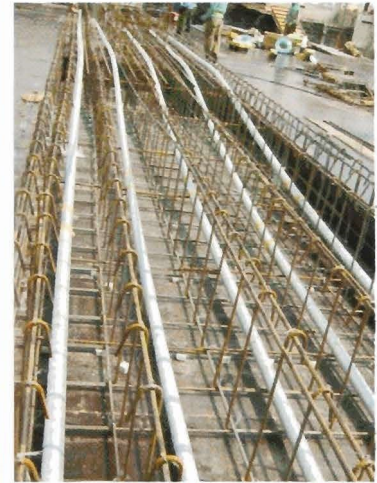


# UTRACON POST - TENSIONING SYSTEM



With in house design and operation capabilities, Utracon has been able to capture a considerable portion of the post-tensioned building market both in Singapore and abroad.

Since 1998, Utracon has designed and constructed more than 3.0 million square meter of post-tensioned floor slab, employing various slab systems (e.g. flat slab, banded beam slab, etc.) to satisfy the varying floor spans and loading requirements.

Besides the post-tensioning system for slab, Utracon has also employed its post-tensioning system in bridge construction. To-date, it has amassed invaluable experiences in all the various construction techniques, with projects spread out in Singapore, Malaysia, U.A.E. and Sri Lanka.

In Singapore, Utracon has constructed the Viaduct from Airport Road to Tampines Ave 10 using the span by span precast segmental method. The balanced cantilever method was used to construct the Braddell/Thomson Interchange. In Sri Lanka, the Bridge at Manampitiya was constructed using the incremental launching method. In Malaysia, the Pasir Gudang Bridge was cast in-situ using formtraveler.

With this wealth of experience, Utracon will enter into the next phase of expansion mode, i.e. to bid for international projects in The Middle East, Africa, Indo China, and beyond.

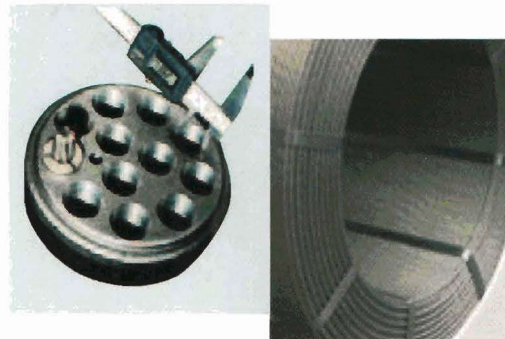
**UTRACON** Post-tensioning system is primarily a bonded system where the strands are grouted after the stressing of tendon. Both the live and dead end anchorages have their unique end block design carried out with simple anti bursting links detailing to cater for the localised bursting effect of the prestressing forces.



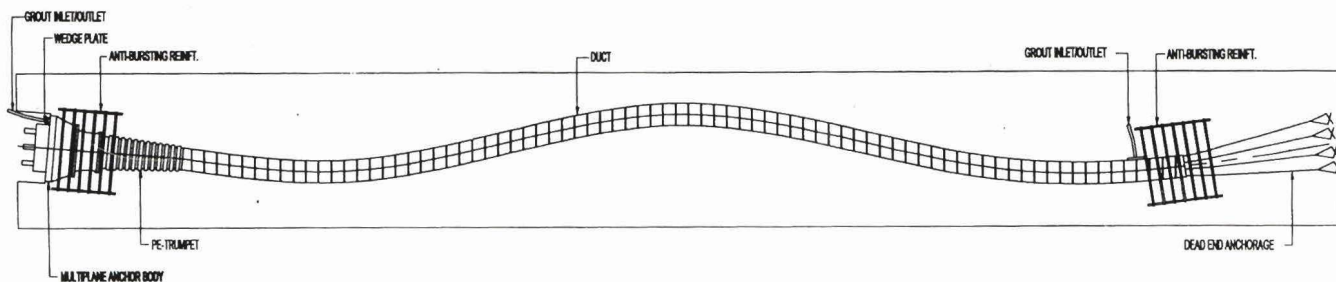
# STANDARD STRANDS



Strands are made from 7 individual cold-drawn wires, 6 helically wound outer wires and one centre wire (king wire). The mechanical properties of the strand as well as corrosion protection properties are most important to UPS. Strands can be supplied either bare, galvanized or epoxy-coated without any loss in strength.



