



Bonded Post-tensioning Systems Using Strands



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Company Profile

Utracon Group of Companies (Utracon) was established in 1998 with the aim to provide specialist design and construction services to our clients.

The main activities of Utracon evolve around the application of sound engineering concepts in the DESIGN & CONSTRUCTION of concrete structures.

Utracon has established its name in the region as being one of the few specialists that has the capabilities of performing the following services:

- Sophisticated structural design and construction methods for both building and civil engineering structures.
- Design, supply and installation of both internal and external prestressing tendons.
- Design, supply and installation of fiber reinforced plastics (FRP) and other structural strengthening methods.
- Design, fabrication and erection of temporary structures and system formwork (to suit construction of bridges, egg shaped digesters, elevated water towers, etc.).



Utracon has established itself in the following overseas markets over the last few years:

- South East Asia
Malaysia / Indonesia / Brunei /
Vietnam / Myanmar / Cambodia / Laos
- Sri Lanka
- India
- Guam
- United Arab Emirates
- Algeria

Through our Singapore's licensee agreement with DYWIDAG Systems International (DSI), Utracon is the authorised supplier of DSI patented products:

- DYWIDAG Post-tensioning System
- DYWIDAG Prestress Bar
- DYWIDAG Geotechnical range of products
- DYWIDAG Stay Cable System



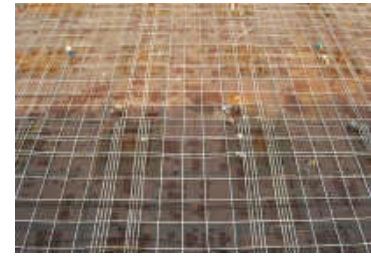
Various PT slab systems



PT beam & slab



PT beam with PC slab



PT flat slab

DYWIDAG Bonded Post-tensioning System is a world renowned system which complies to all international specifications and recommendations. This system is suitable for all applications and is widely used throughout the world in bridges and civil engineering structures, e.g. water tanks, LNG tanks, stay cable structures, etc.

Through years of experience in the design and construction of post-tensioned buildings, Utracon has successfully embarked on a venture to design and produce its own UPS flat anchorage system.

With bonded post-tensioned slab being the most favoured floor system used in South East Asia, Utracon has the opportunity to experience the various design and construction requirements of buildings, where the use of flat anchorages is most predominant.

As a leading post-tensioning specialist in Singapore, Utracon had constructed more than 5 million square meter of post-tensioned floor since 1998. It has accumulated a great deal of experience and knowhow in the application of flat anchorages, which helped it to fine-tune the design of its UPS flat anchorage system.

To-date, Utracon's UPS system has been used extensively in the construction of buildings and civil engineering projects in South East Asia, India, Sri Lanka, The Middle East and Africa.



Post-tensioned high rise buildings in Singapore

Post-tensioning – Site Installation Works



Laying of beam tendons



Uncoiling of precut strands



Fixing of beam tendon support bar



Forming of bulb end



Installation via strand pusher



Fixing of slab tendon bar chair



Fixing of slab anchorages



Fixing of grout vent / hose



Stressing of slab tendon



Stressing of beam tendon



Mixing of grout for tendon grouting



Locking of tendon after grouting

Standard Strands

Strands are made up of 7 individual cold-drawn wires; 6 helically wound outer wires and one centre wire (king wire). Strands can be supplied either bare, galvanized or epoxy-coated without any loss in strength.

