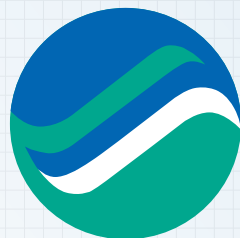
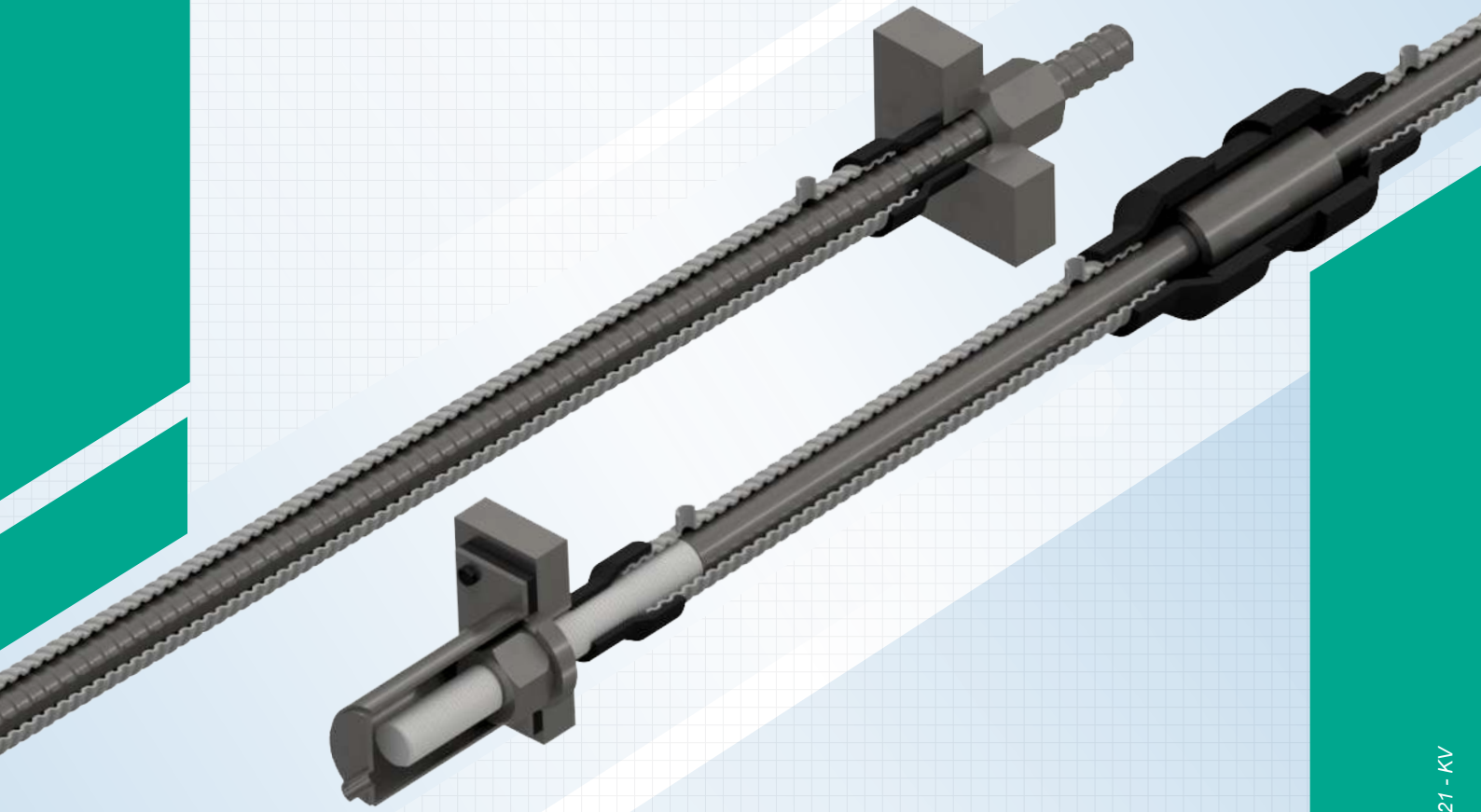


Post Tensioning Bar Systems

PRODUCT DATASHEET



Dextra

www.dextragroup.com

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Introduction

POST TENSIONING BAR SYSTEMS RANGE

The Dextra Pre-Stressing / Post Tensioning System consists for a high tensile steel bar together with accessories, such as couplers, nuts washers, bearing plates. The system is available in the widest range of bar diameters available on the market and in 3 strength grades.

Both smooth, end threaded bars, and hot rolled course threaded bars are available to best suit the project application for either temporary or permanent works.



Smooth bar (end threaded):

- 12 diameters
- 3 grades



Fully-Threaded bar:

- 5 diameters
- 2 grades

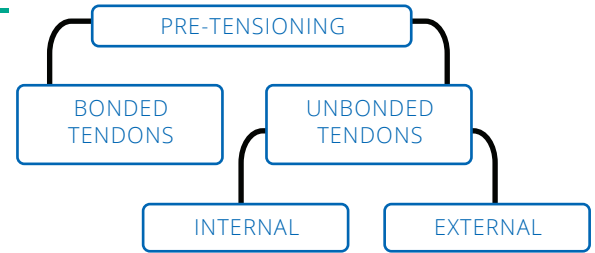
SYSTEM DESCRIPTION

INTERNAL VS EXTERNAL USE

Dextra Post-tensioning system can be used for the following types of tendon:

- Internal bonded tendons
- Internal unbonded tendons
- External unbonded tendons

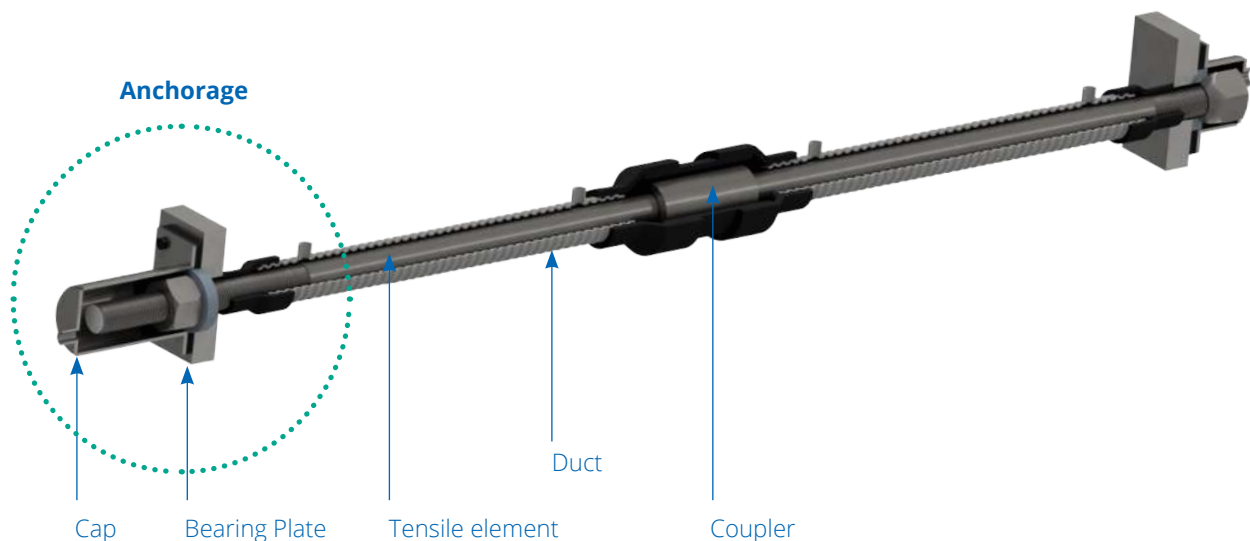
Unbonded tendon may be restressed, removed, and replaced.