## Multistrand System Components



## Technical Data

type code/specification		13 mm (0.5")		15 mm (0.6"/0.62")	
		ASTM A 416		ASTM A 416	
		Grade 270	BS 5896 Super	BS 5896 Super	Grade 270
yield strength $f_{p0.1k}$	[N/mm <sup>2</sup> ]	1,670 <sup>(1)</sup>	1,580 <sup>(2)</sup>	1,500 <sup>(2)</sup>	1,670 <sup>(1)</sup>
ultimate strength $f_{pk}$	[N/mm <sup>2</sup> ]	1,860	1,860	1,770	1,860
nom. Diameter	[mm]	12.70	12.90	15.70	15.24
cross-sectional area	[mm <sup>2</sup> ]	98.71	100.00	150.00	140.00
weight	[kg/m]	0.775	0.785	1.180	1.102
ultimate load	[kN]	183.7	186.0	265.0	260.7
modulus of elasticity	[N/mm <sup>2</sup> ]	~195,000			
relaxation <sup>(3)</sup> after 1,000 h at 0.7 x	[ % ]	max. 2.5			
ultimate strength $f_{pk}$					

- 1) yield measured at 1% effective elongation
- 2) yield measured at 0.1% residual elongation
- 3) applicable for relaxation class 2 according to BS 5896 and SS475: or low relaxation complying with ASTM A 416, respectively

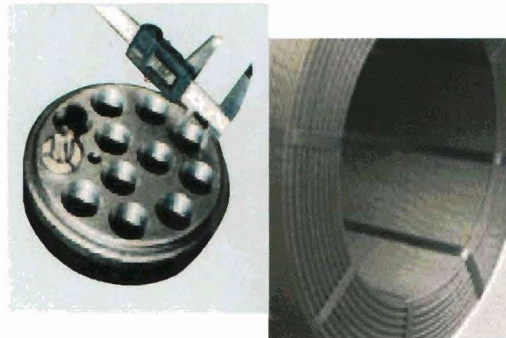
## SINGAPORE STANDARD: SS 475

Type of strand <sup>(1)</sup>	Nominal strand diameter <sup>(1)</sup>	Nominal tensile strength <sup>(1)(2)</sup>	Nominal cross-sectional area <sup>(2)</sup>	Mass per length	maximum force <sup>(2)(3)(4)</sup>	Characteristic 0.1% proof force <sup>(1)(2)(3)</sup>	0.2% proof force <sup>(4)(5)</sup>
Diameter	mm	N/mm <sup>2</sup>	mm <sup>2</sup>	Nominal	Permissible deviation	kN	kN
mm	mm	N/mm <sup>2</sup>	mm <sup>2</sup>	g/m	%	kN	kN
7-wire	12.7	1860	98.7	774	+4, -2	184	151
ordinary	15.2	1860	139	1101	+4, -2	259	212

