



SCAN ME



Boltite Bolt Tensioners Built to Tackle the Toughest Jobs.

BT SERIES

Hydraulic Bolt Tensioner | Manual Return



The manual return bolt tensioner is our first generation model that has been widely used for decades. It is robust and proven to be long-lasting. Petracarbon is able to customize bespoke tensioners for applications other than those listed in the specification sheet.



Operational Benefits

- ✓ Detachable bridge simplifies tool positioning.
- ✓ Unique load cell design for superior sealing performance.
- ✓ Manufactured using high-strength alloy steel.
- ✓ Designed to fit most ANSI B16.5, B16.47 & API flanges.
- ✓ Twin quick connect hydraulic couplings for multiple tool connection.
- ✓ Wide tooling range for bolt sizes M20 to M120 [3/4" to 4-1/2"].
- ✓ High quality PU seals allows long lasting performance.

Technical Specifications

Designed for different industries



LOAD CELL	BOLT SIZE		HYDRAULIC AREA		MAX LOAD		A	B	C	D	E	F
	IMPERIAL	METRIC	IN2	MM2	LBF	KN	MM	MM	MM	MM	MM	MM
BT0	3/4"	M20	1.48	954	32260	143.5	68	25	62	34	91	129
	7/8"	M22						25	62	34	91	132
BT1	1"	M24	2.95	1903	64048	284.9	93	29	68	43	123	167
	1-1/8"	M30						32	80	46	126	174
BT2	1"	M24	4.74	3058	103030	458.3	111	29	75	39	113	172
	1-1/8"	M30						33	80	41	115	180
	1-1/4"	M33						34	92	45	119	190
	1-3/8"	M36						38	96	47	121	198
BT3	1-1/4"	M33	6.9	4452	150127	667.8	128	37	96	47	123	191
	1-3/8"	M36						37	96	47	123	195
	1-1/2"	M39						41	96	51	127	203
	1-5/8"	M42						42	108	54	130	208
BT4	1-1/2"	M39	10.41	6716	226450	1007.3	148	44	113	54	136	207
	1-5/8"	M42						46	113	54	136	214
	1-3/4"	M45						53	118	57	140	220
	1-7/8"	M48						52	114	60	143	226
	2"	M52						52	120	63	146	233

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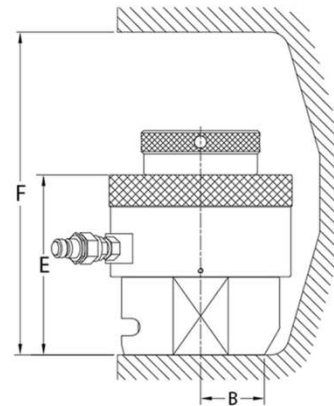
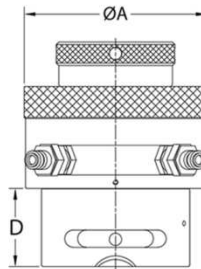
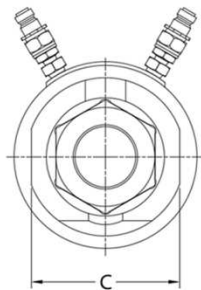
Technical Specifications

LOAD CELL	BOLT SIZE		HYDRAULIC AREA		MAX LOAD		A	B	C	D	E	F
	IMPERIAL	METRIC	IN ²	MM ²	LBF	KN	MM	MM	MM	MM	MM	MM
BT5	2"	M52	13.45	8677	292521	1301.2	176	52	130	64	148	241
	2-1/4"	M56						58	139	70	154	247
BT6	2-1/4"	M56	15.71	10135	340473	1514.5	186	59	138	70	154	249
	2-1/2"	M64						64	153	76	160	262
	2-3/4"	M68						76	165	82	166	275
BT7	2-3/4"	M72	21.67	13980	471492	2097.3	222	87	173	82	166	275
	3"	M76						82	180	89	173	288
BT8	3"	M76	25.49	16445	554379	2466	242	81	180	90	177	292
	3-1/4"	M85						95	190	95	181	310
	3-1/2"	M90						103	205	101	187	320
BT9	3-3/4"	M95	34.09	21991	741397	3297.9	274	94	200	107	193	330
	4"	M100						101	210	114	200	345
BT10	4-1/4"	M105	40.15	25935	873338	3884.8	296	112	225	114	204	365
	4-1/2"	M110						118	236	130	220	385

Max. Working Pressure: 1,500 bar [21,750psi]

Max. Piston Stroke: 10mm

Min. Bolt Protrusion above Nut: 1 x Bolt Diameter



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BTSR SERIES

Hydraulic Bolt Tensioner | Spring Return



Incorporating user feedback over decades, the spring return tensioners are specially designed to improve bolt tensioning performance in two areas; safety and efficiency. The tensioners are also optimally sized to suit most standard API, ANSI B16.5 & B16.47 flanges.

