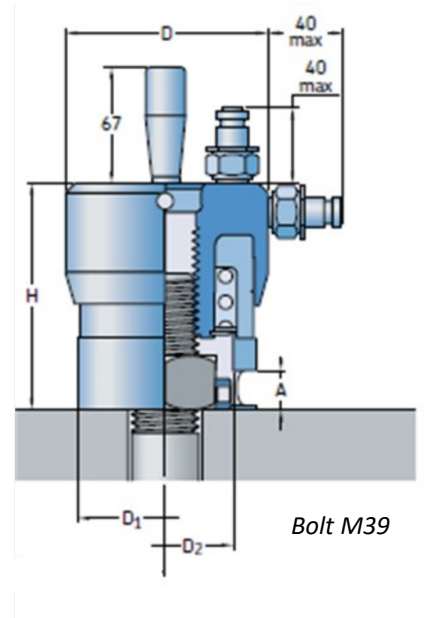
Bolt Size d	Tensioner	Max Hyd. Load	Max Pressure	Diameter D1	Diameter D2	Diameter D	Length H	Tightening preload (*) for 70% yield point	
								kN	MPa
M24x3.0	HTA 20	300	150	74	56	86	100	158	222
M27x3.0	HTA 35	525	150	97	73	109	116	206	289
M30x3.0	HTA 35	525	150	97	73	109	116	251	353
M33x3.5	HTA 35	525	150	97	73	109	116	311	437
M36x4.0	HTA 50	750	150	116	90	128	128	366	515
M39x4.0	HTA 50	750	150	116	90	128	128	437	615
M42x4.5	HTA 60	750	150	133	102	137	140	502	706
M45x4.5	HTA 90	900	150	154	114	166	154	585	823
M48x5.0	HTA 90	1350	150	154	114	166	154	660	928
M52x5.0	HTA 90	1350	150	154	114	166	154	788	1107
M56x5.0	HTA 90	1350	150	154	114	166	154	909	1279
M64x6.0	HTA 130	1950	150	187	137	198	179	1199	1686
M72x6.0	HTA 160	2400	150	203	145	215	190	1550	2180

(*) Hydraulic load tensioner to achieve the bolt tightening preload depends upon ration L/d; L = tightening length & d = bolt

HTC-R

Compact and powerful

HTC-R, the most powerful tensioner in the HYDROCAM standard range, can apply very high traction loads. The brace and the body are monolithic. The HTC-R tensioner with its automatic piston return and few parts, is very easy to use and well suited to simultaneous tightening. Each unit is dedicated to a single bolt diameter.



Bolt Size d	Tensioner	Max Hyd. Load	Max Pressure	Diameter D1	Diameter D2	Diameter D	Length H	Tightening preload (*) for 70% yield point	
								kN	MPa
M24x3.0	HTC R 26	390	150	73	54	83	103	158	222
M27x3.0	HTC R 26	390	150	73	54	83	103	206	289
M30x3.0	HTC R 40	600	150	90	67	103	116.5	251	353
M33x3.5	HTC R 40	600	150	90	67	103	116.5	311	437
M36x4.0	HTC R 54	810	150	103	76.5	117	130	366	515
M39x4.0	HTC R 54	810	150	103	76.5	117	130	437	615
M42x4.5	HTC R 73	1095	150	120	89.5	134	144	502	706
M45x4.5	HTC R 73	1095	150	120	89.5	134	144	585	823
M48x5.0	HTC R 98	1470	150	138	102	154	159.5	660	928
M52x5.0	HTC R 98	1470	150	138	102	154	159.5	788	1107
M56x5.0	HTC R 137	2055	150	160	116	183	195	909	1279
M64x6.0	HTC R 174	2610	150	178	127	204	225	1199	1686
M72x6.0	HTC R 220	3300	150	194	136	227	241	1150	2180

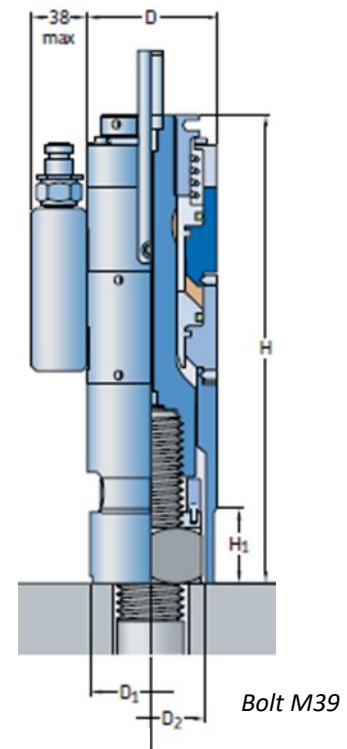
(*) Hydraulic load tensioner to achieve the bolt tightening preload depends upon ration L/d; L = tightening length & d = bolt

HTH-R

Thin and super-powerful

This full-option tensioner provides maximum power for a minimum of space. Built on two or three stories (depending on the diameter of the tightening), this is the thinnest tensioner in the HYDROCAM standard product range. In most cases, it requires the use of a cylindrical nut.

The HTH-R also has an automatic piston return mechanism and is very well suited to simultaneous tightening.