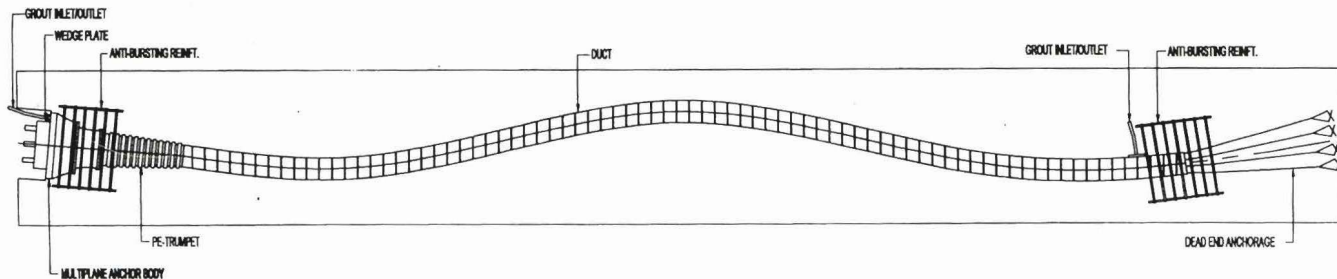
- 1) The type of strand, nominal diameter and nominal tensile strength are for designation purpose only.
- 2) The nominal tensile strength is calculated from the nominal cross-sectional area and the specified characteristic maximum force see footnote 5
- 3) No single test result shall be less than 95% of the specified characteristic value.
- 4) Considering the small tolerance on mass per length, characteristics forces have been specified rather than stresses.
- 5) The 0.1% proof force is mandatory and the 0.2% proof force is for information only (see ISO 6934-1), except when otherwise agreed.



Strands are made from 7 individual cold-drawn wires, 6 helically wound outer wires and one centre wire (king wire). The mechanical properties of the strand as well as corrosion protection properties are most important to UPS. Strands can be supplied either bare, galvanized or epoxy-coated without any loss in strength.



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ultimate load [kN]	183.7	186.0	265.0	260.7
modulus of elasticity [N/mm <sup>2</sup> ]	~195,000			
relaxation <sup>(3)</sup> after 1,000 h at 0.7 x	[%]		max. 2.5	
ultimate strength $f_{pk}$				

1) yield measured at 1% effective elongation

2) yield measured at 0.1% residual elongation

3) applicable for relaxation class 2 according to BS 5896 and SS475: or low relaxation complying with ASTM A 416, respectively

## SINGAPORE STANDARD: SS 475

Type of strand <sup>(1)</sup>	Nominal strand diameter <sup>(1)</sup>	Nominal tensile strength <sup>(1)(2)</sup>	Nominal cross-sectional area <sup>(2)</sup>	Mass per length		maximum force <sup>(2)(3)(4)</sup>	Characteristic 0.1% proof force <sup>(1)(2)(3)</sup>	0.2% proof force <sup>(4)(5)</sup>
Diameter	mm	N/mm <sup>2</sup>	mm <sup>2</sup>	Nominal	Permissible deviation	kN	kN	kN
	mm			g/m	%			
7-wire	12.7	1860	98.7	774	+4, -2	184	151	156
ordinary	15.2	1860	139	1101	+4, -2	259	212	220

1) The type of strand, nominal diameter and nominal tensile strength are for designation purpose only.

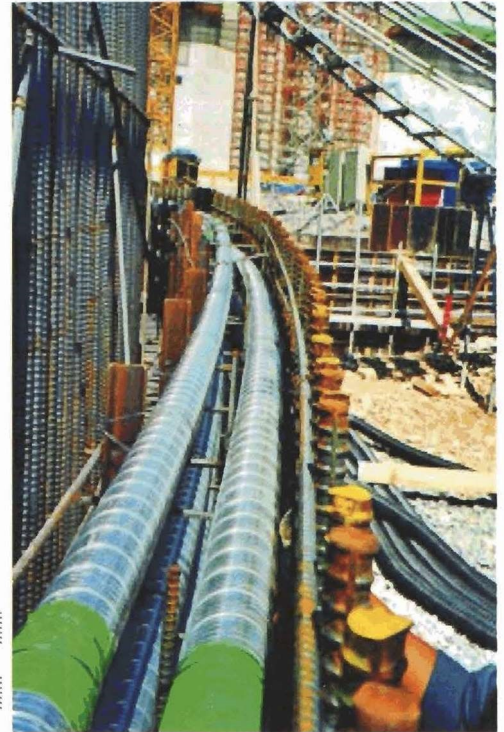
2) The nominal tensile strength is calculated from the nominal cross-sectional area and the specified characteristic maximum force see footnote 5

3) No single test result shall be less than 95% of the specified characteristic value.