POST TENSION BAR & COMPONENTS

Dextra post tensioning kit typically comprises of the following components:

Tensile element :	Bar (plain or ribbed) made of high tensite steel.
Anchoragees :	Anchoragees are typically composed of a bearing plate as a minimum. Additional accessories such as trumpet and cap may be required. Injection channel may also be appropriate depending on intended use (internal/external), agreed scope of supply and defined sequence of work.
Coupler :	Movable coupler : Bars can be stressed simultaneously when both bars are still grouted. Coupler may be located at stressing anchorage or along bar length. Fixed coupler : the bar to be stressed connects onto an already grouted tendon. Fixed couplers are located at the stressing anchorage location.
Duct :	Used to isolate, guide and protect the tensile element. They may be made of steel (strip duct, steel pipe) or plastic (smooth or corrugated). Contractor may supply the duct depending on site schedule. Steel duct diameter shall be agreed upon with the supplier as they impact anchoragees' bearing plate size.
Cap :	For permanent application and when anchorage isn't imbedded in concrete, the cap (steel or plastic) shall be allowed for.
Injection fittings :	Necessary grout port and vent shall be planned for internal bonded tendons.
Bursting reinforcement :	When required, this provides confinement to concrete to withstand prestressing loads. Contractor may generally prepare it based on its designers' input.



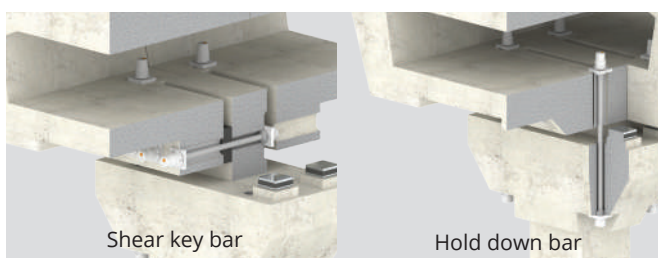
SMOOTH BARS RANGE

PRODUCT FEATURES

- Diameters range from 31 mm to 100 mm.
- Three steel grades are available.
 - › Gr 835/1030
 - › Gr 930/1080
 - › Gr 1050/1200
- Rolled threads (obtained with cold plastic deformation of the metal between two dies) optimized for fatigue performance.
- ISO metric thread as per ISO 965-1.

SPECIAL APPLICATION: SHEAR KEY & HOLD DOWN BARS

- Shear key and hold down bars are a special application of PT smooth bar systems where an assembly acts as a permanent seismic restrainer for the connection of precast elements in elevated metro road for instance.
- Shear key bar systems and hold down bar systems are available with a full range of accessories for grade 1050/1200 and in four diameters: 37/M39, 43/M45, 45/M48 and 49/M52.



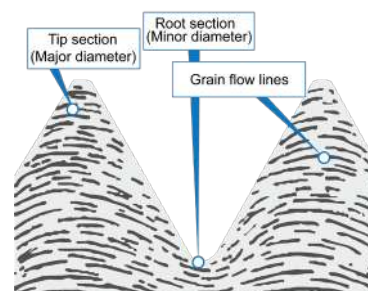
PRODUCT BENEFITS

- High impact resistance.
- Smaller pitch allows finer adjustment and brings less draw-in loss.
- Full range of accessories for specific applications.
- High fatigue performance.



ROLLED THREAD PROFILE

All Dextra Smooth Bars feature rolled threads. This cold forming process shapes the material continuously, giving a higher quality surface finish, as well as a greater resistance to fatigue, surface wear, and corrosion.



LOAD TABLE

Bar thread size	Critical cross section area (mm ²)	Nominal diameter (mm)	Linear weight (kg/m)	Grade 835/1030		Grade 930/1080		Grade 1050/1200	
				Yield load (kN)	Ultimate load (kN)	Yield load (kN)	Ultimate load (kN)	Yield load (kN)	Ultimate load (kN)
M33	694	31	5.9	579	714	645	749	728	832
M39	976	37	8.4	815	1005	907	1054	1025	1171
M42	1121	40	9.9	936	1155	1042	1211	1177	1345
M45	1306	43	11.4	1091	1345	1215	1410	1371	1567
M48	1473	45	12.5	1230	1517	1370	1591	1547	1768
M52	1758	49	14.8	1468	1811	1635	1898	1846	2109
M60	2362	57	20.0	1972	2433	2197	2551	2480	2834
M68	3055	65	26.0	2551	3147	2841	3300	3208	3666
M78	4114	75	34.7	3435	4237	3826	4443	4319	4936
M88	5329	85	44.5	4450	5489	4956	5755	5595	6395
M98	6701	95	55.6	5596	6902	6232	7237	7036	8042
M103	7446	100	61.7	6218	7670	6925	8042	7819	8936

Note:

- Yield loads and ultimate loads are unfactored.
- Yield stress is 0.1% proof stress.

SMOOTH BARS RANGE

BAR AND THREAD LENGTH



Bar thread size	Min. dead end	Min. live end
M33	50	150
M39	60	160
M42	70	170
M45	70	180
M48	80	190
M52	80	200
M60	90	220
M68	100	240
M78	120	270
M88	130	290
M98	140	320
M103	150	330

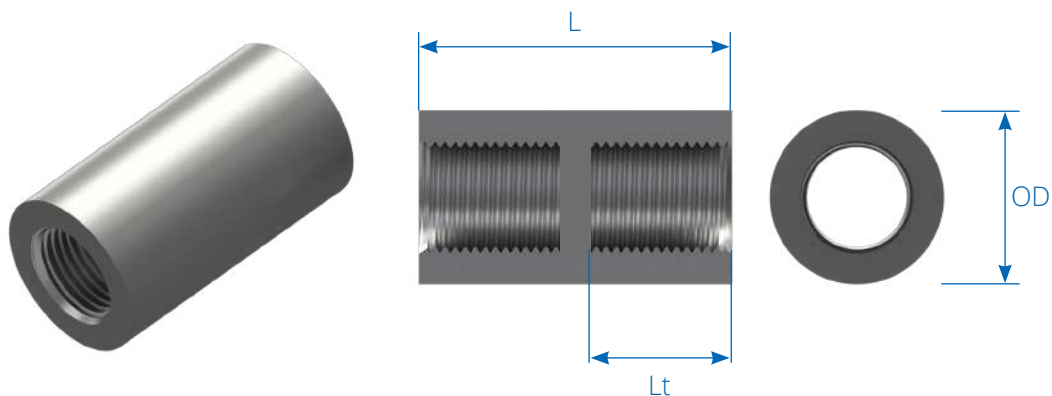
BAR AND THREAD LENGTH FOR GROUTING SYSTEM



Bar thread size	Passive end		Active end	
	Min.	Max.	Min.	Max.
M33	45	70	150	165
M39	55	75	160	180
M42	65	80	170	190
M45	65	85	180	195
M48	65	90	190	205
M52	75	90	200	215
M60	85	105	220	240
M68	95	115	240	260
M78	105	125	270	285
M88	115	135	290	310
M98	125	145	320	335
M103	135	150	330	350