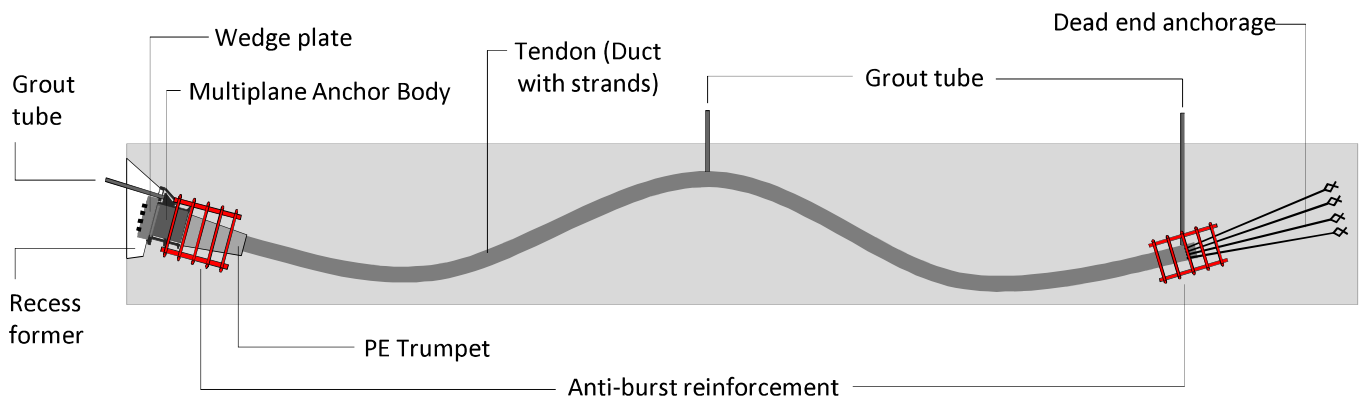


Bare strands



Epoxy coated strands

Components of an Internal Post-tensioned Tendon



Technical Data

Strand Type		0.5"			0.6" / 0.62"				
		ASTM A416 Grade 270	BS 5896 Super	SS 475 Ordinary	ASTM A416 Grade 270	BS 5896 Standard	SS475 Ordinary	BS 5896 Super	BS 5896 Super
Nominal diameter	mm	12.7	12.9	12.7	15.24	15.2	15.2	15.7	15.7
Ultimate Strength, f_{pk}	N/mm ²	1860	1860	1860	1860	1860	1860	1770	1860
Cross-sectional area	mm ²	98.71	100.00	98.70	140.00	139.00	139.00	150.00	150.00
Weight	Kg/m	0.775	0.785	0.774	1.102	1.090	1.101	1.180	1.180
Ultimate load	kN	183.7	186.0	184.0	260.7	259.0	259.0	265.0	279.0
Yield strength, $f_{p0.1k}$	N/mm ²	1670 ⁽¹⁾	1580 ⁽²⁾	1530 ⁽²⁾	1670 ⁽¹⁾	1580 ⁽²⁾	1525 ⁽²⁾	1500 ⁽²⁾	1580 ⁽²⁾
Modulus of elasticity	N/mm ²	~ 195,000							
Relaxation ⁽³⁾ after 1000 hr at 0.7 x ultimate strength f_{pk}	%	Max. 2.5							

note:

(1) Yield at 1% effective elongation.

(2) Yield measured at characteristic 0.1% proof load.

(3) Applicable for relaxation Class 2 according to BS 5896 and SS475: or low relaxation complying with ASTM A 416.

Corrugated Ducts

Metal corrugated ducts are produced from hot-dipped galvanised steel sheet on special tubeformer machines.

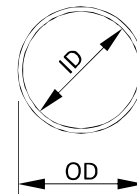
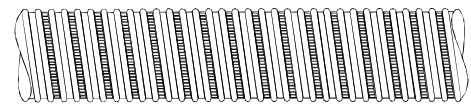
These thin-walled (0.25mm – 0.60mm), ribbed sheet metal ducts provide high rigidity that can withstand being embedded in concrete without deformation. The duct corrugation provides excellent bond behaviour between the tendon and concrete.

Metal ducts also provide a fair secondary corrosion protection to the strands. Primary protection is provided by the alkalinity of grout and concrete.



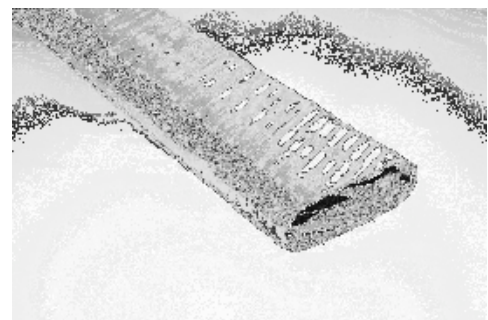
Dimensions of Corrugated Round Duct

No. of Strands in Duct		Duct	
Strand type 0.5"	Strand type 0.6" / 0.62"	I.D. (mm)	O.D. (mm)
07	05	50	55
09	07	65	70
12	09	75	80
15	12	80	85
20	15	90	95
27	19	95	100
31	22	100	105
37	27	110	115
42	31	120	125
--	37	130	135

