



OVM PRESTRESSING SYSTEM

China

Headquarter

OVM MACHINERY CO., LTD
No.3 Longquan Road,
Liuzhou City,
Guangxi, P.R. China
Postcode 545005
TEL: 86-772 3116 402
3130 157
FAX: 86-772 3118 665

Beijing Office

Room No.105, Building No.10,
Qianhejia Yuan, 108 North 4th
Ring East Road, Beijing, China
Postcode 100029
TEL: 86-10 8483 3693
FAX: 86-10 8483 3696

Shanghai Office

Room No.105, 510 Quyang
Road, Shanghai, China
Postcode 200092
TEL: 86-21 6555 5305
FAX: 86-21 6555 0895

Guangzhou Office

9-104, Liuyunwu Street, Tianhe
Tiyu Road(E), Guangzhou,
China
Postcode 510620
TEL: 86-20 8750 7402
FAX: 86-20 8754 0849

Wuhan Office

Room 101, Unit 4, Building D,
Houjiuwanfang Sarcun,
Hankou, Wuhan, China
Postcode 430019
TEL: 86-27 8262 8856
FAX: 86-27 8260 2747

Asia

Hong Kong

HONG KONG OVM
ENGINEERING CO., LTD.
5C, Hong Kong Spinners
Industrial Building,
601-603 Tai Nan West Street,
Cheung Sha Wan, Kowloon,
Hong Kong
TEL: 852-3758 8711
FAX: 852-2370 1791
Mobile: 852-9329 0148

Indonesia

PT. MULTISTRAN
ENGINEERING
Ciputat Indah Permai Blok A-1,
Jl. Ir. H. Juanda No.50,
Ciputat 15419 Indonesia
TEL: 62-21 7418 827
FAX: 62-21 7418 603

PT. ALINDRA CITRA NUSA

Jln Bangka Raya No.32 Pela
Mampang, Jakarta 12720
TEL: 62-21 7181 155
FAX: 62-21 7179 238

Japan

ANDERSON TECHNOLOGY
CORPORATION
Kozato-Kaikan Bldg. 3F,
1-18-14 Nishi-Shinjyushi,
Minato-ku, Tokyo 105-0003,
Japan
TEL: 81 3-3595 5888
FAX: 81 3-3595 5811

Korea

JINSUNG CONSTRUCTION
CO., LTD
Jinsung Building 624-67 Yong
Hyun-Dong Nam-Gu,
Incheon City, Korea
Tel: 82-32 8900 700
Fax: 82-32 8900 780

Singapore

PPT ENGINEERING PTE LTD
No.10 Jalan Lebu Maris
Bartley Rice Estate
Singapore 537995
TEL: 65-6898 9095
FAX: 65-6898 9785

Taiwan

HUNGSU PROJECT CO., LTD.
42, L232 Chu Wei Street,
Chu Nan, Taiwan
TEL: 886-3749 7339
FAX: 886-3748 0810
Mobile: 886-9320 48817

Vietnam

OVM HANOI
REPRESENTATIVE OFFICE
No.6-D2, Lang Khoa Hoc,
Ngoc Khanh,
Ba Dinh Dist, Hanoi City,
Vietnam
TEL: 84-4 3771 8642
FAX: 86-4 3771 8237

Middle East

Egypt

BETA TECHNICAL &
TRADING BUREAU
26-A Asmaa Fahmi St, Apt.3,
Heliopolis, Cairo, Egypt
P.O BOX 9031 Naer City,
Cairo, Egypt
TEL: 202-2418 5219
2417 8867
FAX: 202-2291 5736

Iran

PAYAB ZAMZAM
CONSTRUCTION COMPANY
No.35, 4th Street, Amirabad
1413694561
Tehran, Iran
TEL: 98-21 8863 9899
8863 7198
8863 3152
FAX: 98-21 8863 6424



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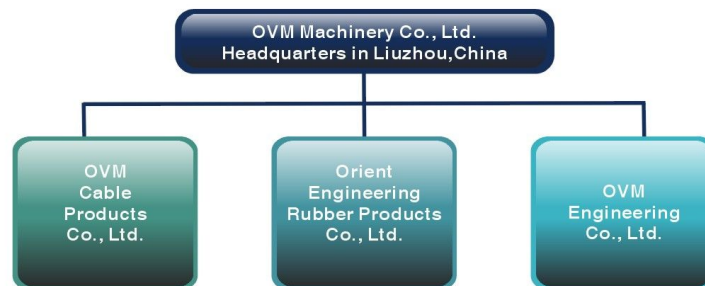
■ OVM PRESTRESSING SYSTEM

- ☐ OVM LOAD & STRAIN MONITORING
- ☐ OVM CABLE SYSTEMS
(Cable-stayed Bridge, Arch Bridge, Suspension Bridge)
- ☐ OVM GROUND ANCHOR SYSTEM
- ☐ OVM BEARING & EXPANSION JOINT
- ☐ OVM ENGINEERING SOLUTIONS
(Heavy Lifting / Turning / Incremental Launching)
- ☐ OVM COMPANY BROCHURE

OVM BRIEF

OVM PRESTRESSING SYSTEM

OVM BRIEF
OVM PRESTRESSING SYSTEM



- + With plenty of experience in prestressing field
- + Abundant in technical research & development
- + With ISO9001-2000 quality management system
- + Products complying with GB, ASTM, AASHTO, JIS, BS, FIP, ETA



Shanghai Maglev, China

Thanks to 4 decades of experience, OVM is now a leading product supplier and specialist contractor in China in the field of prestressing and other special construction techniques. With a strong reputation for reliability, professionalism and innovation, OVM Systems have successfully worked on numerous projects, including bridges, buildings, tunnels, harbours, dams and nuclear power stations, and in doing so have achieved worldwide prestige.

OVM has been accredited with more than 250 items of technical patents, more than 40 of which acquired with provincial and national awards. OVM owns a national technology center and Postdoctoral Research Station with a favorable cooperative relationship with numerous famed universities, institutions and authorities of technology research, design and construction in China.

With decades' development, OVM has accumulated a large number of product programs of over 400

types covering OVM Post-Tensioning System; OVM External Prestressing System; OVM Ground Anchor Sytem, OVM Cable Systems (for cable-stayed bridge, arch bridge and suspension bridge); OVM Engineering Solutions (OVM heavy lifting/turning/incremental launching system); OVM Bearing and Expansion Joint, etc.

OVM is qualified for ISO9001-2000 Quality Management System accredited by CQC and BSI. OVM products satisfy the inspections

and tests conducted by many well-known inspection and test organizations, complying with the Standard of Specification in GB, ASTM, AASHTO, BS, JIS, FIP, ETA.

OVM strives continually to provide quality services to our customers and is seeking partnerships in the areas of prestressing design for structural engineering projects, provision of prestressing systems, and contracting of special structures.

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OVM PRESTRESSING SYSTEM



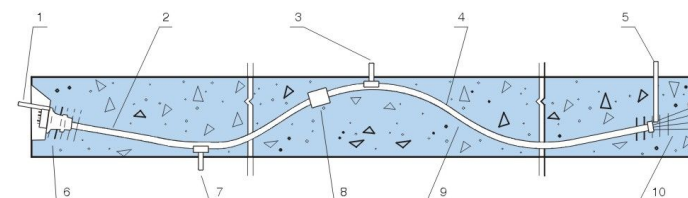
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OVM Post-tensioning System in the Girder



1. Grout tube 2. Duct 3. Vent 4. Strand bundle 5. Grout tube 6. Stressing anchorage
7. Drain port 8. Coupler 9. Grout 10. Dead end anchorage Type P (alternatively)

OVM Post-tensioning System consists of anchorage (stressing-end, dead-end), coupler, strand and duct. For strands with various diameters, the system contains several types of anchorages such as OVM13(strand Dia 12.4mm, 12.7mm, 12.9mm), OVM15(strand Dia 15.24mm, 15.7mm), OVM22(21.8mm), OVM28(28.6mm), BM(slab anchorage), HM(Ring Anchoring System) etc., which feature:

■ Adaptable for strand with various strength class such as 1570 MPa, 1670MPa, 1770MPa, 1860MPa & 2000MPa and with various diameters.

■ Full range of tendon sizes are available (1~55 strands and larger sizes are available on request).

■ No need to accurately determine strand length in advance.

■ High anchoring coefficient, reliable and stable.

* For OVM post-tensioning System:

+ Anchor coefficient: $\eta_a \geq 0.95$;

+ Total strain at ultimate tensile force:

$$\varepsilon_{sp} \geq 2.0\%$$

■ Simple and reliable equipment for installation, tensioning and grouting.