SMOOTH BARS ACCESSORIES

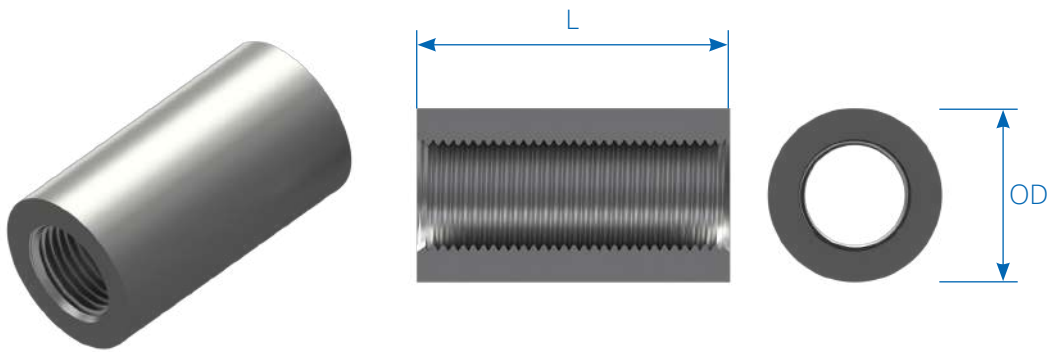
Couplers with stopper



Bar nominal diameter	Bar thread size	ØOD	L	Lt
31	M33	51	107.5	45
37	M39	65	125	52.5
40	M42	65	137.5	57.5
43	M45	70	147.5	62.5
45	M48	76	160	67.5
49	M52	85	170	72.5
57	M60	95	192.5	82.5
65	M68	114	220	95
75	M78	127	250	110
85	M88	140	280	125
95	M98	168	310	140
100	M103	168	325	147.5

SMOOTH BARS ACCESSORIES

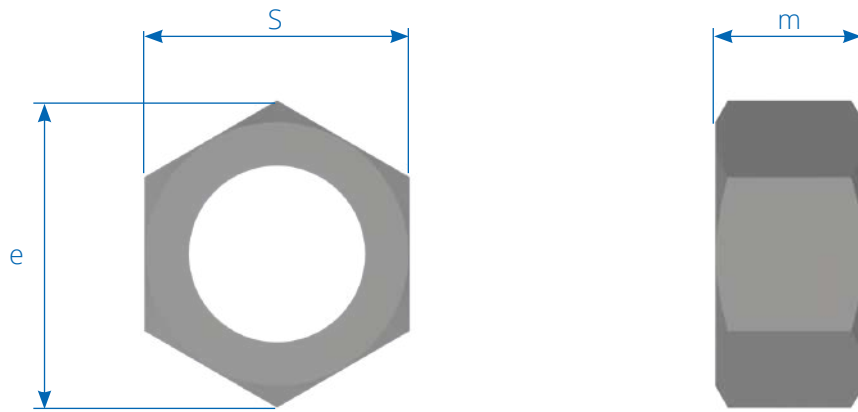
Couplers without stopper



Bar nominal diameter	Bar thread size	ØOD	L
31	M33	51	100.5
37	M39	65	117
40	M42	65	128.5
43	M45	70	138.5
45	M48	76	150
49	M52	85	160
57	M60	95	181.5
65	M68	114	208
75	M78	127	238
85	M88	140	268
95	M98	168	298
100	M103	168	313

SMOOTH BARS ACCESSORIES

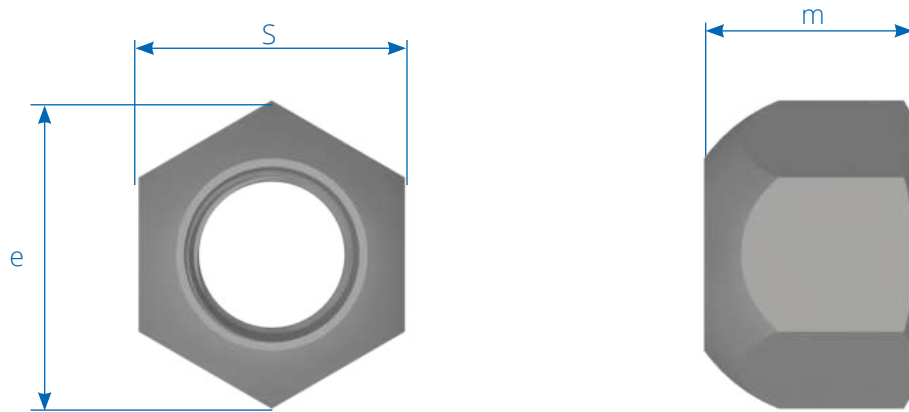
Hex nuts



Bar nominal diameter	Bar thread size	m	S	e
31	M33	33	50	57.7
37	M39	39	60	69.3
40	M42	42	65	75.1
43	M45	45	70	80.8
45	M48	48	75	86.6
49	M52	52	80	92.4
57	M60	60	90	103.9
65	M68	68	100	115.5
75	M78	78	114	131.6
85	M88	88	125	144.3
95	M98	98	140	161.7
100	M103	103	147	169.7

SMOOTH BARS ACCESSORIES

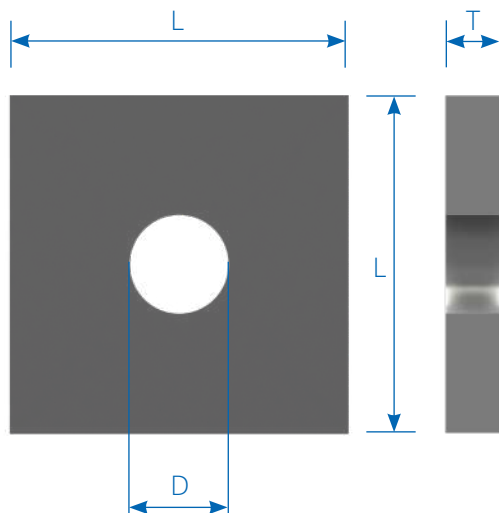
Swivel hex nuts



Bar nominal diameter	Bar thread size	m	S	e
31	M33	42	50	57.7
37	M39	50	60	69.3
40	M42	54	65	75.1
43	M45	58	70	80.8
45	M48	60	75	86.6
49	M52	64	80	92.4
57	M60	74	90	103.9
65	M68	80	100	115.5
75	M78	92	114	131.6
85	M88	100	125	144.3
95	M98	112	140	161.7
100	M103	118	147	169.7

SMOOTH BARS ACCESSORIES

Flat bearing plates

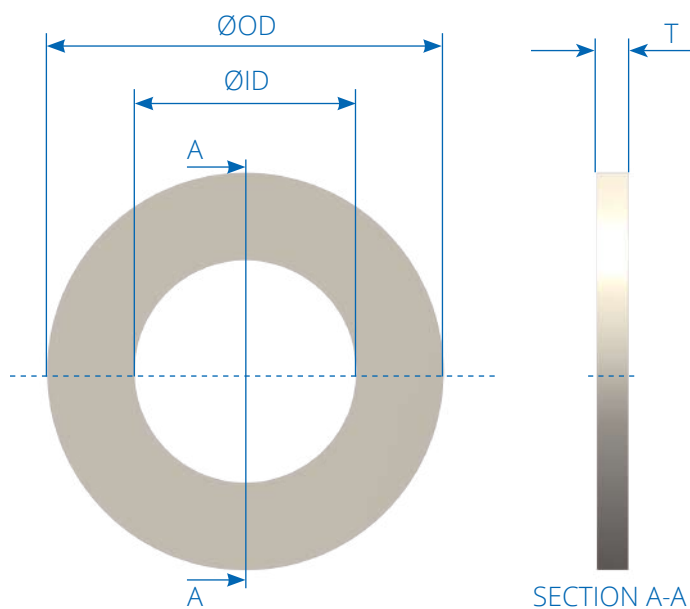


Plates are made of steel grade S355JR as per EN 10025 or equivalent.