Designed for different industries



Operational Benefits

- ✓ Detachable bridge simplifies tool positioning.
- ✓ Spring return feature enables increased productivity.
- ✓ Manufactured using high-strength alloy steel.
- ✓ Designed to fit most ANSI B16.5, B16.47 & API flanges.
- ✓ Twin quick connect hydraulic couplings for multiple tool connection.
- ✓ Wide tooling range for bolt sizes M20 to M115 [3/4" to 4-1/2"].
- ✓ High quality PU seals allows long lasting performance.
- ✓ Visual piston stroke indication for enhanced safety.

Technical Specifications

Load Cell	Bolt Size		Hydraulic Area		Max Load		A	B	C	D	E	F	F
	IMPERIAL	METRIC	IN2	MM2	LBF	KN	MM	MM	MM	MM	MM	MM	MM
BTSR0	3/4"	M20	1.65	1067	35982	160	67	93	63	114	36		142
	7/8"	M22						93	63	114	36		144
BTSR1	1"	M24	2.89	1867	62961	280	85	117	68	142	38	30	177
		M27						117	68	142	38	30	178
	1-1/8"	M30						120	76	145	41	33	183
BTSR2	1"	M24	4.65	3003	101270	450	103	117	75	142	38	30	175
		M27						117	75	142	38	30	178
	1-1/8"	M30						120	80	145	41	33	184
	1-1/4"	M33						123	84	148	44	36	190
BTSR3	1-3/8"	M36	6.82	4400	148381	660	118	126	89	151	47	39	196
	1-1/4"	M33						123	92	150	44	36	192
	1-3/8"	M36						126	96	153	47	39	198
	1-1/2"	M39						129	105	156	51	43	204
BTSR4	1-5/8"	M42	10.34	6669	224899	1000	141	132	105	159	54	46	211
	1-1/2"	M39						132	112	164	51	43	212
	1-5/8"	M42						135	114	167	54	46	218
	1-3/4"	M45						138	126	170	57	49	225
	1-7/8"	M48						141	123	173	60	52	231
	2"						144	128	176	63	55	236	

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BTSR SERIES

Hydraulic Bolt Tensioner | Spring Return



Technical Specifications

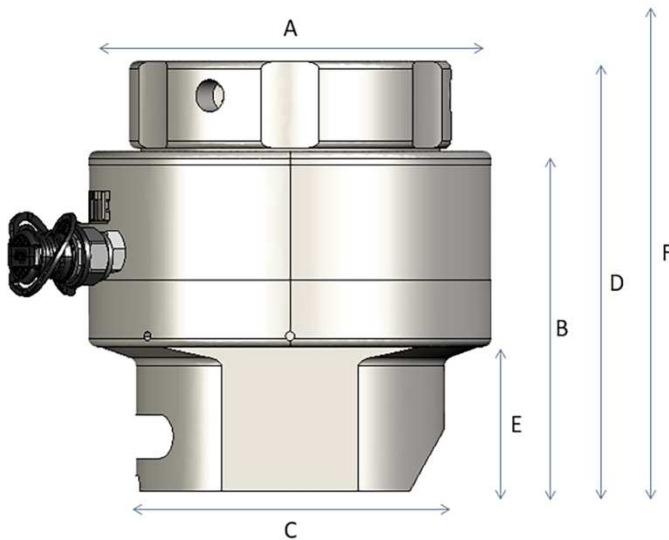
Load Cell	Bolt Size		Hydraulic Area		Max Load		A	B	C	D	E	F	F
	IMPERIAL	METRIC	IN2	MM2	LBF	KN	MM	MM	MM	MM	MM	MM	MM
BTSR5	2"	M52	15.50	10002	337298	1500	176	148	134	187	63	55	249
	2-1/4"	M56						155	148	194	70	62	261
		M60						155	148	194	70	65	264
	2-1/2"	M64						161	153	200	76	68	274
		M68						161	153	200	76	71	279
		M70						161	153	200	76	74	280
BTSR6	2-3/4"	M72	25.84	16670	562163	2501	219	167	172	216	82	74	297
	3"	M76						174	182	223	89	81	308
		M80						174	182	223	89	84	312
	3-1/4"	M85						180	190	229	95	87	323
	3-1/2"	M90						180	205	235	101	93	334
BTSR7	3-1/2"	M90	33.07	21336	719514	3200	252	186	230	241	101	93	341
		M95						186	230	241	101	99	346
	3-3/4"	M100						192	235	247	107	99	357
	4"							199	242	254	114	106	366
BTSR8	4"	M105	42.37	27336	921853	4100	283	199	255	264	114	106	378
		M110						199	255	264	114	115	383
	4-1/4"	M115						205	260	270	120	112	394
	4-1/2"							212	270	277	127	119	400