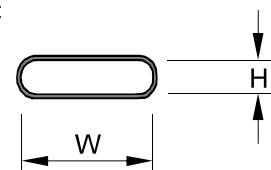


Dimensions of Corrugated Flat Duct

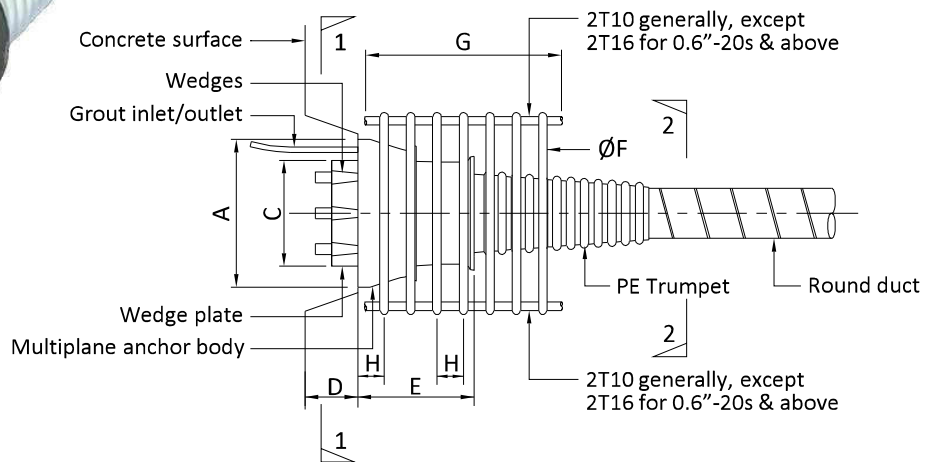
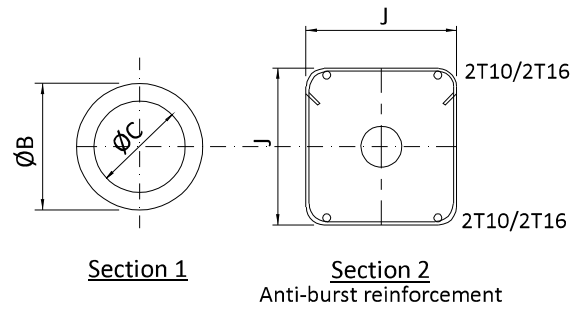
No. of Strands in Duct		Duct	
Strand type 0.5"	Strand type 0.6" / 0.62"	Width (mm)	Height (mm)
3	2	55	23
4 - 5	4	75	23
--	5	90	23



Dimensions (internal width and height) of flat ducts:



DYWIDAG Multiplane Anchorage MA



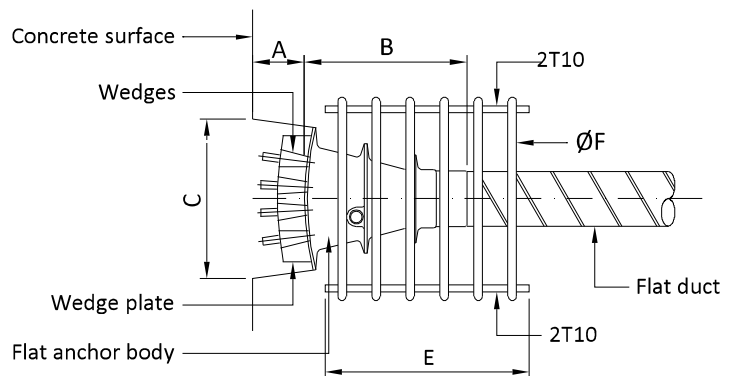
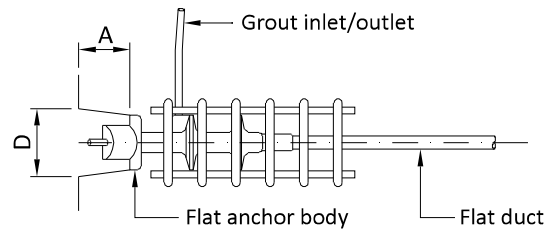
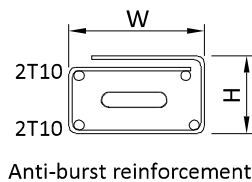
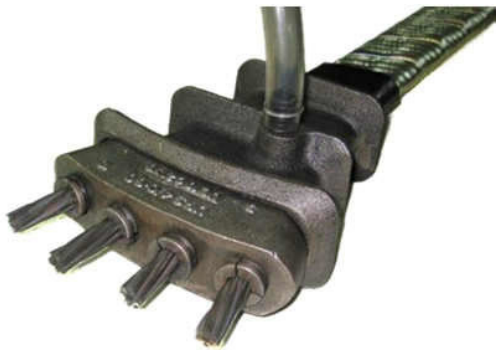
Multiplane Anchorage (MA) & Anti-burst Reinforcement Data