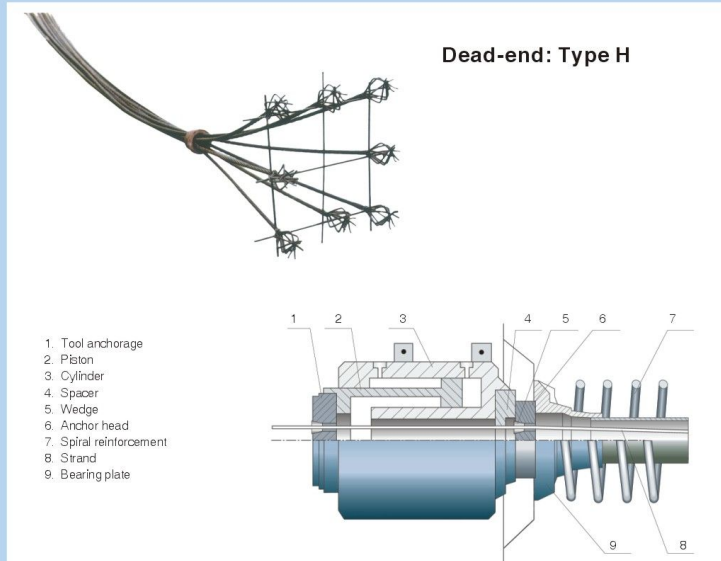


Liuzhou Shengli Viaduct, China

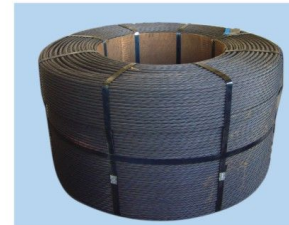
Integral Assembly of OVM Post-tensioning System



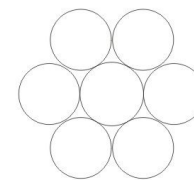
Stressing-end (Two-ends-stressing is available as per design) Dead-end: Type P



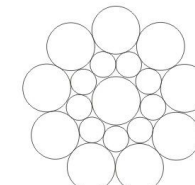
Strand



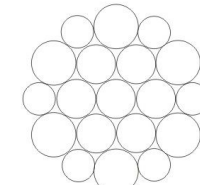
The strand used for OVM PTS (Post-Tensioning System) should comply with the standard of ASTM A416, GB/T5224, JIS G3536 or BS 5896 etc. It can be supplied with appearance bared, galvanized or epoxy-coated.



Cross-section of 13/15/18mm strand



Cross-section of 22mm strand

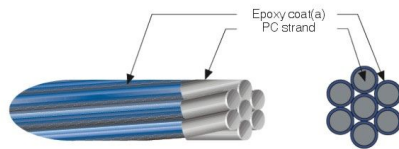


Cross-section of 28mm strand

Main Data of Bare Strand

Type	13mm(0.5 ")			15mm(0.6 ")				18mm	22mm	28mm
specification	En1038 Bs5896 Super	ASTM A416 (Grade 270)	GB/T5224 (1860MPa)	En1038 Bs5896 Super	ASTM A416 (Grade 270)	GB/T5224 (1860MPa)	GB/T5224 (2000MPa)	JIS G3536	JIS G3536	JIS G3536
Nom. Diameter(mm)	12.9	12.7	12.7	15.7	15.24	15.2	15.24	17.8	21.8	28.6
Cross section area(mm ²)	100	98.71	98.7	150	140	139	140	189	312.9	532.4
Unit weight(kg/m)	0.785	0.775	0.774	1.18	1.102	1.101	1.102	1.484	2.482	4.229
Ultimate load(KN)	186	183.7	184	265	260.7	259	Min.280	351	Min.573	Min.949
Proof load @ 1% extension(KN)	158	165.3		225	234.6		252	315		
0.2% Proof load (KN)			156			220			Min.495	Min.807
Elongation (%)	Min. 3.5									
Relaxation after 1000h at 70% ultimate load	Max.2.5									

Epoxy-Coated PC Strand



With excellent anti-corrosion property;
Same strength and mechanical properties as the bare strand before being epoxy-coated;

Epoxy-Coated PC Strand

Type	PC strand		OVMESC13/ESC15				Material
	Spec.	Unit Weight (g/m)	External Dia.(mm)	Unit Weight (g/m)	Coating Thickness on Single Wire (mm)	Unit Weight of Coating (g/m)	
OVMESC13	12.7	775	13.5	789	0.12-0.20	14.9	Epoxy
OVMESC15	15.2	1102	16.0	1119	0.12-0.20	17.7	

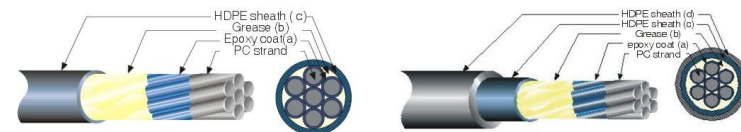
Unbonded strands



Bare Unbonded strand

Epoxy-coated Unbonded Strand

Epoxy-Coated Unbonded Strand



Single Layer PE Sheath Epoxy-Coated Unbonded Strand

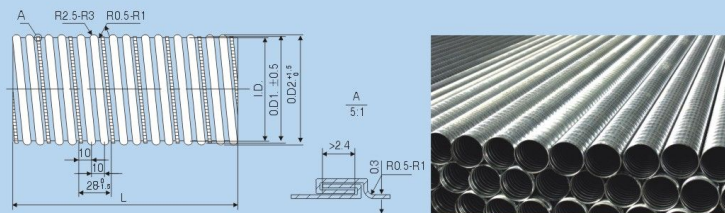
Type	PC strand		UPS13E/15E							
	Spec.	Unit	External	Unit	Thickness (mm)		Weight of Grease (g/m)	Material		
		Weight	Dia.	Weight						
		(g/m)	(Mm)	(g/m)	a	c	b	a	b	c
UPS13E	12.7	775	≥15.6	887	0.12-0.20	≥1.0	≥43	Epoxy	Grease	HDPE
UPS15E	15.2	1102	≥18.1	1235	0.12-0.20	≥1.0	≥50			

Double-Layer PE Sheath Epoxy-Coated Unbonded Strand

Type	PC strand		UPS13E2/15E2									
	Spec.	Unit	External	Unit	Thickness (mm)			Weight of Grease (g/m)	Material			
		Weight	Dia.	Weight	a	c	d	b				
		(g/m)	(Mm)	(g/m)								
UPS13E2	12.7	775	≥16.9	912	0.12-0.20	≥1.0	0.8-1.0	≥43	Epoxy	Grease	HDPE	HDPE
UPS15E2	15.2	1102	≥19.7	1270	0.12-0.20	≥1.0	0.8-1.0	≥50				

Galvanized Steel Duct

Round Duct

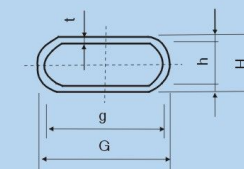


Main Data

Specs	Duct			Coupler of duct			Length(mm)
	I.D.	O.D.1	O.D.2	I.D.	O.D.1	O.D.2	
2B40(Zn)	40	42.5	45.5	45	47.5	50.5	200-300
2B45(Zn)	45	47.5	50.5	50	52.5	55.5	200-300
2B50(Zn)	50	52.5	55.5	55	57.5	60.5	200-300
2B55(Zn)	55	57.5	60.5	60	62.5	65.5	200-300
2B60(Zn)	60	62.5	65.5	65	67.5	70.5	200-300
2B65(Zn)	65	67.5	70.5	70	72.5	75.5	200-300
2B70(Zn)	70	72.5	75.5	75	77.5	80.5	200-300
2B75(Zn)	75	77.5	80.5	80	82.5	85.5	200-300
2B80(Zn)	80	82.5	85.5	85	87.5	90.5	200-300
2B85(Zn)	85	87.5	90.5	90	92.5	95.5	200-300
2B90(Zn)	90	92.5	95.5	95	97.5	100.5	200-300
2B95(Zn)	95	97.5	100.5	100	102.5	105.5	200-300
2B100(Zn)	100	102.5	105.5	105	107.5	110.5	200-300
2B105(Zn)	105	107.5	110.5	110	112.5	115.5	200-300
2B110(Zn)	110	112.5	115.5	115	117.5	120.5	200-300
2B115(Zn)	115	117.5	120.5	120	122.5	125.5	200-300
2B120(Zn)	120	122.5	125.5	125	127.5	130.5	200-300
2B125(Zn)	125	127.5	130.5	130	132.5	135.5	200-300
2B130(Zn)	130	132.5	135.5	135	137.5	140.5	200-300
2B135(Zn)	135	137.5	140.5	140	142.5	145.5	200-300
2B140(Zn)	140	142.5	145.5	145	147.5	150.5	200-300
2B145(Zn)	145	147.5	150.5	150	152.5	155.5	200-300
2B150(Zn)	150	152.5	155.5	155	157.5	160.5	200-300
2B155(Zn)	155	157.5	160.5	160	162.5	165.5	200-300
2B165(Zn)	160	162.5	165.5	165	167.5	170.5	200-300