Max. Working Pressure: 1,500 bar [21,750psi]

Max. Piston Stroke: 10mm

Min. Bolt Protrusion above Nut: 1 x Bolt Diameter

BTSR0 is manual retract model.



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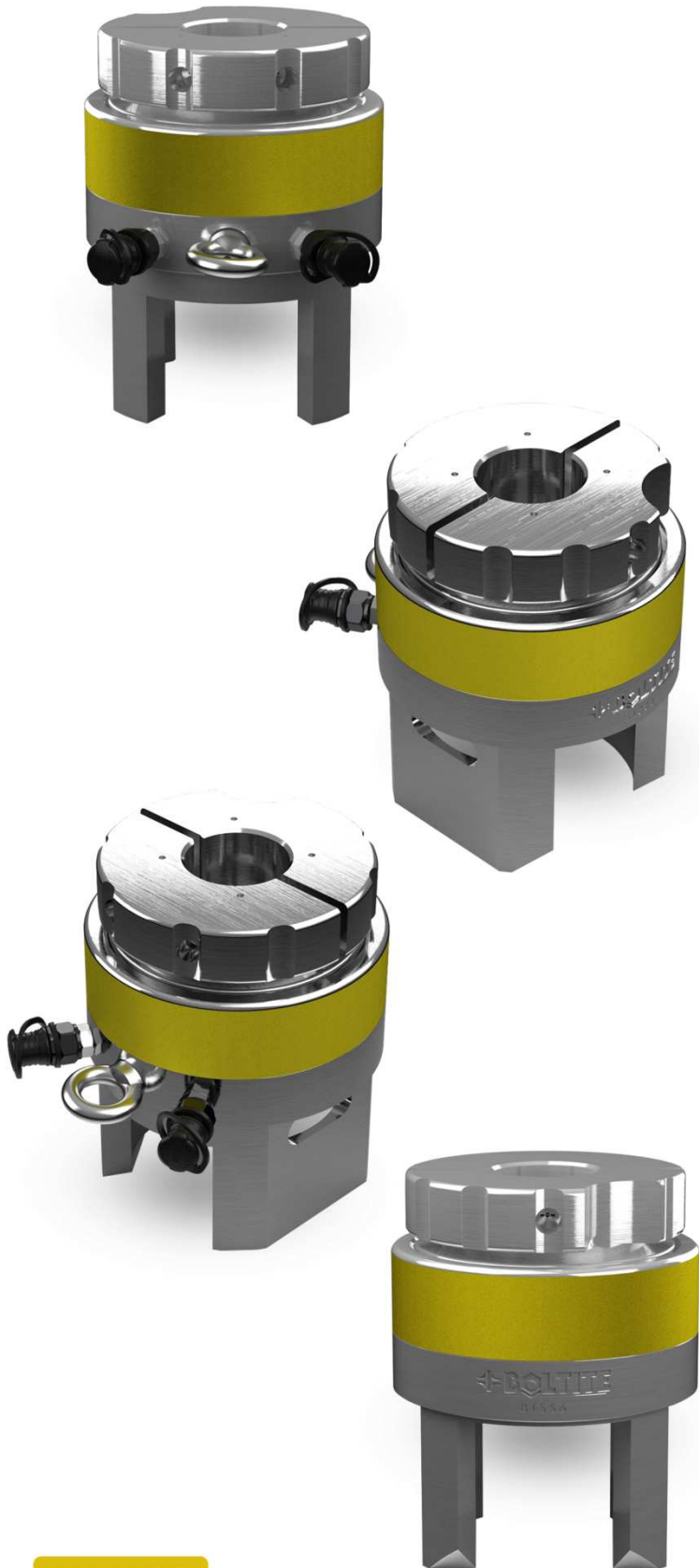