Technical Data							Anti-burst Reinforcement Schedule				
Type 0.5"	Type 0.6"/0.62"	A	ØB	ØC	D	E	ØF	G	H	J	No. of Links
7	5	200	150	117	100	90	T16	210	45	170	4
9	7	220	170	130	100	100	T16	250	45	185	5
12	9	230	190	145	100	125	T16	275	45	240	6
15	12	270	220	170	100	180	T16	300	45	280	7
20	15	300	250	190	100	200	T16	320	45	320	7
27	19	330	280	210	120	220	T16	365	45	360	8
31	22	360	310	220	120	220	T16	410	45	400	9
37	27	390	340	240	120	240	T20	400	50	430	8
42	31	435	385	270	120	350	T20	500	50	480	10
--	37	470	420	270	135	350	T20	550	50	530	11

note:

- (1) For type 0.6"/0.62", maximum UTS of strand applicable is 279kN.
- (2) The above configurations can be substituted with equivalent helical reinforcement.
- (3) The above is based on minimum concrete (cube) strength at transfer of 25 N/mm². For higher concrete strength at transfer, please refer to Utracon Design Department for details.

UPS Flat Anchorage FA

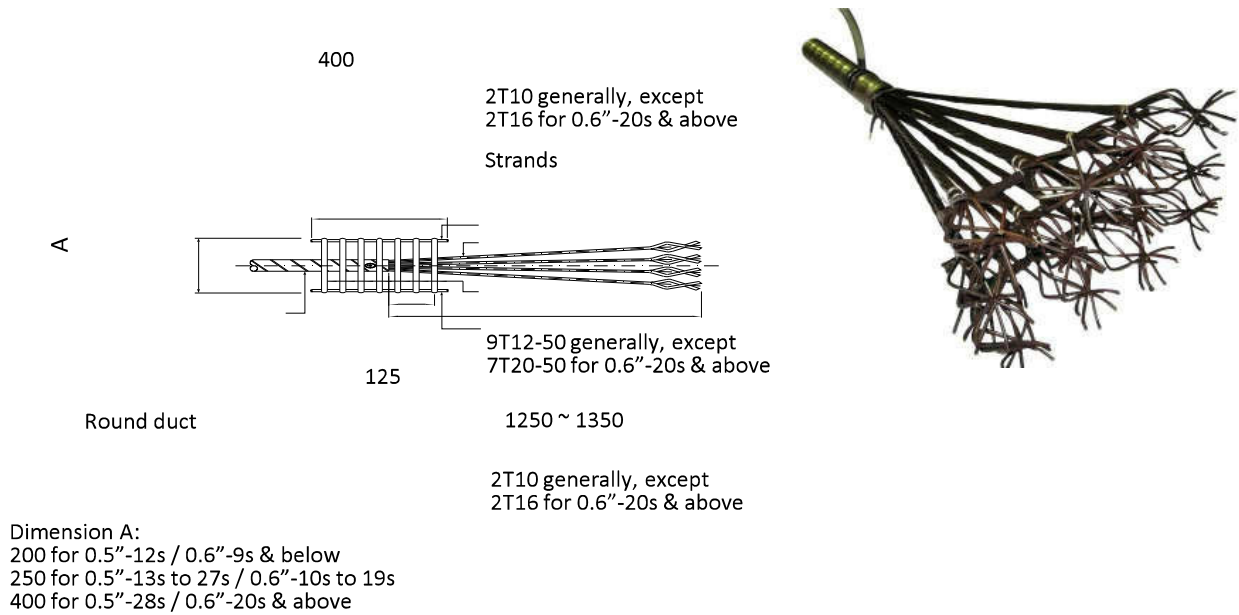


UPS Flat Anchorage (FA) & Anti-burst Reinforcement Data

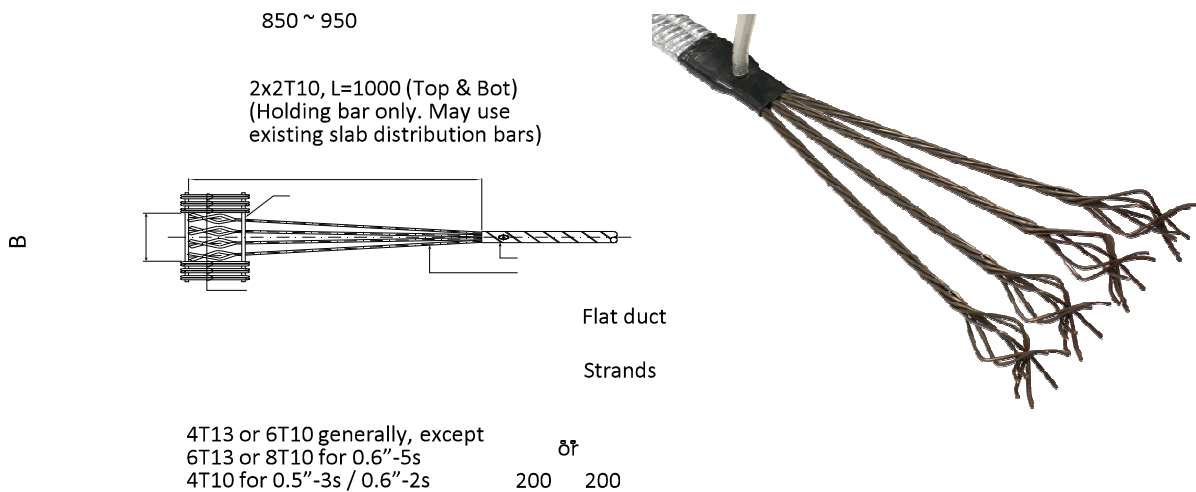
Type 0.5"	Type 0.6"/0.62"	A	B	C	D	E	ØF	Anti-burst Reinforcement		
								H*	W	No. of Links
3	2	81	120	180	90	150	T10	130	200	3