4) Considering the small tolerance on mass per length, characteristics forces have been specified rather than stresses.

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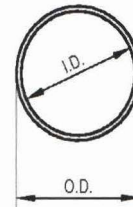
Metal ducts represent the most economical means to create a void for tensile elements. This thin-walled (0.25 – 0.60 mm), ribbed sheet metal ducts provide a fair secondary protection with excellent bond behavior between tendon and concrete. Primary protection is provided by the alkalinity of grout and concrete.



## Dimensions of Corrugated Duct (Standard Sizes)

tendon type 0.5"	tendon type 0.6"/ 0.62"	sheathing (duct)	
		I.D. mm	O.D. mm
5907	-	50	54
-	6807	64	68
5912	-	75	79
5915	6812	80	84
5920	6815	91	95
5927	6819	95	99
-	6822	100	104
5937	6827	112	117
-	6837	130	135

The tendon type number (e.g. 5901, 6801) is composed as follows: the first digit (5 or 6) identifies the nominal strand diameter in the tenth of inches, i.e. 0.5" or 0.6"/0.62", the last 2 digits (.01) reference the number of used strands)=1 strand). The second digit is an internal code.



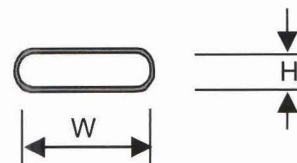
## Dimensions of Corrugated Flat Ducts

flat anchorage type 0.5"	flat anchorage type 0.6"/ 0.62"	sheathing (duct)	
		W mm	H mm
4-5	4	80(max)	20(min)
-	5	90(max)	20(min)

\* Varying dimensions in flat duct are due to the pressing process during production

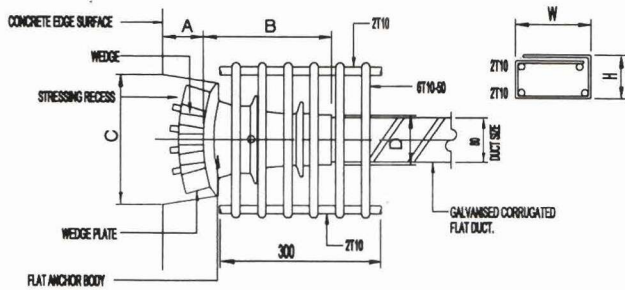
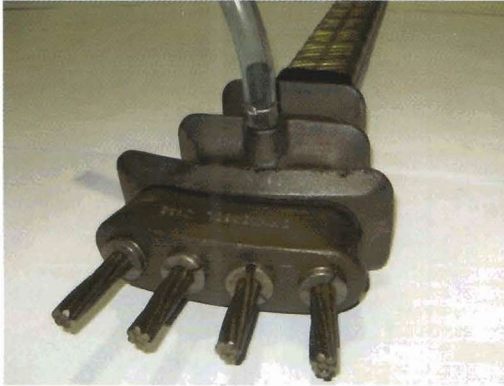


Dimensions (width and height) of flat ducts:

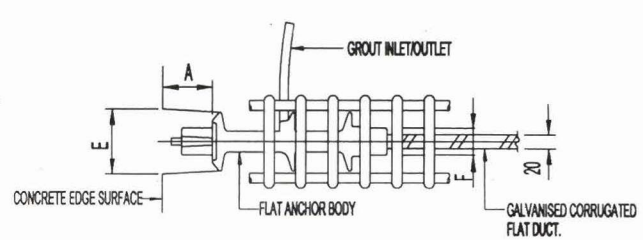








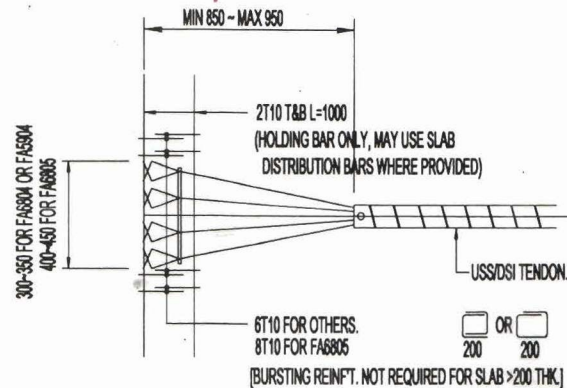
PLAN VIEW OF FLAT ANCHORAGE (FA)



SECTIONAL ELEVATION OF FLAT ANCHORAGE (FA)

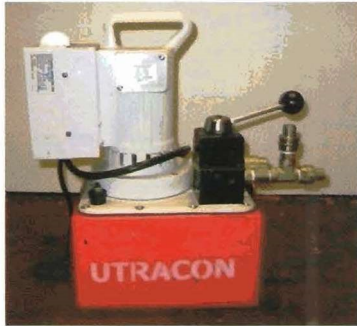
FLAT ANCHORAGE DIMENSION							
TENDON TYPE	A	B	C	D	E	F	DUCT SIZE
FA 6804/FA5905	85	203	225	90	95	40	20X80
FA 6805	95	235	310	105	105	40	20X90

MEMBER	THICKNESS	H	FA 5905/ FA 6804	FA 6805
			W	W
SLAB	170~195	115	250	300
SLAB	200~250	130	250	300
SLAB	≥255	200	250	300



TYP. DETAILS OF FLAT SLAB TENDON BOND HEAD ANCHORAGE TYPE Z (FOR FLAT SLAB < 200 THK)

## Hydraulic Pumps



U60

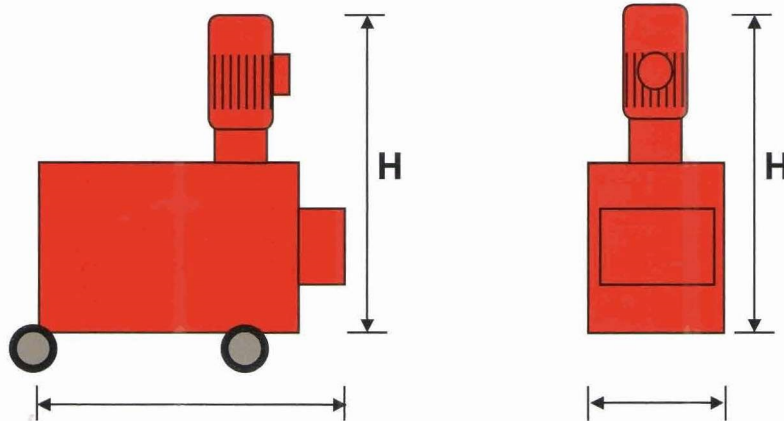


U6.4



U70

Pump	Jack	CH258DA	CH2006DA	CH3006DA	CH4006DA	CH7006DA	CH9006DA
U60		●					
U70			●	●	●		
U6.4						●	●
U77		●	●	●	●		
R11.2-11.2						●	●



### Technical data

Pumps	operating pressure (Bar)	capacity V min (l/min)	effective oil amount (l)	weight (kg)	dimension LxWxH (mm)
U60	700	60cu	5	65lbs	11.5"x9.5"x7"
U70	700	1.5	44	144	600x310x350
U6.4	700	6.4	70	310	1400x700x1100
U77	700	3	10	50	420x380x480
R11.2-11.2	550	11.2/22.4	170	615	2000x800x1000



## Strand Pusher



## Grout Pump



Grouting Equipment	max. injection pressure (bar)	max. capacity (l/min)	weight (kg)	dimension LxWxH (mm)
SD6503	15	20	300	1500/630/1680