I. One-class-bigger duct can be used as the coupler.
II. Special duct can be supplied on request.

Flat Duct



Main Data

Specs	Duct					Coupler of duct					Length(mm)
	g	G	h	H	t	g	G	h	H	t	
2B50B(Zn)	50	56	19	25	3	57	62	25	30	2.5	200-300
2B60B(Zn)	60	66	19	25	3	67	72	25	30	2.5	200-300
2B70B(Zn)	70	76	19	25	3	77	82	25	30	2.5	200-300
2B90B(Zn)	90	96	19	25	3	97	102	25	30	2.5	200-300

I. One-class-bigger duct can be used as the coupler.
II. Special duct can be supplied on request.

Plastic Duct

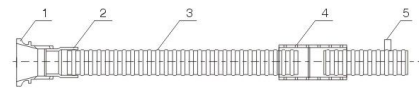
Compared to steel duct, plastic duct obtains

*Better corrosion protection

*Improved tendon fatigue performance

*Reduced tendon friction

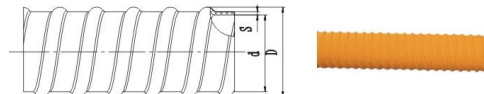
Structural Diagram of Plastic Duct Assembled with Coupler



1. Bearing plate 2. OLT round coupler 3. Plastic duct
4. OLG round coupler 5. Vent



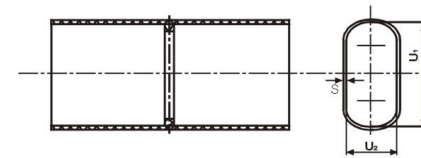
Round Plastic Duct



Main Data(Round Duct)

Specification	d	D	s	Anchorage adapted
OVMSBG-50	φ50	φ63(61)	2.5	OVM.M15-2~3 OVM.M13-2~5
OVMSBG-60	φ60	φ73	2.5	OVM.M15-6~7 OVM.M13-6~7
OVMSBG-70	φ70	φ83(81)	2.5	OVM.M15-4~7 OVM.M13-6~9
OVMSBG-80	φ80	φ94	2.5	OVM.M15-10 OVM.M13-10~12
OVMSBG-85	φ85	φ99	2.5	OVM.M15-8~9 OVM.M13-10~14
OVMSBG-90	φ90	φ106	2.5	OVM.M15-13~17 OVM.M13-20~22
OVMSBG-100	φ100	φ116(114)	2.5	OVM.M15-10~19 OVM.M13-15~27
OVMSBG-115	φ115	φ131	3	OVM.M15-23~27 OVM.M13-32~37
OVMSBG-130	φ130	φ146	2.5	OVM.M15-22~31 OVM.M13-28~44

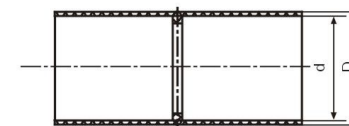
Flat Plastic Duct



Main Data(Flat Duct)

Specification	U1	U2	s	Anchorage adapted
OVMSBGB-41	41	22	2.5	BM15(13)-2
OVMSBGB-55	55	22	2.5	BM15(13)-3
OVMSBGB-72	72	22	2.5	BM15(13)-4
OVMSBGB-90	90	22	3	BM15(13)-5

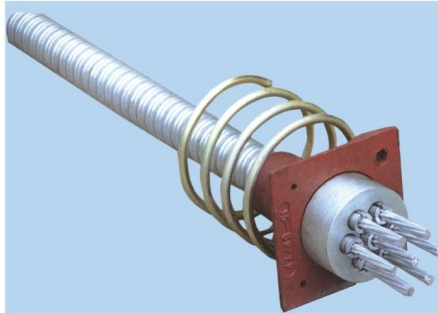
Coupler (OLG)



Main Data(Coupler)

Specification	d	D	L
OVMOLG50	64	67	160
OVMOLG70	84	87	160
OVMOLG85	102	106	160
OVMOLG100	118	121	160
OVMOLG120	136.5	140.5	170
OVMOLG130	147	151	170

Stressing-end Anchorage



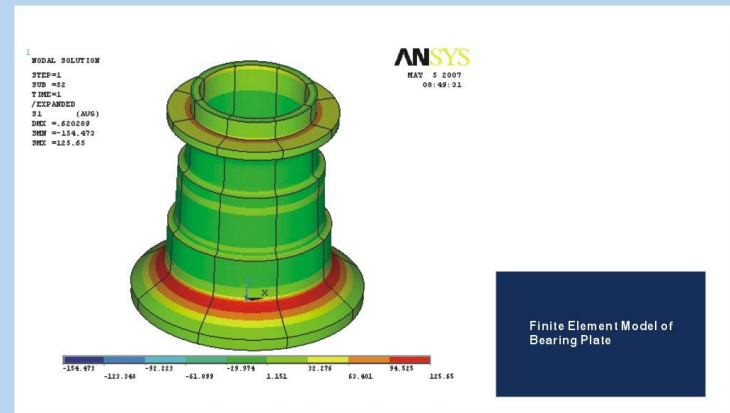
Assembled with square bearing plate:
OVM.M13
OVM.M15

Assembled with round bearing plate:
OVM.M13A
OVM.M15A



Round bearing plate obtains better load transfer property.

'13' refers to strand diameter 12.4mm, 12.7mm, 12.9mm(0.5").
'15' refers to strand diameter 15.24mm, 15.7mm(0.6").

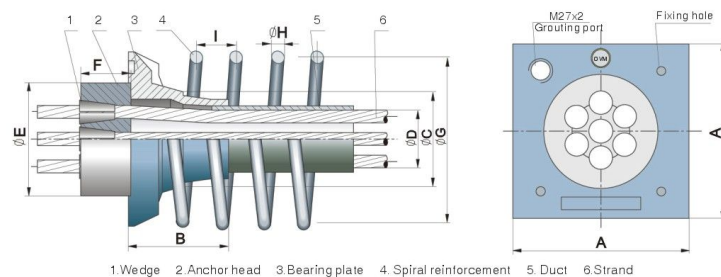


Finite Element Model of Bearing Plate



OVM working anchor head and wedges

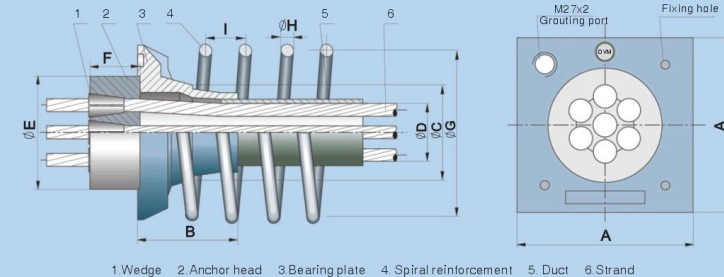
Stressing Anchorage OVM.M15 with Square Bearing Plate



Main Data

Specification	Bearing Plate		Duct φ D.	Anchor head		Spiral reinforcement				Stressing jack
	AxBx φ C	Distance for fixing hole	φ ExF	φ G	φ H	I	N			
OVM.M15-2	115x100X φ 80	80	45	φ 85x48	φ 115	φ 8	40	4		YCW100B
OVM.M15-3	135x110X φ 83	95	45	φ 85x48	φ 130	φ 10	50	4		YCW100B
OVM.M15-4	165x120X φ 93	120	55	φ 101x48	φ 150	φ 12	50	4		YCW100B
OVM.M15-5	180x130X φ 93	135	55	φ 116x48	φ 170	φ 12	50	4		YCW100B/ YCW150B
OVM.M15-6	210x160X φ 108	145	70	φ 126x48	φ 200	φ 12	50	4		YCW150B
OVM.M15-7	210x160X φ 108	145	70	φ 126x52	φ 200	φ 12	50	4		YCW150B/ YCW250B
OVM.M15-8	220x160X φ 123	160	80	φ 143x53	φ 216	φ 14	50	5		YCW250B
OVM.M15-9	240x180X φ 125	180	80	φ 152x53	φ 240	φ 14	50	5		YCW250B
OVM.M15-10	270x210X φ 140	200	90	φ 166x55	φ 270	φ 14	60	5		YCW250B
OVM.M15-11	270x210X φ 140	200	90	φ 166x57	φ 270	φ 16	60	5		YCW250B
OVM.M15-12	270x210X φ 140	200	90	φ 166x60	φ 270	φ 16	60	5		YCW250B/ YCW350B
OVM.M15-13	270x210X φ 140	200	90	φ 166x62	φ 270	φ 16	60	5		YCW350B
OVM.M15-14	285x220X φ 152	210	90	φ 175x62	φ 285	φ 16	60	5		YCW350B
OVM.M15-15	300x240X φ 170	225	90	φ 195x65	φ 300	φ 16	60	5		YCW350B
OVM.M15-16	300x240X φ 170	225	90	φ 195x65	φ 300	φ 18	60	5		YCW350B/ YCW400B
OVM.M15-17	300x240X φ 170	225	90	φ 195x70	φ 300	φ 18	60	5		YCW350B/ YCW400B
OVM.M15-18	310x250X φ 174	230	100	φ 205x70	φ 310	φ 18	60	6		YCW400B
OVM.M15-19	310x250X φ 174	230	100	φ 205x73	φ 310	φ 18	60	6		YCW400B/ YCW500B
OVM.M15-20	320x260X φ 188	230	120	φ 224x75	φ 320	φ 20	60	6		YCW500B
OVM.M15-21/22	320x260X φ 188	230	120	φ 224x78	φ 320	φ 20	60	6		YCW500B
OVM.M15-23/24	350x295X φ 210	260	120	φ 244x82	φ 350	φ 20	60	6		YCW650A
OVM.M15-25/26/27	350x295X φ 210	260	120	φ 244x85	φ 350	φ 20	60	6		YCW650A
OVM.M15-28/29	390x346X φ 222	290	130	φ 260x88	φ 390	φ 20	60	7		YCW650A
OVM.M15-30/31	390x346X φ 222	290	130	φ 260x90	φ 390	φ 20	60	7		YCW650A
OVM.M15-32/33/34	465x390X φ 246	350	140	φ 296x95	φ 465	φ 20	60	8		YCW650A/ YCW900A
OVM.M15-35/36/37	465x390X φ 246	350	140	φ 296x100	φ 465	φ 20	60	8		YCW650A/ YCW900A