4	--	81	203	233	106	300 (200)	T10 (T13)	130	250	6 (4)
5	4	81	203	233	106	300 (200)	T10 (T13)	130	250	6 (4)
--	5	90	234	300	106	300 (200)	T10 (T13)	130	300	6 (4)

note:

- (1) For type 0.6"/0.62", maximum UTS of strand applicable is 265kN.
- (2) The above configurations can be substituted with equivalent helical reinforcement.
- (3) The above is based on minimum concrete (cube) strength at transfer of 25 N/mm². For higher concrete strength at transfer, please refer to Utracon Design Department for details.
- (4) * For slab thickness <200mm, H = 115mm.



Typical Dead End Anchorage Type Z for Multistrand Tendon



Typical Dead End Anchorage Type Z for Flat Tendon

Anti-burst reinforcement only required for slab ≤ 200thk



Coupler R

Coupler P



For full range of coupler types, please refer to DSI catalogue.



Anchorage Coupler for Multistrand Tendon



Available for anchorage types:

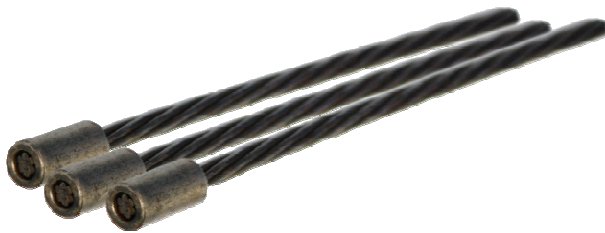
0.6" - 5s

0.6" - 4s

0.5" - 5s

0.5" - 4s

Anchorage Coupler for Flat Tendon



Available for both 0.5" and 0.6" strand diameters

Strand with Compression Fitting

Note:

- Full details of the above products will be made available upon request.