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BTSS SERIES

Hydraulic Bolt Tensioner | Subsea

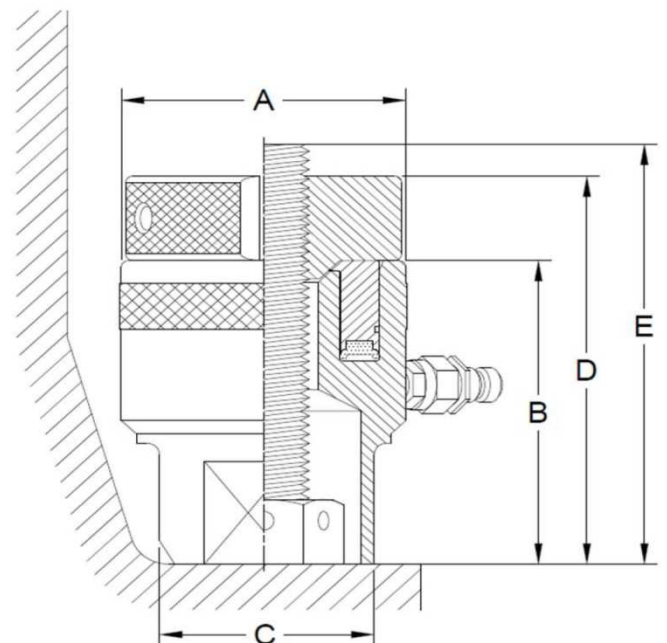


The subsea tensioners are designed with a quick fastening split nut to minimize tensioning duration. It is made from high strength corrosion resistant steel with anti slip surface coating for better handling.

Operational Benefits

- ✓ Quick fastening split nut saves time and increases efficiency.
- ✓ Visual piston stroke indication for enhanced safety.
- ✓ Unique design to compensate against misalignment.
- ✓ Compact design to suit most flanges.
- ✓ Twin quick connect hydraulic couplings for multiple tool connection.
- ✓ Wide tooling range for bolt sizes M20 to M90 [3/4" to 3-1/2"].
- ✓ High quality PU seals allows long lasting performance.
- ✓ Long piston stroke to maximize tool efficiency.

Designed for different industries



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BTSS SERIES

Hydraulic Bolt Tensioner | Subsea



Technical Specifications

Load Cell	Bolt Size		Hydraulic Area		Max Load		Stroke	A	B	C	D	E	WEIGHT
	IMPERIAL	METRIC	IN ²	MM ²	LBF	KN							
BTSS1	3/4"	20	1.46	943	31472	140	20	66	97	48	117	122	1.7
	7/8"	22											
BTSS2		24	2.47	1596	53727	239	30	82	127	60	147	152	3.7
	1"	27											
	1-1/8"	30											
BTSS3	1-1/4"	33	3.93	2533	85424	380	30	97	137	77	163	168	6
	1-3/8"	36											
BTSS4	1-1/2"	39	5.70	3676	123865	551	30	111	146	90	170	175	7
	1-5/8"	42											
BTSS5	1-3/4"	45	9.09	5868	197824	880	30	136	158	114	189	194	11.2
	1-7/8"	48											
	2"	52											
BTSS6		56	16.17	10433	351587	1564	30	177	181	140	223	228	21.3
	2-1/4"	60											
	2-1/2"	64											
	2-3/4"	72											
BTSS7		76	26.62	17174	579085	2576	30	217	202	180	256	261	33.6
	3"	80											
	3-1/4"	85											
	3-1/2"	90											

Max. Working Pressure: 1,500 bar [21,750psi]

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BTMS SERIES

Hydraulic Bolt Tensioner | Multi-Stage



The multi-stage tensioners are designed for applications that require high load with limited clearance or bolt spacing. Load cells are stacked in series to generate the required load while keeping its diameter slim. Typically, these tensioners are customized to suit application needs. Contact Petracarbon for more details.