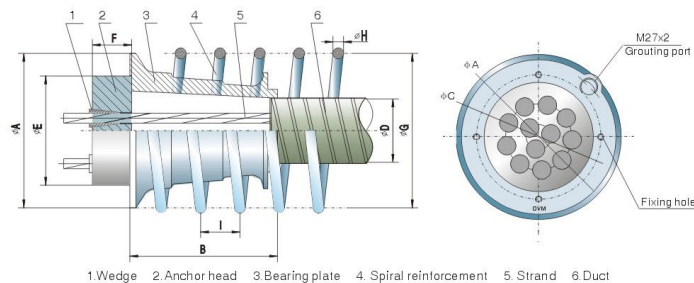
Stressing Anchorage OVM.M13 with Square Bearing Plate



Main Data

Specification	Bearing Plate		Duct φ D.	Anchor head		Spiral reinforcement				Stressing jack
	AxBx φ C	Distance for fixing hole	φ ExF	φ G	φ H	I	N			
OVM.M13-2	115x100X φ 80	80	45	φ 75x50	φ 110	φ 6	30	3		YCW100B
OVM.M13-3	120x130X φ 80	85	45	φ 80x50	φ 120	φ 10	50	3		YCW100B
OVM.M13-4	135x130X φ 80	95	50	φ 90x50	φ 135	φ 10	50	3		YCW100B
OVM.M13-5	145x130X φ 80	105	50	φ 100x55	φ 145	φ 12	50	4		YCW100B
OVM.M13-6/7	165x130X φ 94	120	60	φ 115x55	φ 165	φ 12	50	4		YCW100B
OVM.M13-8	190x150X φ 100	135	60	φ 130x55	φ 175	φ 12	50	4		YCW150B
OVM.M13-9	190x150X φ 108	135	70	φ 137x60	φ 190	φ 14	50	4		YCW150B
OVM.M13-10/11	216x180X φ 134	160	80	φ 157x60	φ 216	φ 14	50	5		YCW150B
OVM.M13-12	216x180X φ 134	160	80	φ 157x60	φ 216	φ 14	50	5		YCW150B
OVM.M13-13	230x180X φ 136	190	80	φ 157x60	φ 230	φ 16	60	5		YCW250B
OVM.M13-14	230x180X φ 136	190	80	φ 165x65	φ 230	φ 16	60	5		YCW250B
OVM.M13-15/16	240x245X φ 140	200	90	φ 195x70	φ 240	φ 16	60	5		YCW250B
OVM.M13-17	240x245X φ 140	200	90	φ 195x70	φ 240	φ 18	60	5		YCW250B
OVM.M13-18/19	270x245X φ 154	200	90	φ 195x70	φ 265	φ 16	60	5		YCW250B
OVM.M13-20	290x340X φ 176	220	90	φ 217x70	φ 290	φ 18	60	5		YCW350B
OVM.M13-21/22	290x340X φ 176	220	90	φ 217x80	φ 290	φ 18	60	5		YCW350B
OVM.M13-23/24	300x355X φ 185	220	100	φ 230x80	φ 310	φ 18	60	6		YCW400B
OVM.M13-25/26	300x355X φ 185	220	100	φ 230x85	φ 310	φ 18	60	6		YCW400B
OVM.M13-27	300x355X φ 185	220	100	φ 230x85	φ 310	φ 20	60	6		YCW400B
OVM.M13-28/29	315x370X φ 190	230	105	φ 245x85	φ 315	φ 20	60	6		YCW400B
OVM.M13-30/31	315x370X φ 190	230	105	φ 245x95	φ 315	φ 20	60	6		YCW500B
OVM.M13-32/33	370x470X φ 216	280	120	φ 270x110	φ 370	φ 20	60	7		YCW500B
OVM.M13-34	370x470X φ 216	280	120	φ 270x110	φ 370	φ 20	60	7		YCW500B
OVM.M13-35/36	370x470X φ 216	280	120	φ 270x110	φ 370	φ 20	60	7		YCW500B
OVM.M13-37	370x470X φ 216	280	120	φ 270x110	φ 370	φ 20	60	7		YCW650A

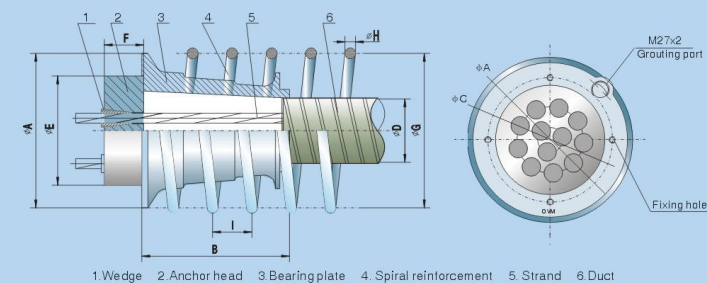
Stressing Anchorage OVM.M15A with Round Bearing Plate



Main Data

Specification	Bearing Plate		Duct	Anchor head	Spiral reinforcement				Stressing jack
	φ AxB	Distance for fixing hole φ C			φ G	φ H	I	N	
OVM.M15A-2	132x80	105	45	φ 86x50	φ 115	φ 8	40	4	YCW100B
OVM.M15A-3	136x80	110	50	φ 91x50	φ 130	φ 10	50	4	YCW100B
OVM.M15A-4	140x125	120	55	φ 102x50	φ 150	φ 12	50	4	YCW100B
OVM.M15A-5	155x130	135	55	φ 115x50	φ 170	φ 12	50	4	YCW100B/150B
OVM.M15A-6	165x160	145	70	φ 126x52	φ 200	φ 12	50	4	YCW150B
OVM.M15A-7	172x170	145	70	φ 126x53	φ 200	φ 12	50	4	YCW150B/250B
OVM.M15A-8	185x180	162	80	φ 136x55	φ 216	φ 14	50	5	YCW250B
OVM.M15A-9	200x190	175	80	φ 146x55	φ 240	φ 14	50	5	YCW250B
OVM.M15A-10	210x210	190	90	φ 156x58	φ 270	φ 14	60	5	YCW250B
OVM.M15A-11	210x220	190	90	φ 166x58	φ 270	φ 16	60	5	YCW250B
OVM.M15A-12	214x230	190	90	φ 166x60	φ 270	φ 16	60	5	YCW250B/350B
OVM.M15A-13	224x230	190	90	φ 170x63	φ 270	φ 16	60	5	YCW350B
OVM.M15A-14	233x260	200	90	φ 176x68	φ 285	φ 16	60	5	YCW350B
OVM.M15A-15	246x290	220	90	φ 186x65	φ 300	φ 16	60	5	YCW350B
OVM.M15A-16	246x330	220	90	φ 196x70	φ 300	φ 18	60	5	YCW350B/400B
OVM.M15A-17	256x395	220	90	φ 196x73	φ 300	φ 18	60	5	YCW350B/400B
OVM.M15A-18	272x325	230	100	φ 206x75	φ 310	φ 18	60	6	YCW400B
OVM.M15A-19	272x325	230	100	φ 206x75	φ 310	φ 18	60	6	YCW400B/500B
OVM.M15A-20	300x325	250	120	φ 226x80	φ 320	φ 20	60	6	YCW500B
OVM.M15A-21/22	300x325	250	120	φ 226x80	φ 320	φ 20	60	6	YCW500B
OVM.M15A-23/24	330x430	280	120	φ 244x82	φ 350	φ 20	60	6	YCW650A
OVM.M15A-25/26/27	330x430	280	120	φ 244x85	φ 350	φ 20	60	6	YCW650A
OVM.M15A-28/29	352x415	290	130	φ 260x88	φ 390	φ 20	60	7	YCW650A
OVM.M15A-30/31	352x415	290	130	φ 260x90	φ 390	φ 20	60	7	YCW650A
OVM.M15A-32/33/34	386x510	330	140	φ 296x95	φ 465	φ 20	60	8	YCW650A/900A
OVM.M15A-35/36/37	394x510	330	140	φ 296x100	φ 465	φ 20	60	8	YCW650A/900A