Equipment Overview

Hydraulic Jacks



CH258DA

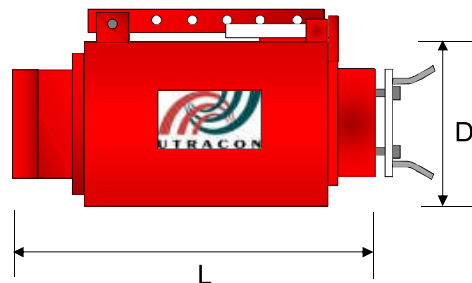


CH2006DA



CH7008DA

Strand Type	0.5" 0.6" / 0.62"	01	07	09	12	15	20	27	31	37	42	--
		01	05	07	09	12	15	19	22	27	31	37
Jack												
CH258DA		•										
CH2006DA			•	•	•							
CH2206/8DA			•	•	•							
CH3006DA						•	•					
CH4006DA								•				
CH7008DA									•	•	•	
CH9008DA												•



Technical Data

	Length, L (mm)	Diameter, D (mm)	Stroke (mm)	Piston Area (cm ²)	Capacity (kN)	Weight* (kg)
Jack						
CH258DA	510	118	200	33.25	250	24
CH2006DA	590	320	150	304.02	2000	220
CH2206/8DA	600	355	150	324.72	2200	290
CH3006DA	670	404	150	465.59	3000	350
CH4006DA	710	457	150	602.40	4000	525
CH7008DA	860	630	200	1004.00	7000	1230
CH9008DA	1010	700	200	1776.56	9000	1650

note:

Weight with gripping assembly

Hydraulic Pumps



U60

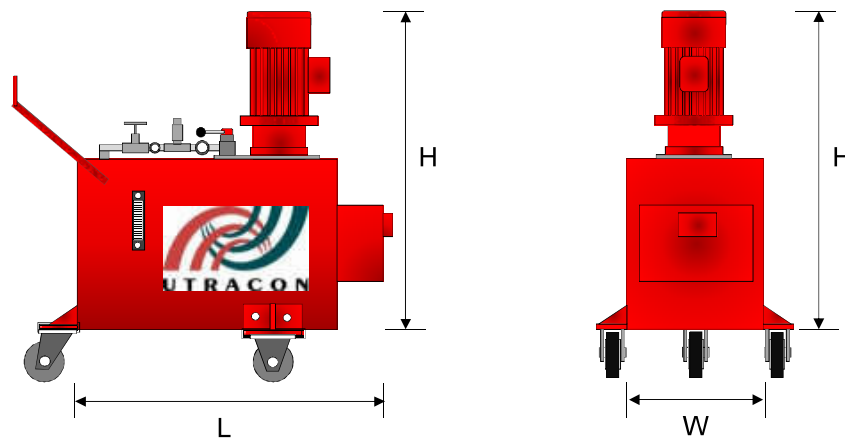


U6.4



U70

	Jack	CH258DA	CH2006DA	CH2206DA	CH3006DA	CH4006DA	CH7008DA	CH9008DA
Pump								
U60		•						
U70			•	•	•	•		
U77		•	•	•	•	•		
U6.4							•	•
R11.2 - 11.2							•	•



Technical Data

	Operating Pressure (Bar)	Capacity* V min (l/min)	Effective Oil Amount (l)	Weight (kg)	Dimension L x W x H (mm)
Pump					
U60	700	1.1	5	30	292 x 241 x 178
U70	700	1.6	44	144	600 x 310 x 350
U77	700	3.0	10	50	420 x 380 x 480
U6.4	700	6.4	70	310	1400 x 700 x 1100
R11.2-11.2	550	11.2 / 22.4	170	615	2000 x 800 x 1000

note:

* Capacity of flow rate at 500 bar working pressure

Grouting Equipment



**SD6503
Combined Mixer**

**MX6503
Colloidal Mixer**

Model	Function	Max. Injection Pressure (Bar)	Max. Capacity (l/min)	Weight (kg)	Dimension L x W x H (mm)
SD6503	Mixer & Pump	15	20	300	1500 x 630 x 1680
MX6503	Mixer	--	--	300	1500 x 630 x 1680

Note:

- The combined mixer functions as a mixer, an agitator and a pump. It is capable of producing a homogenous grout that satisfy requirements of most grout specifications.
- The colloidal mixer is purely a mixer and needs to pair up with a combined mixer or a piston pump for pumping purposes. The colloidal mixer’s motor operates at very high revolutions and it is able to produce a high quality grout that can comply with the most stringent requirements. Together with a combined mixer, it can supply grout for continuous pumping without intervals.

Ancillary PT Equipment



SSP3



S6/M60SP

Strand Pusher

	Power (HP)	Weight (kg)	Dimension: L x W x H (mm)
Pusher			
S6/M60SP	30	1210	1800 x 900 x 2000
SSP3	3	70	720 x 450 x 440



Compression Fitting Machine



Bulb End Former

Note:

- Full details of the above products will be made available upon request.

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