Operational Benefits

- ✓ Compact, high load tensioners to suit workpiece with tight bolt spacing.
- ✓ Spring return feature enables increased productivity.
- ✓ Manufactured using high-strength alloy steel.
- ✓ Robust Gearbox Drive for nut rotation.
- ✓ Cycle counter included to track usage.
- ✓ High quality seals allows long lasting performance.
- ✓ Customizable sizes available, made to order. Consult Petracarbon.

Designed for different industries



Technical Specifications

Load Cell	Bolt Size	Hydraulic Area		Max Load		Max Working Pressure		Hex Size	OD	Stroke	Weight
	METRIC	IN ²	MM ²	LBF	KN	PSI	BAR	MM	MM	MM	KG
BTMS24	M24	3.52	2274	69020	307	19580	1350	36	59	7	5
BTMS30	M30	5.30	3417	103642	461	19580	1350	46	72	7	6.6
BTMS33	M33	6.83	4407	133768	595	19580	1350	50	79	10	8
BTMS36	M36	7.81	5037	152878	680	19580	1350	55	85	10	10.7
BTMS39	M39	9.18	5926	179856	800	19580	1350	60	92	10	12.8
BTMS42	M42	10.59	6830	207284	922	19580	1350	65	99	10	16.1
BTMS45	M45	12.47	8047	244155	1086	19580	1350	70	107	10	20.8
BTMS48	M48	14.89	9604	291367	1296	19580	1350	75	116	10	22
BTMS56	M56	19.06	12296	373201	1660	19580	1350	85	131	10	24
BTMS64	M64	29.14	18800	528327	2350	18130	1250	95	148	10	47.2

BTMS series are customized products, contact Petracarbon to enquire.

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Introduction to Bolt Tensioning

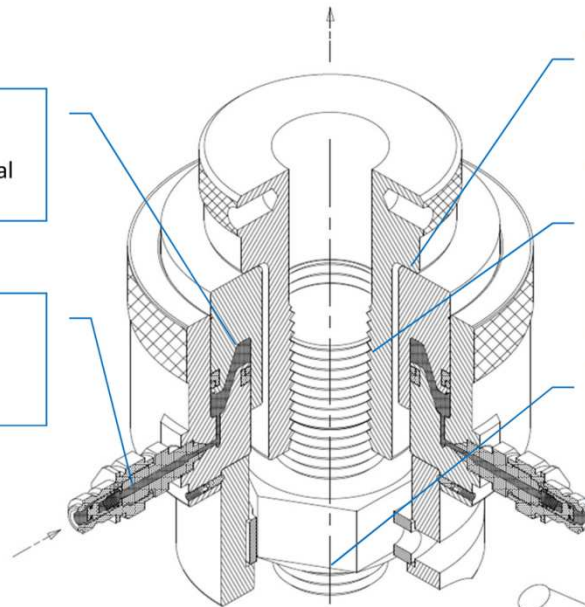
Bolt Tensioning is a tightening method whereby bolts are stretched axially to achieve the calculated preload. An advantage of this tightening method over conventional torquing is that inaccuracies involved with friction are effectively eliminated. As such, bolt tensioning is considered to be a more accurate tightening method than bolt torquing.



How it Works?

Step 2: The build up pressure creates a known amount of axial load upwards.

Step 1: Hydraulic oil enters the load cell cavity at a preset pressure.



Step 3: This axial load from the load cell is transferred onto the puller.

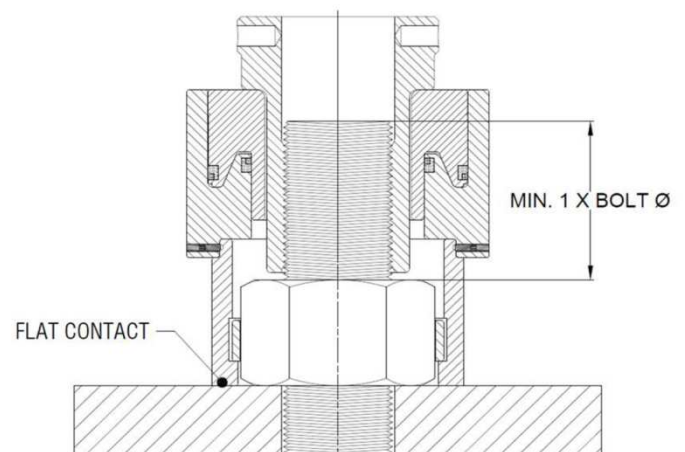
Step 4: The puller is threaded onto the stud bolt, and pull the stud along.