Stressing Anchorage OVM.M13A with Round Bearing Plate



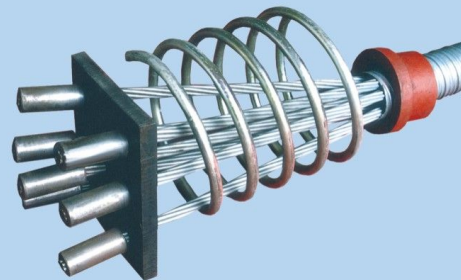
Main Data

Specification	Bearing Plate		Duct	Anchor head	Spiral reinforcement				Stressing jack
	φ AxB	Distance for fixing hole φ C			φ G (I.D.)	φ E * F	φ G * φ H * I * N		
M13A-2	125 x 80	105	45	75 x 45	110	6	30	3	YCW100B
M13A-3	132 x 80	105	45	80 x 45	120	10	50	3	YCW100B
M13A-4	136 x 102	105	50	85 x 48	135	10	50	3	YCW100B
M13A-5	140 x 125	120	50	100 x 48	145	12	50	4	YCW100B
M13A-6	155 x 130	135	60	105 x 48	165	12	50	4	YCW100B
M13A-7	155 x 130	135	60	105 x 50	165	12	50	4	YCW150B
M13A-8	170 x 160	135	60	116 x 52	175	12	50	4	YCW150B
M13A-9	175 x 170	145	70	126 x 53	190	12	50	4	YCW150B
M13A-10/11	200 x 190	162	80	136 x 53	216	14	50	4	YCW150B
M13A-12	210 x 210	175	80	146 x 55	216	14	50	5	YCW250B
M13A-13	210 x 210	175	80	146 x 55	230	14	50	5	YCW250B
M13A-14	210 x 230	190	80	156 x 57	230	14	50	5	YCW250B
M13A-15	214 x 230	190	90	166 x 60	240	16	50	5	YCW250B
M13A-16/17	246 x 270	200	90	176 x 62	265	16	60	5	YCW250B
M13A-18/19	246 x 270	200	90	176 x 65	265	16	60	5	YCW350B
M13A-20	260 x 365	220	90	196 x 68	290	18	60	5	YCW350B
M13A-21/22	260 x 365	220	90	196 x 70	290	18	60	5	YCW350B
M13A-23/24	275 x 380	245	100	216 x 73	310	18	60	6	YCW400B
M13A-25/26/27	275 x 380	245	100	216 x 75	310	18	60	6	YCW400B
M13A-28/29	300 x 400	250	105	224 x 78	315	18	60	6	YCW400B
M13A-30/31	300 x 400	250	105	224 x 80	315	18	60	6	YCW500B
M13A-32/33/34	330 x 430	280	120	244 x 82	370	20	60	7	YCW500B
M13A-35/36	330 x 430	280	120	244 x 85	370	20	60	7	YCW500B
M13A-37	330 x 430	280	120	244 x 85	370	20	60	7	YCW650A

Dead-end Anchorage Type P OVM.P15/OVM.P13

It is composed of the swaged end (including swage socket and swage spring), spiral reinforcement, anchor plate, restraining ring etc. The swage socket and swage spring cover on strand end are extruded by GYJC50-150 swaging machine. ZB4-500 hydraulic pump serves the operation.

Assembly of Anchorage Type P



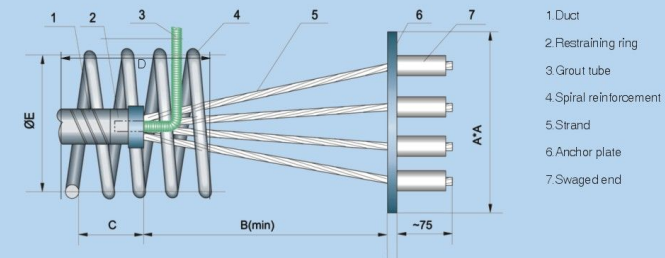
GYJC50-150 Swaging Machine



Swage Socket and Swage Spring



Anchorage Type P



Main Data

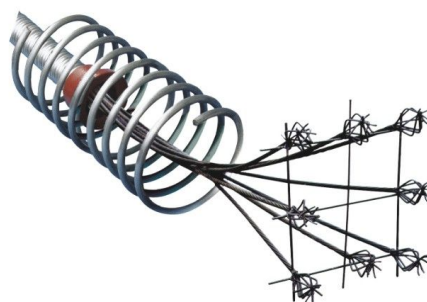
Strand Number	2	3	4	5	6/7	8	9	10	11	12	13	14	15	16	17	18	19
AxA	100x80 (90x70)	120 (100)	150 (120)	170 (140)	200 (150)	220 (170)	220 (170)	250 (220)	250 (220)	250 (220)	250 (220)	260 (250)	260 (250)	260 (250)	290 (250)	300 (250)	300 (250)
B(min)	180 (120)	180 (120)	240 (180)	300 (180)	380 (300)	440 (380)	440 (380)	500 (440)	500 (440)	500 (440)	500 (440)	560 (500)	560 (500)	560 (500)	720 (500)	720 (500)	720 (500)
C	110 (85)	110 (85)	110 (110)	110 (110)	120 (110)	120 (110)	120 (110)	135 (120)	135 (120)	135 (120)	135 (120)	135 (135)	135 (135)	135 (135)	135 (135)	135 (135)	135 (135)
D	200 (200)	200 (200)	250 (200)	250 (200)	250 (200)	250 (200)	250 (200)	250 (250)	250 (250)	250 (250)	250 (250)	300 (250)	300 (250)	300 (250)	300 (250)	300 (250)	300 (250)
ØE	115 (110)	130 (120)	150 (135)	170 (145)	200 (165)	216 (175)	240 (190)	270 (216)	270 (216)	270 (216)	270 (230)	285 (230)	300 (240)	300 (240)	300 (240)	310 (265)	310 (265)

The figures in brackets are for OVM.P13..

Dead-end Anchorage Type H OVM.H15/13

In order to transfer the prestress into the concrete directly, anchorage type H can be adopted. It is composed of strand with bulbs, spacer, spiral reinforcement, restraining ring and duct. The bulbs are formed by YH3 bulb machine equipped with ZB4-500 hydraulic pump.

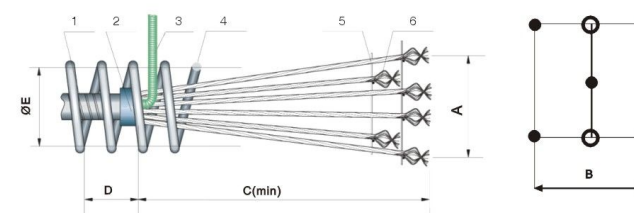
Assembly of Anchorage Type H



YH3 Bulb Machine



Dead-end Anchorage Type H



1.Duct 2.Vent 3.Restraining ring 4.Spiral reinforcement 5.Spacer 6.Bulb

Main Data

Specification	Qty of strand	A	B	C(min)	D	ϕE
OVM.H ₁₅ -3	3	190(130)	90(70)	950(650)	145(145)	130(120)
OVM.H ₁₅ -4	4	190(150)	210(170)	950(650)	145(145)	150(135)
OVM.H ₁₅ -5	5	200(160)	220(180)	950(650)	145(145)	170(145)
OVM.H ₁₅ -6/7	6/7	210(170)	230(190)	1300(850)	155(155)	200(165)
OVM.H ₁₅ -9	9	270(220)	310(250)	1300(850)	155(155)	240(190)
OVM.H ₁₅ -12	12	330(270)	390(310)	1300(850)	155(155)	270(216)
OVM.H ₁₅ -19	19	390(310)	470(390)	1300(950)	155(155)	310(265)
OVM.H ₁₅ -27	27	450(410)	520(430)	1700(1150)	155(155)	350(310)
OVM.H ₁₅ -31	31	510(430)	570(470)	1700(1150)	165(155)	390(315)
OVM.H ₁₅ -37	37	510(430)	690(570)	2000(1680)	185(165)	465(370)
OVM.H ₁₅ -43	43	550(560)	750(580)	2500(1680)	210(185)	500(390)
OVM.H ₁₅ -55	55	620(560)	850(680)	2500(1980)	240(185)	540(465)

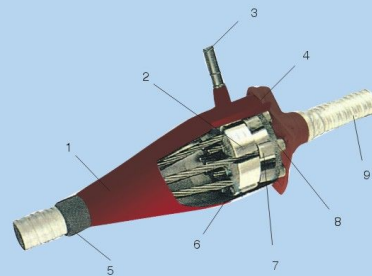
The figures in brackets are for OVM.H13.