Plate steel grade S355							
Bar grade		930/1080			1050/1200		
Bar nominal Dia	Bar thread size	Length (L)	Thickness (T)	Hole diameter (D)	Length (L)	Thickness (T)	Hole diameter (D)
31	M33	140	30	38	150	30	38
37	M39	175	30	44	180	35	44
40	M42	185	35	47	190	40	47
43	M45	195	40	50	210	40	50
45	M48	210	40	53	215	45	53
49	M52	225	45	57	235	50	57
57	M60	255	50	65	270	55	65
65	M68	290	60	73	305	70	73
75	M78	340	70	83	355	80	83
85	M88	385	80	93	400	90	93
95	M98	430	90	103	455	100	103
100	M103	450	100	108	480	110	108

SMOOTH BARS ACCESSORIES

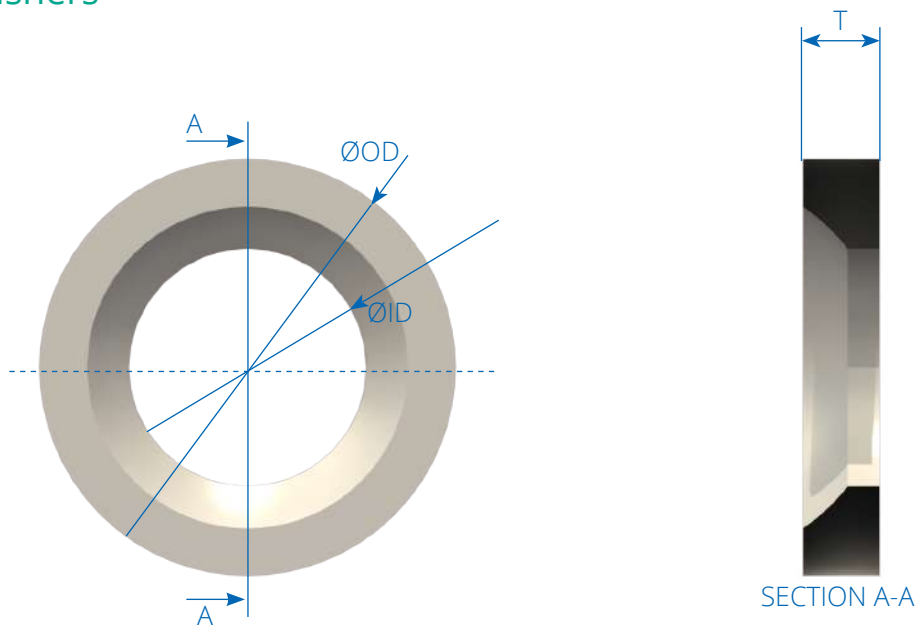
Plain washers



Bar nominal diameter	Bar thread size	ØID	ØOD	T
31	M33	37	65	5
37	M39	43	80	7
40	M42	46	85	7
43	M45	49	90	7
45	M48	52	95	7
49	M52	56	105	9
57	M60	64	130	12
65	M68	72	140	12
75	M78	82	160	14
85	M88	91	180	17
95	M98	102	200	18
100	M103	107	215	21

SMOOTH BARS ACCESSORIES

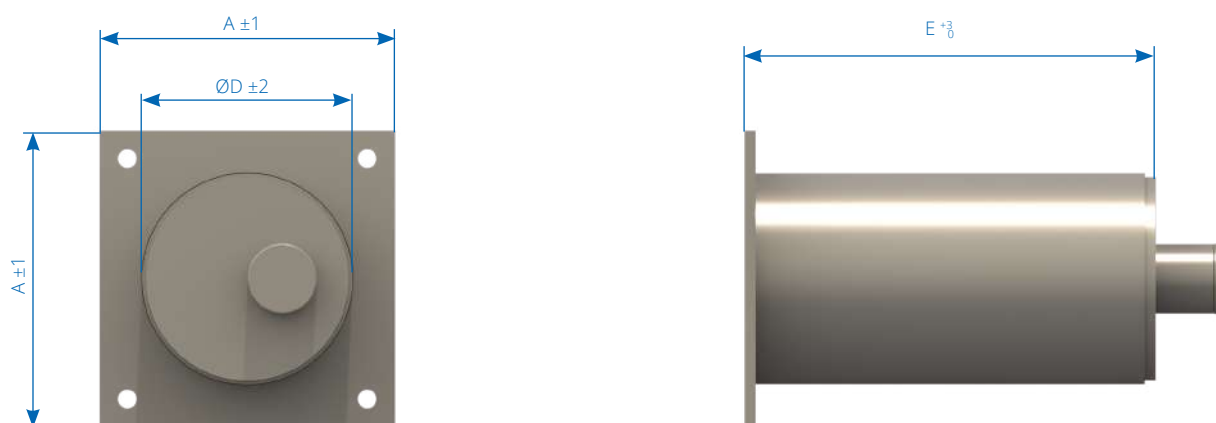
Swivel washers



Bar nominal diameter	Bar thread size	ØID	ØOD	T
31	M33	37	65	13
37	M39	43	80	16
40	M42	46	85	17
43	M45	49	90	18
45	M48	52	95	19
49	M52	56	100	23
57	M60	64	130	21
65	M68	72	140	25
75	M78	82	160	29
85	M88	91	180	32
95	M98	102	200	35
100	M103	107	210	37

SMOOTH BARS ACCESSORIES

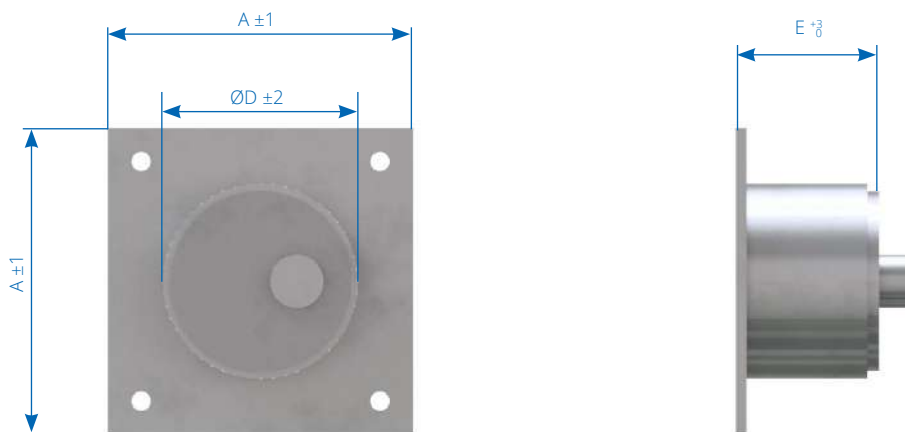
PT-cap active end tube



Bar nominal diameter	Bar thread size	A	D	E
31	M33	120	89	170
37	M39	140	102	184
40	M42	150	102	192
43	M45	160	102	200
45	M48	170	114	208
49	M52	180	114	217
57	M60	200	140	235
65	M68	220	168	255
75	M78	270	219	280
85	M88	270	219	305
95	M98	300	219	330
100	M103	320	273	343