Step 5: The nut rises together with the stud and is rotated down using a tommy bar.

Step 6: The bolt is now 'locked' in a tensioned (stretched) state.

Checks Prior to Tensioning

To avoid damaging equipment or the workpiece, it is important to ensure that the bolt tensioner sits flat and upright with respect to the bolt and the minimum stud protrusion length shall be at least equal to the stud diameter.



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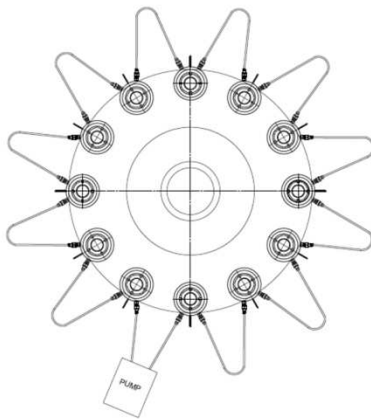


Tensioning Operation

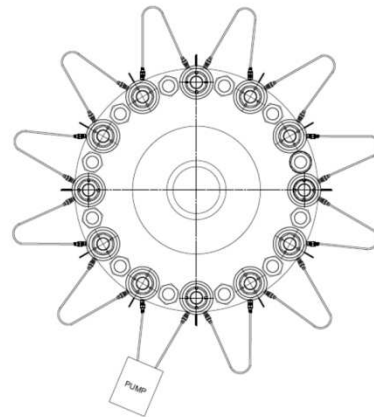
Bolt tensioning can be performed using single or multiple tools. This is termed as tool coverage (percentage of bolt tensioners as compared to number of bolts on flange). Typically, 100% tool coverage is preferred because it eliminates load losses due to multiple tensioning cycles. The tools can be chained together using interconnecting hoses to a single pump unit. In one tensioning operation, a uniform and evenly distributed load is exerted on the bolted joint simultaneously. On pressure boundary bolted joints or flanges where gaskets are used, such tightening method produces optimal result in achieving the required gasket sealing performance.

Apart from 100% tool coverage, 50% (or 25%) tool coverage method can be adopted too. This however creates an additional consideration in terms of estimating load loss. Whenever stretching of bolts are done in multiple (more than one) steps, subsequent bolt stretching affects the clamping effect on the previously tensioned bolts. To counter this effect, a larger tensioning load is typically applied on the 1st set of bolts.

100% TOOL COVERAGE
1 TENSIONER ON EVERY BOLT



50% TOOL COVERAGE
1 TENSIONER ON EVERY ALTERNATE BOLT



Application Data Sheet

In order for Petracarbon to select a suitable tensioner for your application, please use the form below when enquiring for bolt tensioners.

Customer : _____

Location : _____

A : _____ (\varnothing x Pitch)

B : _____

C : _____ (A/F or \varnothing)

D : _____

E : _____ (\varnothing)

F : _____

G : _____ (\varnothing)

H : _____

J : _____

K : _____

L : _____

M : _____

N : _____ (\varnothing ID)

P : _____ (\varnothing OD)

Q : _____ (\varnothing PCD)

R : _____ (CLAMP LG)

No. of Studs : _____

Max Load/Torque : _____

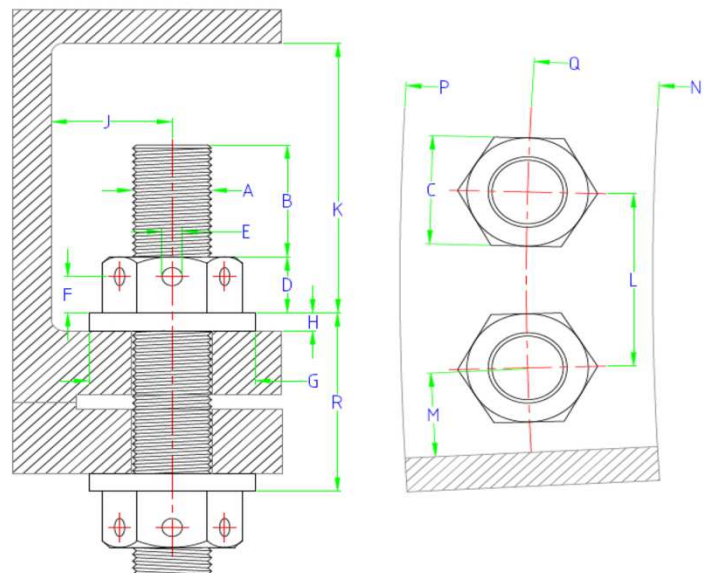
Stud Mat'l/Yield : _____

Units : Metric / Imperial

Remarks : _____

Important : *Fill in the blanks where applicable

For Bolt Tensioning, Ensure Bolt Protrusion ('B') \geq Bolt Diameter ('A')