Coupler L15/L13

Coupler OVM.L15 is used for strand diameter 15.24mm, 15.7mm and OVM.L13 used for strand 12.4mm, 12.7mm or 12.9mm.

Coupler L15/L13 is usually includes seven parts: coupler block, bearing plate, protective sleeve, restraining ring, spiral reinforcement, wedges and swaged ends. GYJC50-150 swaging machine and hydraulic pump ZB4-500 serve operation for extruding the swaged end.

Multi-strand Coupler L15/L13

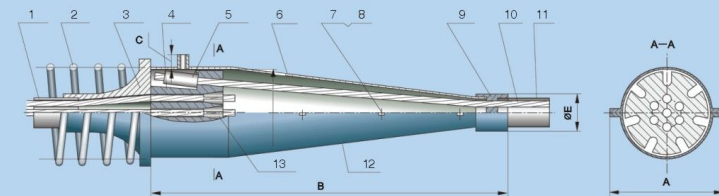


- 1.Protective cover 2.Coupler block 3.Grouting tube
4.Bearing plate 5.Restricting ring 6.Wedges
7.Swaged end 8.Omega ring 9.Duct

Coupler Block of L15/L13



Coupler L15/L13



- 1.Duct 2.Spiral Reinforcement 3.Bearing Plate 4.Coupler block 5.Swaged end 6.Protective cover I
7.Bolt 8.Nut 9.Restricting ring 10.Strand 11.Duct 12.Protective cover II 13.Wedge

Main Data of Coupler OVM.L15

Model	A	B	C	φD	φE
L15-(2~3)	214	590	40	154	80
L15-4	230	660	40	170	85
L15-5	244	722	40	184	85
L15-(6~7)	258	722	40	198	100
L15-8	272	739	40	212	110
L15-9	282	783	40	222	110
L15-(10~13)	298	809	40	238	120
L15-14	308	809	40	248	120
L15-(15~17)	332	915	40	272	120
L15-(18~19)	336	932	40	276	140
L15-(21~22)	356	1020	40	296	170
L15-(25~27)	386	1074	40	326	180
L15-31	434	1241	40	374	180

Main Data of Coupler OVM.L13

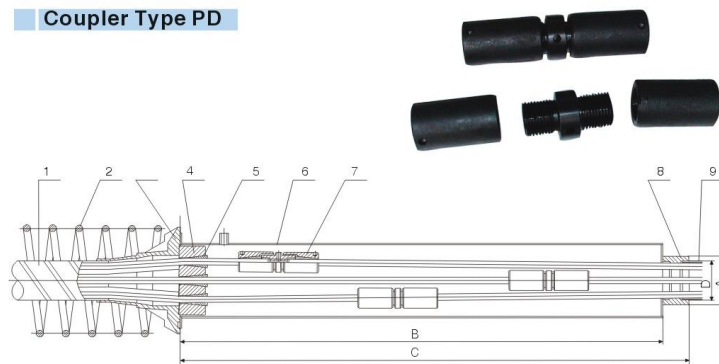
Model	A	B	C	φD	φE
L13-(2~3)	184	606	25	144	65
L13-4	194	628	25	154	70
L13-5	204	677	25	164	70
L13-(6~7)	219	694	25	179	80
L13-9	241	791	25	201	90
L13-12	261	791	25	221	100
L13-19	300	918	25	260	120
L13-(26~27)	376	1130	25	313	150
L13-31	429	1340	25	366	155
L13-35	471	1503	25	408	160

Coupler PD

It is composed of n (n-strand number) pieces of mono-couplers which are set parallelly in the protective sleeve. usually including seven parts : anchor

head, bearing plate, spiral reinforcement, protective sleeve, restraining ring, wedges and mono-coupler.

Coupler Type PD



1.Duct 2.spiral reinforcement 3.Bearing plate 4.Working anchor head 5.Wedge
6.Protective sleeve 7.Mono-strand coupler 8.Restricting ring 9.Duct

Main Data

Spec Size	OVM ₁₃ -F-3	OVM ₁₃ -F-4	OVM ₁₃ -F-5	OVM ₁₃ -F-6	OVM ₁₃ -F-8	OVM ₁₃ -F-12	OVM ₁₃ -F-19	OVM ₁₃ -F-27	OVM ₁₃ -F-31	OVM ₁₃ -F-37
φA	125 (125)	125 (125)	140 (140)	150 (150)	180 (180)	200 (200)	250 (250)	280 (250)	300 (270)	330 (280)
B	760 (760)	760 (760)	800 (800)	880 (850)	1100 (1100)	1300 (1300)	1360 (1300)	1500 (1380)	1600 (1430)	1700 (1500)
C	800 (800)	800 (800)	850 (880)	930 (900)	1160 (1160)	1360 (1360)	1440 (1360)	1560 (1460)	1670 (1500)	1780 (1580)
φD	75 (75)	85 (80)	85 (80)	100 (90)	110 (90)	120 (110)	140 (120)	180 (130)	180 (135)	190 (150)

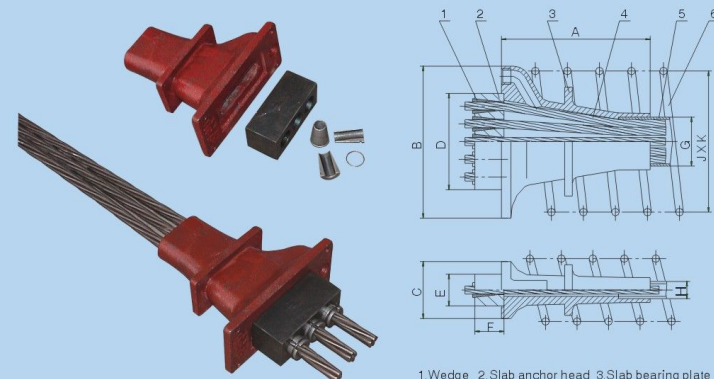
The figures in brackets are for OVM₁₃L-F.

Slab Anchorage BM13/15

Stressing end usually includes 3 parts: anchor head, bearing plate, wedge. Jack YDC240QX-200 and hydraulic pump ZB4-500 serve tensioning operation. Dead end has two types: type P and type H. Type P usually includes 4 parts: swaged end, bearing plate, spi-

ral reinforcement and restraining ring. GYJC50-150 equipped with ZB4-500 pump are used to form the swaged end. For the type H, only restraining ring is included. The YH3 bulb machine equipped with ZB4-500 pump shall be used to form the strand bulbs.

Stressing-end Slab Anchorage

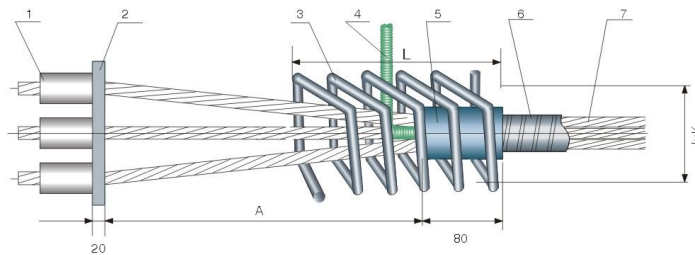


1.Wedge 2.Slab anchor head 3.Slab bearing plate
4.Strand 5.Steel flat duct 6.Spiral reinforcement

Main Data

Strand Number	Bearing plate			Anchor head			Duct		Spiral Reinforcement
	A	B	C	D	E	F	G	H	
2	150	160	80	80	48	50	50	19	130x100
3	190	200	90	115	48	50	60	19	170x100
4	235	240	90	115	48	50	70	19	210x100
5	270	270	90	185	48	50	90	19	250x100

Dead-end Slab Anchorage Type BM-P

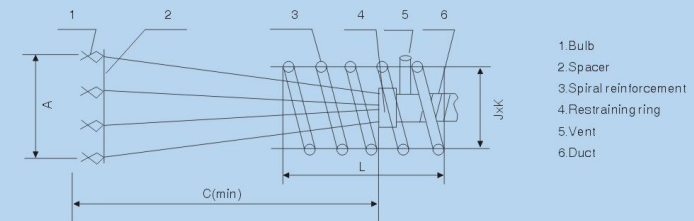


1.Swaged end 2.P-bearing plate 3.Spiral reinforcement
4.Vent 5.Restricting ring 6.Flat duct 7.Strand

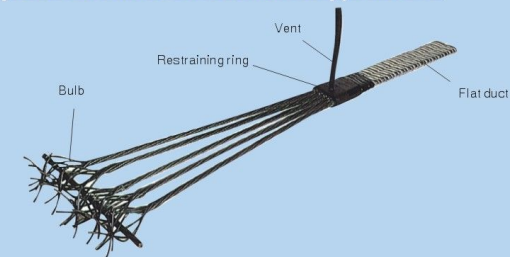
Main Data

Strand Number	Anchor Plate	Spiral Reinforcement	Restraining Ring	Slab Duct	A Min
	Length Width	L J K	Length Width	Length Width	
2	140 70	210 x 130 x 100	90 50	50 19	190
3	180 70	210 x 170 x 100	90 50	60 19	250
4	220 70	210 x 210 x 100	100 50	70 19	320
5	260 70	260 x 250 x 100	100 50	90 19	400