SMOOTH BARS ACCESSORIES

PT-cap passive end tube



Bar nominal diameter	Bar thread size	A	D	E
31	M33	120	89	75
37	M39	140	102	81
40	M42	150	102	84
43	M45	160	102	87
45	M48	170	114	90
49	M52	180	114	94
57	M60	200	140	102
65	M68	220	168	110
75	M78	270	219	120
85	M88	270	219	130
95	M98	300	219	140
100	M103	320	273	145

FULLY THREADED RANGE

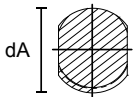


PRODUCT FEATURES

- Diameters range from 25 mm to 50 mm.
- Two steel grades are available.
 - › 830/1030.
 - › 930/1080.
- Continuous hot rolled thread.

PRODUCT BENEFITS

- Bars and accessories are re-suable. It is recommended to be reused maximum 10 times considering that each components are new and remain in good condition after first uses. Actual re-use rate shall be defined and validated by the Engineer depending on the actual conditions of each components on site and application.
- Cuttable at site.
- Continuous thread makes connection possible at any point.
- Large pitch especially suitable for fast installation and temporary applications.
- Re-tensioning possible without any damage.
- Full range of accessories, including corrosion protection accessories, also supplied by Dextra.



SYSTEM LOAD TABLE

Bar nominal diameter	Max diameter dA	Pitch c	Cross-section area	Linear weight	Grade 830/1030		Grade 930/1080	
					Yield load	Ultimate load	Yield load	Ultimate load
mm	mm	mm	mm ²	kg/m	kN	kN	kN	kN
25	28	12	491	3.9	407	506	457	530
32	36	16	804	6.3	668	828	748	869
36	41	18	1018	8.0	845	1048	947	1099
40	45	20	1257	9.9	1043	1294	1169	1357
50	56	24	1963	15.4	1630	2022	1826	2121

Note: Yield loads and ultimate loads are unfactored.

BAR AND THREAD LENGTH

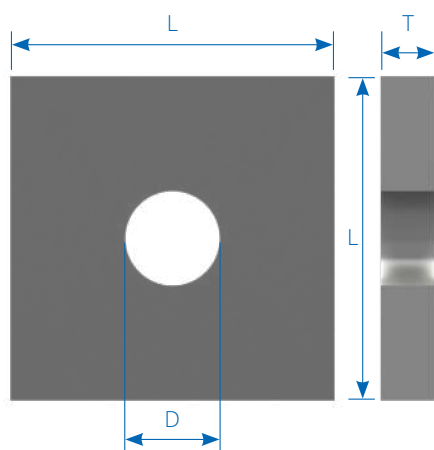


Bar nominal diameter	Min. live end	Min. dead end
	mm	mm
25	180	90
32	217	112
36	227	122
40	267	147
50	312	172

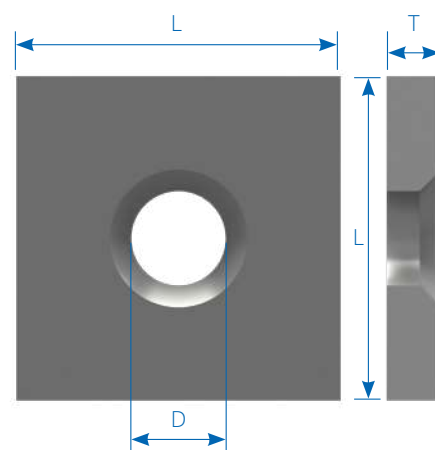
FULLY THREADED BARS ACCESSORIES

Bearing plates

Flat bearing plate



Swivel bearing plate



Flat bearing plate			
Bar grade	830/1030 and 930/1080		
Bar nominal diameter	Length (L)	Thickness (T)	Hole diameter (D)
25	110	20	35
32	140	25	45
36	155	30	50
40	175	35	55
50	215	50	60

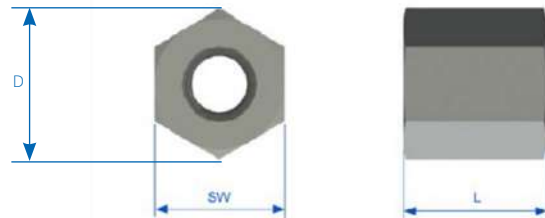
Swivel bearing plate			
Bar grade	830/1030 and 930/1080		
Bar nominal diameter	Length (L)	Thickness (T)	Hole diameter (D)
25	110	30	35
32	140	35	45
36	155	40	50
40	175	45	55
50	215	60	60

Note: Plate dimensions are designed based on following assumptions. Dimension may vary depending on actual design parameters and requirements :

1. Seating on Concrete: Concrete grade of C45/55 with cylinder compressive strength of 45MPa.
2. Tensioning Force: Maximum stressing force = $0.8F_u$ = maximum between ($0.80 F_u$ as per ETAG 13) and (minimum of $0.8F_u$ and $0.9F_y$ as per BS EN 1992-1-1 clause 5.10.2.1)

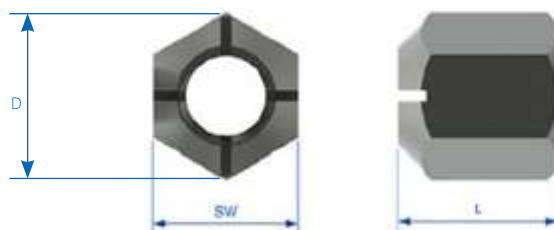
FULLY THREADED BARS ACCESSORIES

Flat hexagonal nuts



Bar nominal diameter	L	SW	D
mm	mm	mm	mm
25	60	50	57
32	72	65	75
36	80	65	75
40	100	70	81
50	110	80	92

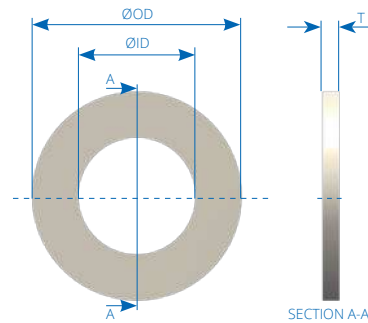
Swivel hexagonal nuts



Bar nominal diameter	L	SW	D
mm	mm	mm	mm
25	60	50	57
32	72	65	75
36	80	65	75
40	100	70	81
50	110	80	92

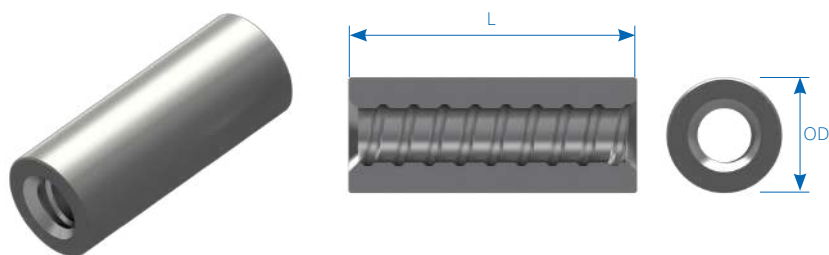
FULLY THREADED BARS ACCESSORIES

Flat washers



Bar nominal diameter	ØID	ØOD	T
mm	mm	mm	mm
25	37	65	5
32	46	85	7
36	52	95	7
40	56	100	7
50	64	130	12

Couplers

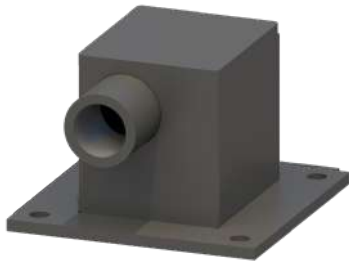


Bar nominal diameter	L	OD
mm	mm	mm
25	132	50
32	168	60
36	180	70
40	220	74
50	270	88

FULLY-THREADED & SMOOTH BAR SPECIAL ACCESSORIES

CAPS

Square cap can be used in a specific project that requires minor adjustment and low tolerances in installation, and shall be used when the hex nut needs to be secured by the cap before final installation.