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Sample Computation

Determine Target Bolt Stress and calculate Residual Bolt Load
 $F_R = \sigma_T \times A_S$

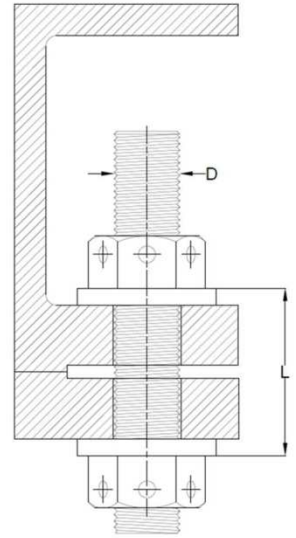
Calculate Load Transfer Factor:
 $LTF = 1.01 + \frac{D}{L}$ (MIN. = 1.1)

Calculate Pressure B:
 $P_B = \frac{F_R \times LTF}{A_{BT}}$

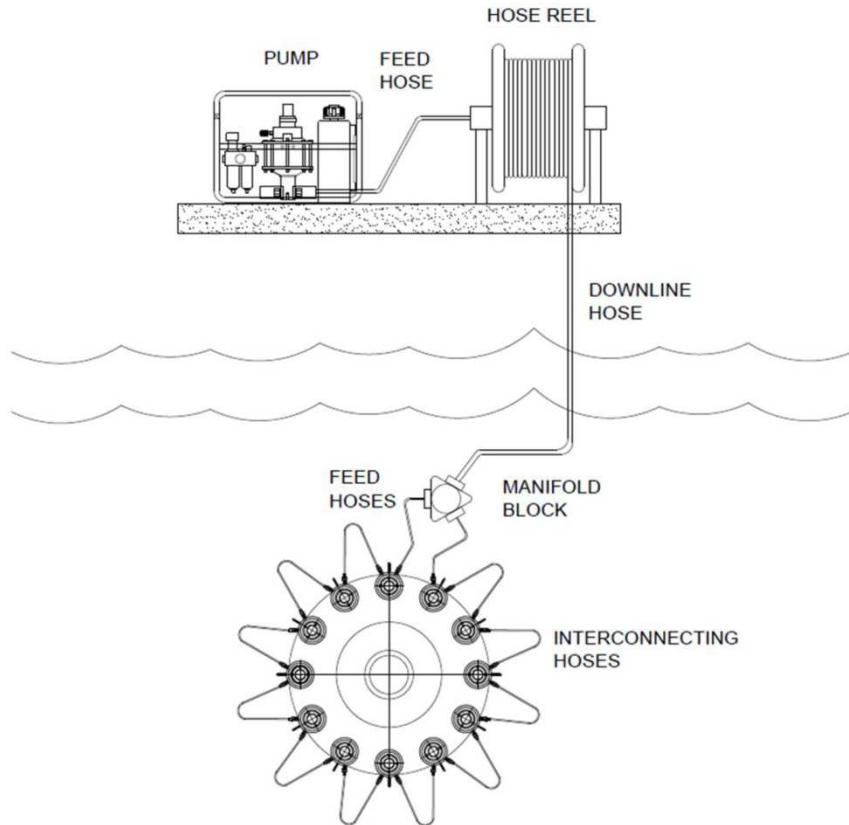
Calculate Pressure A (<100% Tool Coverage):
 $P_A = \frac{F_R \times LTF \times CLF}{A_{BT}}$

Symbols

- σ_T Target Bolt Stress
- F_R Residual Bolt Load
- A_S Bolt Tensile Stress Area
- P_A Pressure A
- P_B Pressure B
- D Bolt Diameter
- L Clamp Length
- LTF Load Transfer Factor
- CLF Cross Loading Factor (Manufacturer Recommendation)
- A_{BT} Bolt Tensioner Hydraulic Area