Dead-end Slab Anchorage Type BM-H



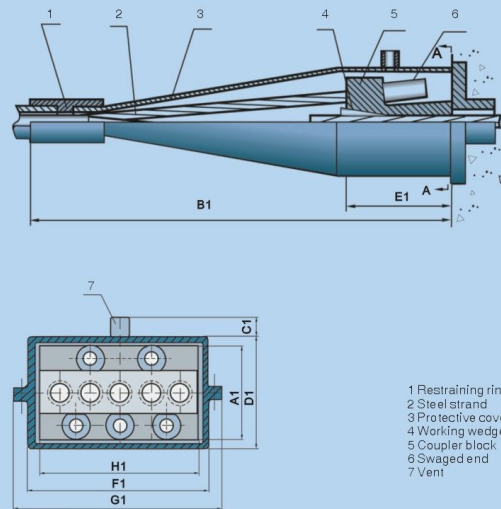
Assembly of Dead-end of Slab Anchor Type BM-H



Main Data

Type	Strand Number	A	C(min)	Spiral Reinforcement L J K	Restraining Ring Length Width
BM ₁₃ ¹⁵ -2H	2	90	950	210 x 130 x 100	90 50
BM ₁₃ ¹⁵ -3H	3	190	950	210 x 170 x 100	90 50
BM ₁₃ ¹⁵ -4H	4	240	950	210 x 210 x 100	100 50
BM ₁₃ ¹⁵ -5H	5	270	950	260 x 250 x 100	100 50

Coupler of Slab Anchorage



- 1 Restraining ring
- 2 Steel strand
- 3 Protective cover
- 4 Working wedge
- 5 Coupler block
- 6 Swaged end
- 7 Vent

Main Data

Strand Number	A1	B1	C1	D1	E1	F1	G1	H1
2	100	700	25	118	135	90	130	80
3	100	700	25	118	135	125	165	115
4	100	750	25	118	135	160	200	150
5	100	750	25	118	135	195	235	185

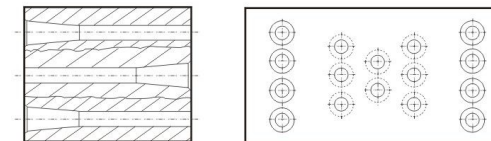
Ring Anchoring System OVM.HM

Application Field

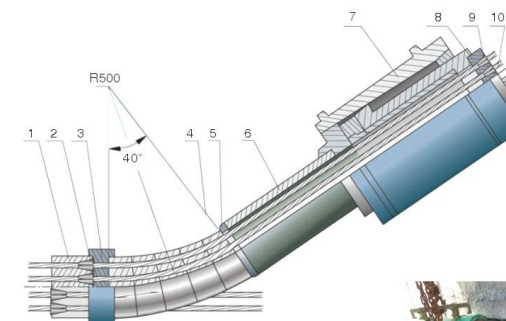
- Rounded PC storage tank, such as silo, liquid gas tank and sewage treatment tank
- PC protective shell of nuclear reactor
- PC Hydrodynamic tunnel and well
- Other similar round prestress concrete structure

When prestressing is applied to a ring structure, **OVM.HM** anchoring system is recommended. Both stressing end and dead end of ring prestressing tendon are overlapped and staggered at same anchor head as a coupler. A special deviating device is required for tensioning tendons.

Anchor Head of Ring Anchoring System



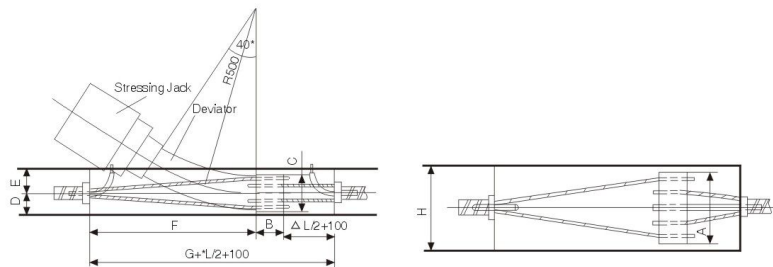
OVM.HM Ring Anchoring System



- 1 HM anchor head
- 2 Wedge
- 3 Spacer
- 4 Deviator
- 5 Transfer block
- 6 Stretch tube
- 7 Jack
- 8 Tool anchor head
- 9 Tool wedge
- 10 P.C. strand



Structural Diagram of OVM.HM Anchoring system



Main Data

Specification	A	B	C	D	F	H
HM15-2	160	65	50	50	150	200
HM15-4	160	80	90	65	800	200
HM15-6	160	100	130	80	800	200
HM15-8	210	120	160	100	800	250
HM15-12	290	120	180	110	800	320
HM15-14	320	125	180	110	1000	340

Parameter E and G would be determined according to actual engineering structure.



Wuhai Sanjintan Sewage Treatment Plant, China

Mono-strand Post-tensioning System

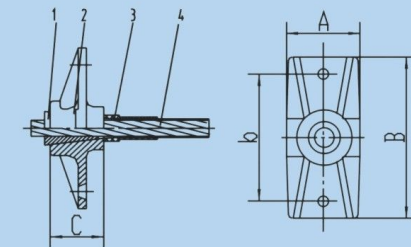
Mono-strand Anchorage for Strand Dia.12.7/15.4/15.7/17.8/21.8/28.6mm



Assembly of Mono-strand Anchorage



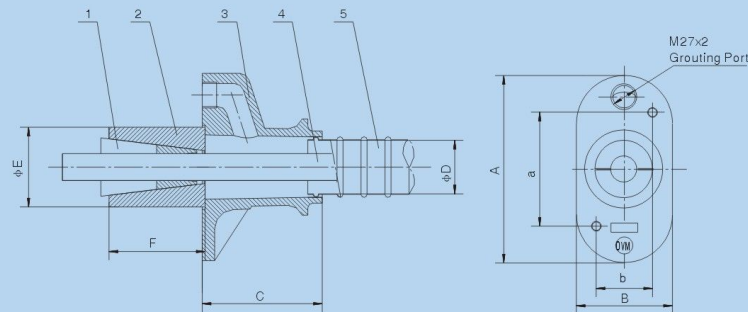
Mono Unbonded Strand Anchorage OVM.ZM13/ZM15



Specification	Bearing Plate	
	AxBxC	Installation Distance b
OVM.ZM13-1	58x127x40	100
OVM.ZM15-1	65x130x48	100

1 Working wedge 2 Bearing plate 3 Casing 4 Unbonded strand

Mono-strand Anchorage OVM.M22/M28



1.Working wedge 2.Working anchor head 3.Bearing plate 4.Strand 5.Plastic duct

Parameter table of mono-strand anchorage

Specification	Bearing Plate		Duct	Anchor Head
	AxBxC	Installation Distance a x b	(I.D)	$\phi E \times F$
OVM.M22-1	145x90x100	80x58	$\phi 30$	$\phi 65 \times 75$
OVM.M28-1	195x100x125	120x60	$\phi 40$	$\phi 85 \times 100$

Jack YC75Q is for stressing OVM.M28-1 and OVM.M22-1. Hydraulic pump ZB4-500 serves the operation.

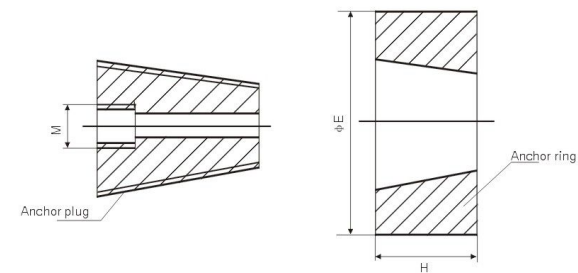
Parameter table of mono-strand anchorage

Specification	Bearing Plate	Anchor head	Spiral reinforcement				Stressing jack
	AxBx ϕ C	$\phi E \times F$	ϕG	ϕH	I	N	
OVM.M15-1	80x80x ϕ 14	ϕ 46x48	ϕ 80	ϕ 6	30	4	YDC240QX
OVM.M13-1	80x80x ϕ 14	ϕ 43x43	ϕ 80	ϕ 6	30	3	YDC240QX
OVM.M15A-1	80x80x ϕ 14	ϕ 50x48	ϕ 80	ϕ 6	30	4	YDC240QX
OVM.M13A-1	80x80x ϕ 14	ϕ 40x40	ϕ 80	ϕ 6	30	3	YDC240QX

Anchorage using wires

GZ anchorage

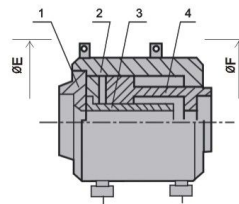
It is used to anchor $\phi 5$ & $\phi 7$ wires with strength of 1570MPa.YZ85 jack equipped with ZB4-500 pump serves the tensioning operation.