Short length steel square cap



Long length steel square cap

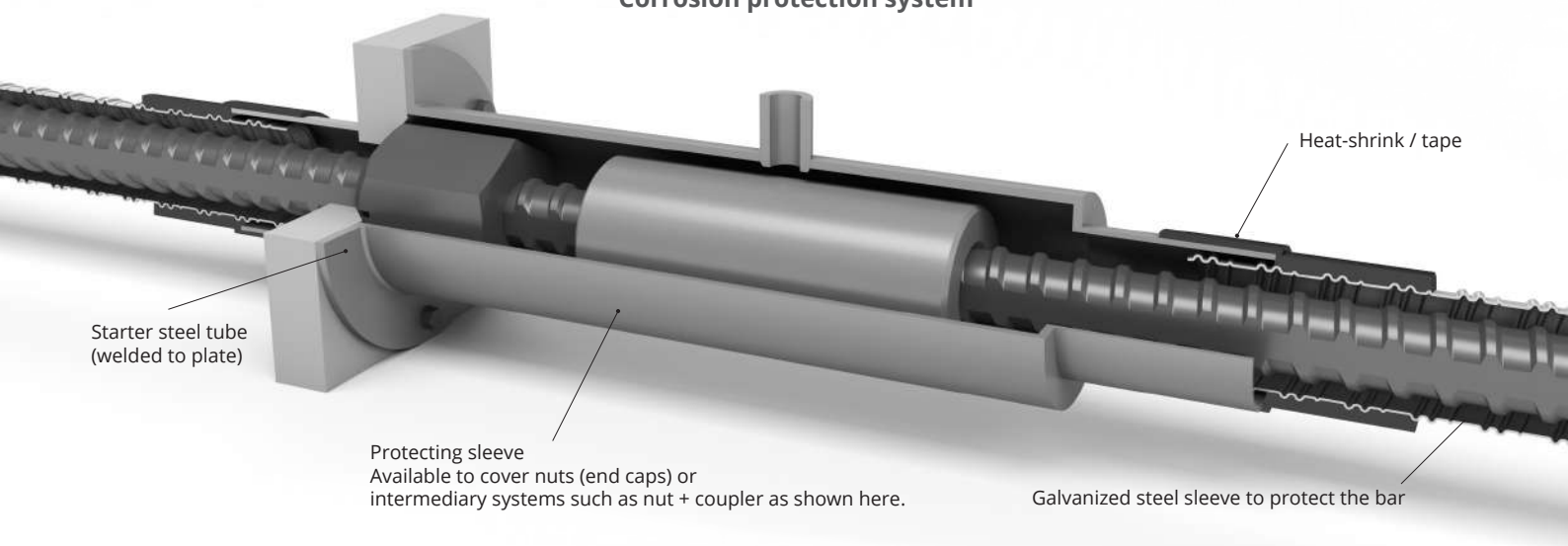
DUCTS



CONTINUATION CONNECTION



Corrosion protection system



Starter steel tube (welded to plate)

Protecting sleeve
Available to cover nuts (end caps) or intermediary systems such as nut + coupler as shown here.

Galvanized steel sleeve to protect the bar

Heat-shrink / tape

CORROSION PROTECTION

BAR CORROSION PROTECTION

Selected corrosion protection system depends on type of bar.
Bonded tendons are generally protected by cement grout which provides an alkaline environment.

Unbonded bars may be coated with:

- Grease impregnated heat shrink
- Grease (encapsulated in plastic duct)
- Wax (hot injection) (encapsulated in plastic duct)
- Petroleum tape (only applicable for smooth bar)
- Epoxy coating (for temporary use)

Corrosion protection related accessories will vary depending on the selected corrosion protection solution.

Bar Protection	BONDED	UNBONDED		
		With free tendon duct (External)	Without free tendon duct (Internal)	
	Permanent	Permanent	Temporary	Permanent
With steel strip trumpet tube and grouting injection after stressing.		Heat shrink / Petrolatum tape +PE +Trumpet	PE Duct +Trumpet	Heat shrink / Petrolatum tape
		Grouting after stressing. (Grease / wax before stressing if for shear key)	No coating	Grouting / Wax / Grease before stressing (applied by others)

ANCHORAGE CORROSION PROTECTION

When anchorage is embedded in concrete or grouted after stressing, no corrosion protection is required. This is most often the case for bonded items.

When anchorage remains exposed after stressing and completion of work, corrosion protection of anchorage (plate, nut, cap) shall be considered:

- Plate and cap: May be painted or galvanized
- Nut: Shall be protected by a corrosion protection compound injected in the cap.
This may be grout, grease or wax.

STRESSING

LIMITATION OF STRESSING FORCE

The maximum allowable stressing force in the prestressing bars is given by the relevant applicable standard and National Annex. Below recommendation is given as an example only :

Eurocode

Stressing force: $\text{Min}\{0.8 f_{pk} ; 0.9 f_{p0.1k}\}$
 Initial prestressing force*: $\text{Min}\{0.75 f_{pk} ; 0.85 f_{p0.1k}\}$
 *Immediately after transfer of stressing force onto stressing anchorage.

AASHTO

Stressing force: $\text{Min}\{0.8f_{pk} ; 0.94 f_{p0.2k}\}$
 Initial prestressing force*: $0.70 f_{pk}$
 *Immediately after transfer of stressing force onto stressing anchorage.