Typical Subsea Bolt Tensioning Arrangement



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PUMPS & ACCESSORIES

Pump | Hose | Fitting

Electric Tensioning Pump

- Model: BTEP1
- Power: 1.1kW, 220V/50Hz Motor
- Hydraulic Tank Capacity: 6 liters
- Output Flow (Low-High): 6 - 0.3 l/min
- Pressure: 0 - 2000 bar [29,000 psi]
- Output Port: 2-off G1/4"
- Weight: 27kg
- Envelope Dimension (L x W x H): 419 x 292 x 434mm



Quick Connect Coupling

Female Coupling
Max Working Pressure:
1,500 bar,
G1/4" Female Thread



Male Coupling
Max Working Pressure:
1,500 bar, G1/4"
Female Thread



Pneumatic Tensioning Pump

- Model: BTAP1
- Power: 3.0kW Motor
- Air Requirement: 3.4m³/min @ 6bar
- Hydraulic Tank Capacity: 6 liters
- Output Flow (Low-High): 6 - 0.26 l/min
- Pressure: 0 - 2000 bar [29,000 psi]
- Output Port: 2-off G1/4"
- Weight: 24kg
- Envelope Dimension (L x W x H): 419 x 267 x 434mm



3-Ports Manifold Block

Max Working Pressure:
1,500 bar, inclusive 3-off
male couplings



Hydraulic Hoses

Max Working Pressure: 1,800 bar, couplings sold separately.
Available lengths: 1m, 2m, 3m, 5m, 10m, 30m.
Length can be customized on request.



Downline Adapter Fitting

Max Working Pressure:
1,500 bar, inclusive 2-off
male couplings



Hose Reel Stand

Steel frame customized to suit hose length



Adapter Fitting

G1/4" Male
Thread both ends



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TRAINING

ECITB Mechanical Joint Integrity

Petracarbon is an approved training provider for delivering Mechanical Joint Integrity (MJI) courses developed by the Engineering Construction Industry Training Board (ECITB). Our approved trainers have been within the Oil and Gas, petrochemical industry for more than a decade and have delivered these MJI courses since year 2021 in various countries such as Singapore, Vietnam, Thailand and China.

What is ECITB Global?



ECITB Global is the international division of the Engineering Construction Industry Training Board, a UK-based leading skills organisation sponsored by the UK Government's Department for Education. Working with almost 200 licensed training providers worldwide, the ECITB delivers internationally recognised training and qualifications in key engineering construction industry skills and health and safety programmes.

Mechanical Joint Integrity (MJI)

It is the controlled and verified bolting of pipework, flanges and other assemblies to remove the risk of hydrocarbon and non-hydrocarbon release when working with mechanical joints associated with construction, maintenance and disassembly operations.

Who is the scheme for?



Anyone who is involved with MJI activities, especially new entrants or inexperienced workers.

Struggling to adjust your work schedule for in-person training sessions?

No worries! MJI theory classes are now offered online, allowing you to complete them at your own pace within 30 days. For more details about this eLearning course, reach out to Petracarbon.

About the Course

The complete ECITB MJI course is a training program which comprises of six separate modules. Each of these modules are designed to equip trainees with the fundamental knowledge and safety awareness to handle various mechanical joint activities. Trainees will be introduced to topics such as risk and hazard identification, health and safety requirements, recommended good working practices, correct tightening techniques and inspection of flange components referencing ASME PCC-1 guidelines. Each of these modules are also available separately as individual courses.

List of Courses

- ✓ Hydraulically Torque and Tension Bolted Connection Techniques
- ✓ Hand Torque Bolted Connection Techniques
- ✓ Hand & Hydraulically Torque Bolted Connection Techniques
- ✓ Hydraulically Tensioned Bolted Connection Techniques
- ✓ eLearning - Hydraulically Torque and Tension Bolted Connection Techniques
- ✓ Blended Learning - Hydraulically Torque and Tension Bolted Connection Techniques



Training Venues

Contact our team to learn more about the available courses.

Singapore

Blk 1001 Jalan Bukit Merah #04-01/06 Redhill Industrial Estate, Singapore 159455

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POWERING THE FUTURE THROUGH INNOVATION

With 40 years of expertise, Petracarbon stands as a trusted leader in engineering solutions. Backed by a team of experienced professionals, and robust equipment and tools, we excel in mechanical engineering and machining services span across a wide range of industries, from Offshore Oil and Gas to Power Generation, and Marine to Petrochemical, and Shipbuilding, we bring precision and reliability to every project, no matter the challenge.

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