Bolt Size d	Tensioner	Max Hyd. Load	Max Pressure	Diameter D1	Diameter D2	Diameter D	Length H	Tightening preload (*) for 70% yield point	
								kN	MPa
M24x3.0	HTH R 24	360	150	70	55	70	208	158	222
M27x3.0	HTH R 34	510	150	77	66	73	233	206	289
M30x3.0	HTH R 34	510	150	77	66	73	233	251	353
M33x3.5	HTH R 45	675	150	90	76	84	252	311	437
M36x4.0	HTH R 45	675	150	90	76	84	252	366	515
M39x4.0	HTH R 62	930	150	100	89	100	286	437	615
M42x4.5	HTH R 62	930	150	100	89	100	286	502	706
M45x4.5	HTH R 82	1230	150	116	102	110	304	585	823
M48x5.0	HTH R 82	1230	150	116	102	110	304	660	928
M52x5.0	HTH R 108	1620	150	122	106	122	371	788	1107
M56x5.0	HTH R 108	1620	150	122	106	122	371	909	1279
M64x6.0	HTH R 135	2025	150	140	122	136	420	1199	1686
M72x6.0	HTH R 180	2700	150	155	135	147	470	1550	2180

(*) Hydraulic load tensioner to achieve the bolt tightening preload depends upon ration L/d; L = tightening length & d = bolt

Power Pack Options

You've now made the crucial choice of selecting the appropriate tensioner type for your specific application and quantity requirements. The next step is to choose the suitable power pack that will introduce hydraulic fluid into the tensioning system.

When it comes to selecting the delivery method, there are three straightforward options:

1. **Air Driven:** This option offers higher efficiency and is more operator-friendly. Typically used for multi-tensioning due to oil volume required.
2. **Hand Operated:** While more economical and flexible for operating in remote areas. Suitable only when tensioning low qty of tensioners.
3. **Electric Driven:** Convenient when wanting the capacity and functionality of an Air Driven pump however there is no air supply.

Our sales specialists are available to provide guidance throughout this process. Alternatively, if you prefer, leave it to us to make the correct selection as part of the full HYDROCAM package offer, selecting all the required hydraulic equipment ensuring you get all you need to start your tensioning.

For a comprehensive overview of all available options, please feel free to browse the MORPESS PUMP RANGE brochure.



Mk-12 MorPress 525 air driven pump



PH1600 MorPress hand operated pump



MorPress Pump Range brochure

HYDROCAM TENSIONER ENQUIRY FORM



Customer Contact Details

Company Name

Contact Name

Date

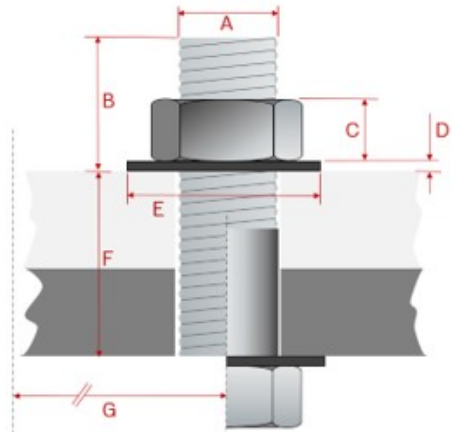
Contact Telephone

e-mail Address

Please scan the QR code to visit our website:



Thank you for considering Pilgrim's HYDROCAM Tensioning Systems. To ensure we provide the best possible solution, we first need to understand something about the application. Please take a couple of minutes to answer as much detail as possible and return to your sales contact or e: mail us at: sales@pilgrim-international.co.uk

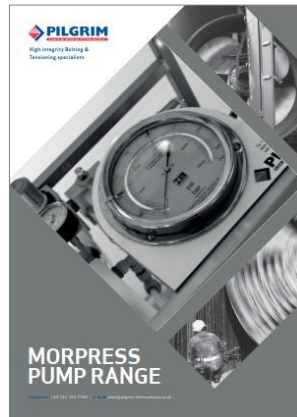
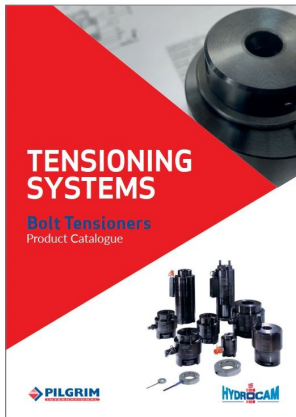


Application Details

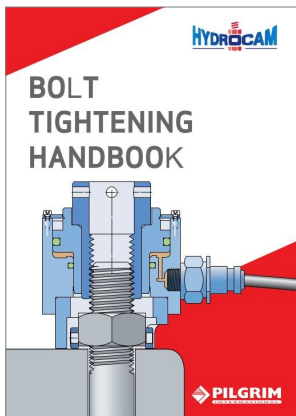
Describe What's Being Tightened	<input type="text"/>					
Current Tightening Method	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	None / Other	Torque Wrench	Pneumatic Wrench	Heat Induction	Single Tensioner	Multi-Tensioner
Bolt / Stud Details	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Units of Measure	Nominal Bolt Diameter \varnothing .	Thread Form (Pitch)	Bolt Protruding length.		
		A		B		
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Pitch Circle Diameter \varnothing .	Quantity of Bolts / Studs	Nut Width (Across Flats)	Nut Height		
	G		C			
	Any other details about the Bolt / Studs, such as material specifications etc <input type="text"/>					
Washer Details	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Washer (tick if washer is included)	Washer Thickness	Washer Diameter \varnothing	D	E	
Joint Details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Static	Dynamic	Joint Thickness	Material description (if known)		
	Describe any space restrictions <input type="text"/>					
Tightening Options	Please select an option that best suits your requirements					
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Single Tensioner	Undecided I would like to learn more about the possible benefits of Homogeneous Tightening.	25% of Bolts / Studs Minimum recommendation to achieve homogeneous tightening	50% + of Bolts / Studs Balancing Time saving and cost		

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Other Associated Literature



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