Reuse:

Stressing force: $0.5 f_{pk}$

STRESSING PROCEDURE

Stressing of straight tendons is generally performed from one end only (stressing/active anchorage). Two jacking methods are given as examples only:

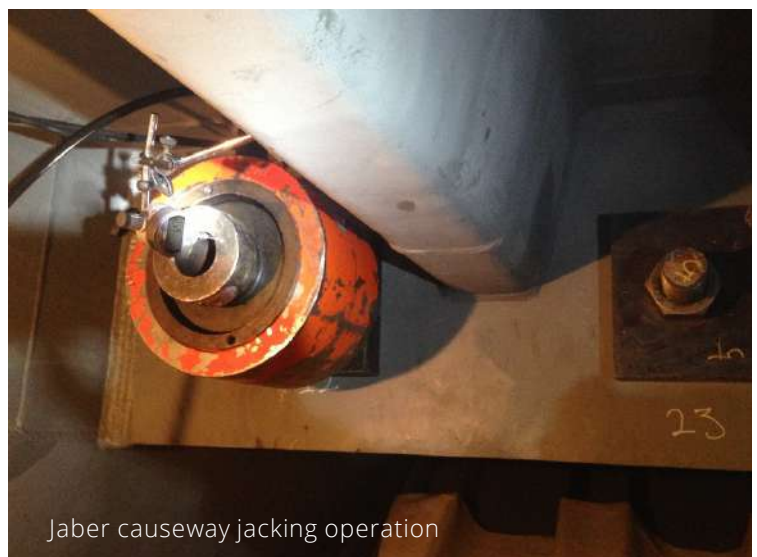
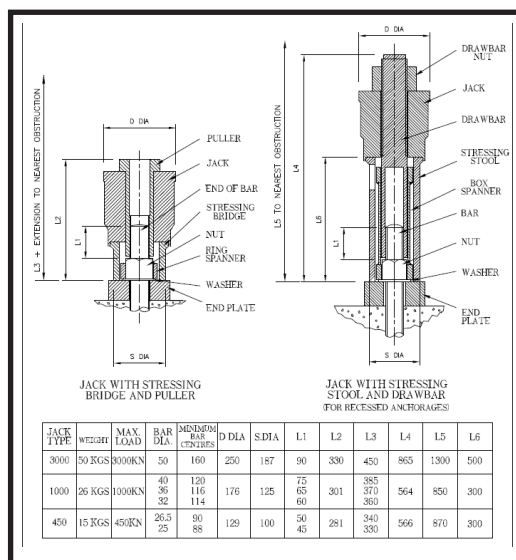
Torque tensioning: Calibrated torque wrenches may be used when low loads are required ($\approx 25\%$ of f_{pk}). The accuracy of the load induced is very dependent on the friction between nut and bar. Dextra therefore do not recommend torque tensioning when accurate or high prestressing load must be applied.

Tension by jack: This is the recommended method. Jack may be connected directly to the tendon using a threaded puller. Alternatively, standard hollow jack may be used and tendon extended by a "stressing kit" (coupler, short bar, nut).

Jack shall calibrated and used in conjunction with high pressure and low flow rate pump to allow progressive tensioning. Calibrated gauge shall be used to record the force. Tendon stretch shall also be recorded.

Also, bar jacks have a hand or mechanical ratchet to rotate and tighten the anchor nut against the anchor plate as the bar elongates under load.

Anchorage recess and surrounding concrete or steel structure shall allow sufficient room for operating the jack. See below dimensions to consider.



TRANSPORTATION & INSTALLATION

BARS PACKING

Dextra pays particular attention to the packing of all its bars and components to ensure safe delivery of the products.

The process includes the individual protective packing of the steel bars and various solutions such as steel racks, boxes or tailor made packing structures.

Bars can also be packaged with air bags to protect both bars and coating during sea shipment.



ACCESSORIES PACKING

Similarly, accessories can be shipped in wooden boxes, crates, wrapped on pallets or secured on specific packing structures.



DRAWING APPROVAL

Dextra will submit drawing for approval to agree on detailed scope of supply and interface between packages to ensure subsequent smooth site works.

INSTALLATION

Detailed installation method statement will be provided at time of delivery.

GROUTING OR COMPOUND INJECTION

Dextra system will include required injection port and vent/drain whenever grouting or corrosion protection compound injection is scheduled. The durability of post-tensioning works depends on the quality of the grouting execution. Contractor shall comply with applicable standard and guideline.

TRANSPORTATION, HANDLING AND STORAGE

Dextra PT systems should be transported in containers or covered vehicles. Do not drag or drop the bars over sharp edges, steel or concrete.

For bars longer than 6m, a spreader bar should be used for lifting to prevent the bars from over bending.

All products must be stored in a dry, covered and well-ventilated area, on wooden sleepers and not directly on the ground.

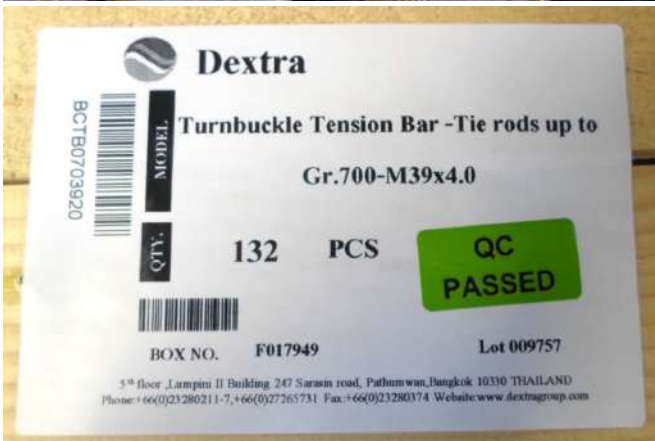
TEMPORARY SURFACE RUST PREVENTION

Once delivered, the PT bars can be regularly spraid with Shell Dromos-B compound every 2 to 4 weeks.

QUALITY & TRACEABILITY

LABELLING & IDENTIFICATION

Bars are traceable by batch. Accessories part numbers are identified on boxes, crates, pallets, etc.



QUALITY ASSURANCE

ISO 9001-certified since 1996, Dextra also became in 2009 the first manufacturer in South East Asia to be certified by the American Society of Mechanical Engineers (ASME), emphasizing its outstanding commitment to top quality.



TRACEABILITY CONTROL

Every component of the Dextra post tensioning bar system is manufactured under consistent quality assurance as required by ISO 9001 certification.

Load-bearing components such as plates, nuts and couplers are all individually marked with a lot number that enables full traceability.

Traceability of bars is achieved through both the mill certificates and the certificates of compliance provided together with the delivery notes.

A certificate of compliance, provided with every delivery enables full traceability of bars including, mill certificates, testing reports and inspection data.

Upon request, the compilation of all the quality documents can be delivered, once all goods have been shipped out.

ENQUIRIES

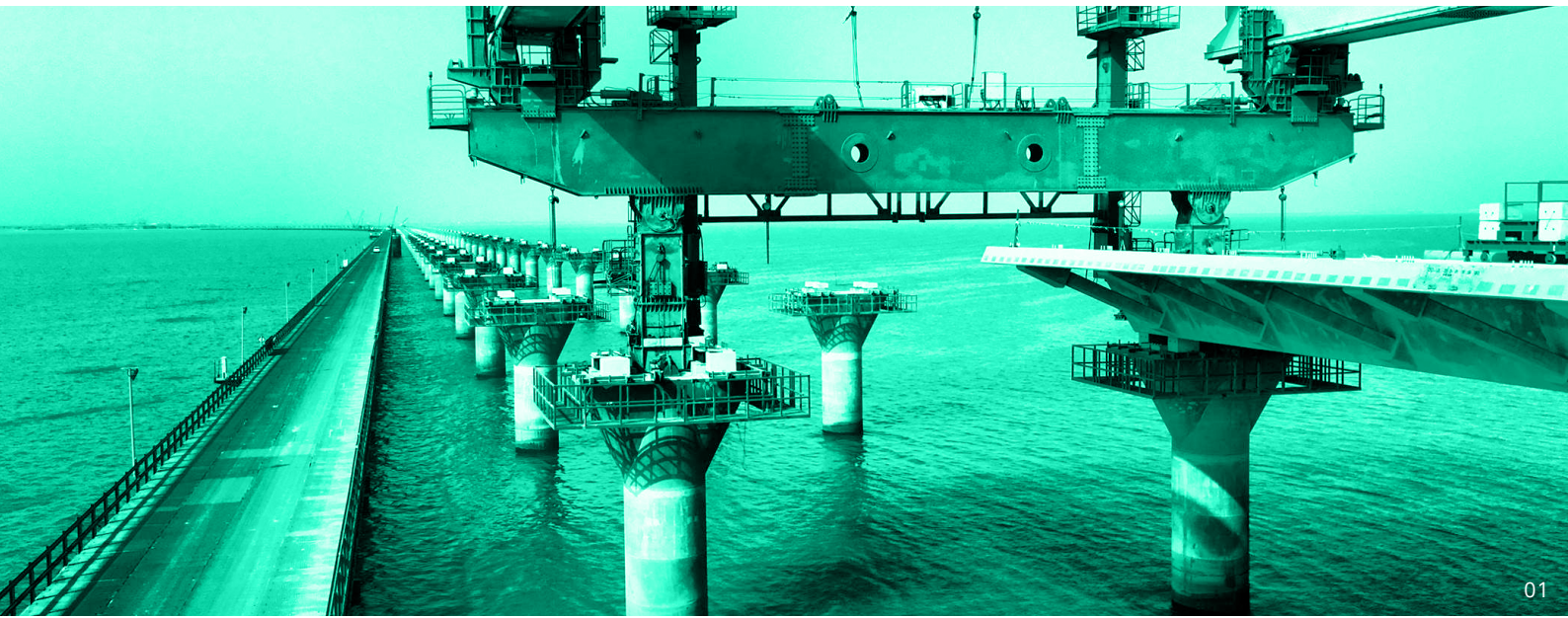
For each enquiry, customers are requested to provide the following information:

1. The applicable design standard (EC2, AASTHO)
2. The required grade of bar
3. The required diameter of bar
4. The required prestressing loads
5. The concrete compressive strength
6. The duct diameter if supplied by Contractor
7. The required concrete to concrete length
8. Bill of Quantity
9. Type (Bonded, unbonded, internal, external)
10. Required corrosion protection system
11. Expected scope of supply
12. Delivery location
13. INCOTERMS
14. Expected lead time

PROVISION FOR CHANGE

As we strive for continuous improvement of all our products, Dextra reserves the right to modify the contents of this document at any time without prior notice.

PROJECT REFERENCES



01



02



03



04



05



06

01 | Causeway Across Kuwait Bay

Jaber Causeway, Kuwait
Application: Lifting of the Main girder,
fixing of the Pylon piles

02 | Mandovi Bridge

Panaji, Goa, India
Application: temporary lifting precast
segments

03 | Bach Dang Bridge

Quang Ninh, Vietnam
Application: lifting and fixing of the
girder precast segments

04 | Binh Khanh Bridge

Ho Chi Minh City, Vietnam
Application: lifting and fixing of the
girder precast segments

05 | Hyderabad Metro, India

Hyderabad, India
Application: lifting and fixing of the
girder precast segments

06 | Nhat Than Bridge

Hanoi, Vietnam
Application: lifting and fixing of the
girder precast segments



07 | La Reunion: Route du Littoral

Reunion, France
Application: Lifting



08 | TH 2139 Windmill TH

Thailand
Application: Anchoring



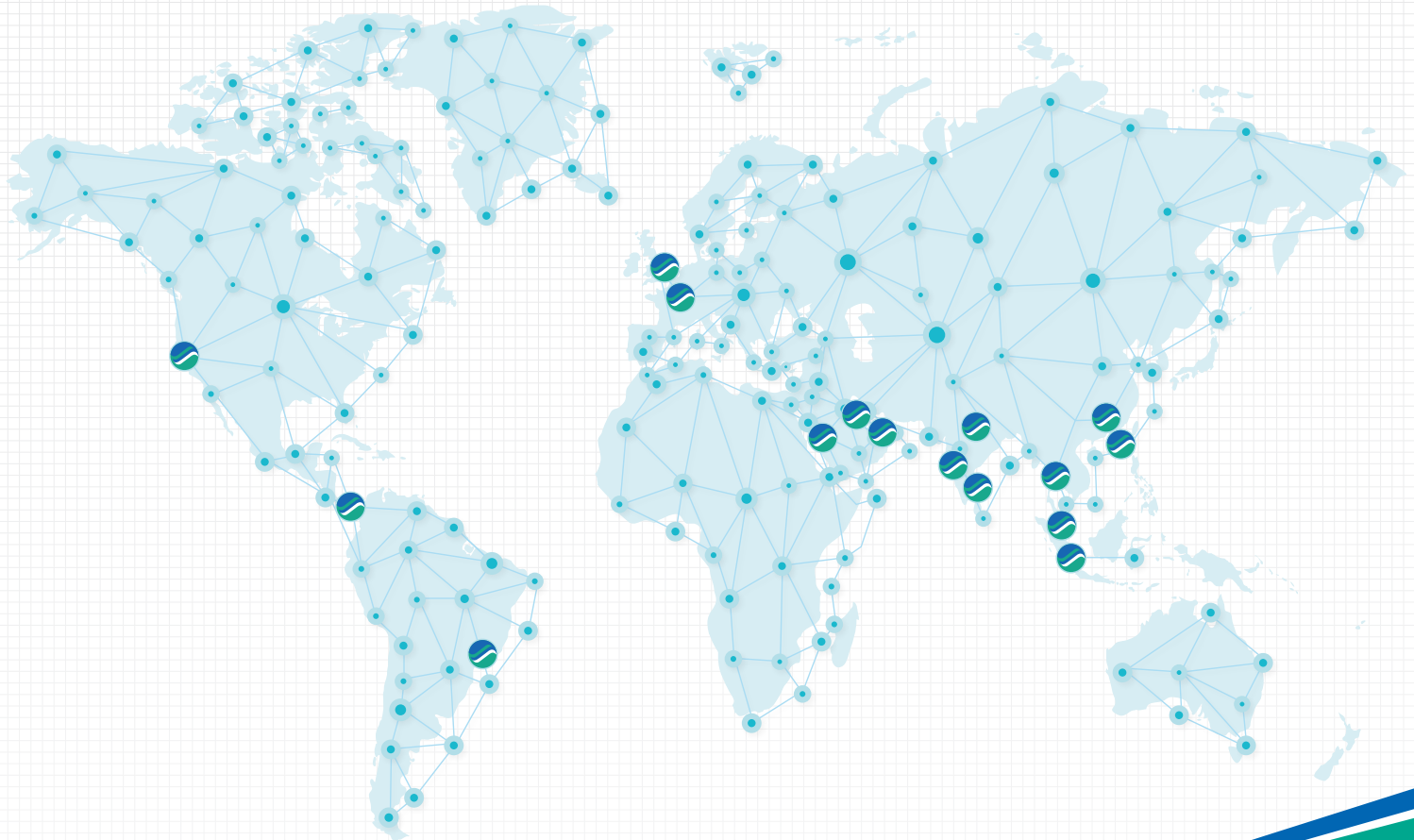
09 | Nakhon Ratchasima Motorway

Nakhon Ratchasima, Thailand
Application: Fixing of segment launcher



10 | Nakhon Ratchasima Motorway

Nakhon Ratchasima, Thailand
Application: Lifting of girder



Commercial presence
in more than
55 countries



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