Parameter table of mono-strand anchorage

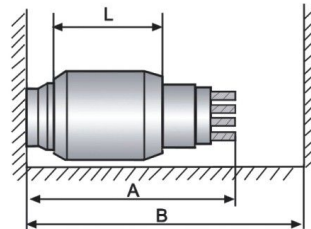
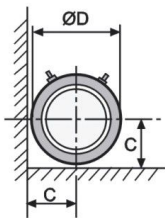
Type	M	ϕE	H
GZ5-12	M12	90	50
Gz5-14	M12	95	45
Gz5-18	M16	100	50
Gz5-24	M18	110	53
Gz5-28	M18	117	53
GZ5-30	M18	136	53
FM7-12	M18	110	60

Hydraulic Jack YCWA Series



1. Block 2. Cylinder 3. Cavity sleeve 4. Piston

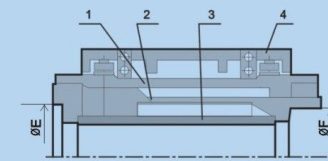
Min. Service Space



Parameters of YCWA Series Jacks

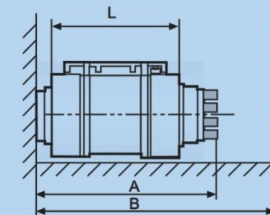
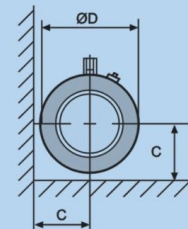
Type	Nom. Force (KN)	Nom. Pressure (Mpa)	Tension Piston Area (m²)	Return Piston Area	Return Pressure (Mpa)	Cavity Aperture (mm)	Stroke (mm)	Weight (Kg)	Overall Size (D*L mm)	Min. Service Space (mm)	Strand Precutting Length A (mm)
YCW500A	4900	49	1.0*10-1	4.76*10-2	<25	φ 196	200	648	φ 510*609	2000*310	750
YCW650A	6500	49	1.35*10-1	7.07*10-2	<25	φ 240	200	960	φ 610*640	2000*330	850
YCW900A	8952	54	1.6579*10-1	8.7256*10-2	<25	φ 280	200	1325	φ 670*600	2200*450	1000
YCW1200A	11790	51	2.313*10-1	11.5375*10-2	<25	φ 275	200	1700	φ 790*600	2400*500	1200

Hydraulic Jack YCWB Series



1. Cylinder 2. Piston 3. Cavity sleeve 4. Handle

Min. Service Space



Parameters of YCWB Series Jacks

Type	Nom. Force (KN)	Nom. Pressure (Mpa)	Tension Piston Area (m²)	Return Piston Area	Return Pressure (Mpa)	Cavity Aperture (mm)	Stroke (mm)	Weight (Kg)	Overall Size (D*L mm)	Min. Service Space (mm)	Strand Precutting Length A (mm)
YCW100B	973	51	1.098*10-2	0.777*10-2	<25	φ 78	200	65	φ 214*370	1220*150	570
YCW150B	1492	50	2.98*10-2	1.381*10-2	<25	φ 120	200	108	φ 285*370	1250*190	570
YCW250B	2480	54	4.592*10-2	2.2.802*10-2	<25	φ 140	200	164	φ 380*344	1270*220	590
YCW350B	3497	54	6.476*10-2	3.462*10-2	<25	φ 175	200	235	φ 410*400	1320*250	620
YCW400B	3956	52	7.607*10-2	4.562*10-2	<25	φ 175	200	270	φ 432*400	1320*265	620
YCW500B	4924	49	10.05*10-2	4.773*10-2	<25	φ 196	200	533	φ 490*564	1960*310	750

Mono-jack YDC240QX

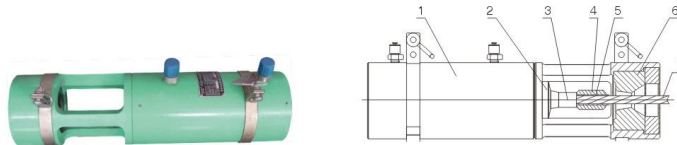


1.Cylinder 2.Cavity sleeve 3.Piston 4.Wedge
5.Anchor cup 6.Supporting sleeve 7.Supporting nut

Parameters of YDC240QX Jack

Type	Nom. Force (KN)	Nom. Pressure (Mpa)	Tension Piston Area (m ²)	Return Pressure (Mpa)	Cavity Aperture (mm)	Stroke (mm)	Mass (Kg)	Dimension D*L (mm)	Adapted Strands
YCW240QX	240	50	4.771*10 ⁻³	<25	φ18	200	20.5	φ110*573	φ13&φ15

Swaging Machine GYJC50-150

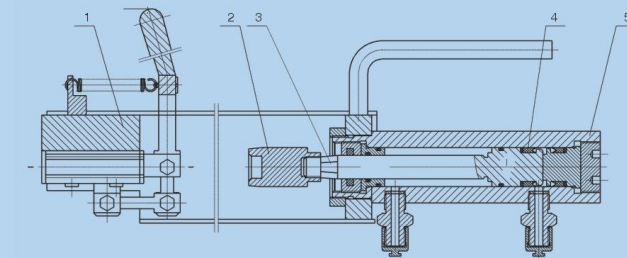


1.Cylinder 2.Piston 3.Swaging head 4.Swagad tube
5.Swagad spring 6.Swaging mould 7.Prestrcsing strand

Parameters of GYJC50-150 Swaging Machine

Type	Nom. Force (KN)	Nom. Pressure (Mpa)	Tension Piston Area (m ²)	Return Pressure (Mpa)	Cavity Aperture (mm)	Stroke (mm)	Mass (Kg)	Dimension D*L (mm)	Adapted Pump
GYJC50-150	509	45	1.131*10 ⁻²	0.4948*10 ⁻²	φ30	150	48	φ150*565	ZB4-500

Bulb Machine YH3

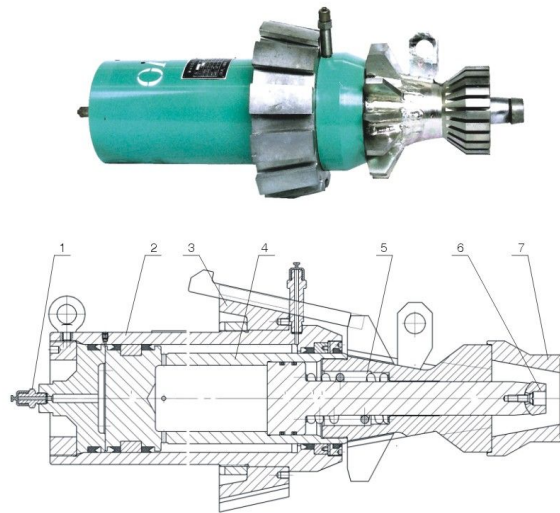


1.Engine Body 2.Pushing Head 3.Piston 4.Seal Ring 5.Cylinder

Parameters of YH3 Bulb Machine

Type	Nom. Force (KN)	Nom. Pressure (Mpa)	Tension Piston Area (m ²)	Return Piston Area (m ²)	Mass (Kg)	Dimension L*W*H (mm)
YH3	34	50	7.068*10 ⁻⁴	4.524*10 ⁻⁴	13.6	535*150*224

YZ Series Jacks



1. Nozzle tip 2. Main cylinder 3. Snap ring 4. Secondary cylinder 5. Spring 6. Pushing head 7. Centering sleeve

Parameters of YZ Series Jacks

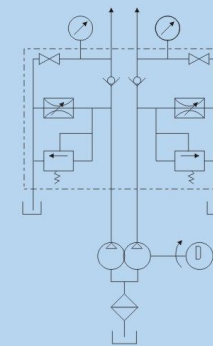
Type	Nom. Stress Force (kN)	Nom. Pressure (Mpa)	Pressing Force (kN)	Wedge Release Force (kN)	Stress Piston Area(m ²)	Press Piston Area(m ²)	Return Piston Area(m ²)	Stroke (mm)	Pressing Stroke (mm)	Mass (Kg)	Dimension (D*L mm)	Adapted Pump
YZ285-250	850	46	390	260	1.887*10 ⁻²	8.659*10 ⁻³	5.595*10 ⁻³	250	65	170	φ326*840	ZB4-500
YZ285-300	850	46	390	260	1.887*10 ⁻²	8.659*10 ⁻³	5.595*10 ⁻³	300	65	180	φ326*890	ZB4-500
YZ285-400	850	46	390	260	1.887*10 ⁻²	8.659*10 ⁻³	5.595*10 ⁻³	400	65	190	φ326*990	ZB4-500
YZ285-500	850	46	390	260	1.887*10 ⁻²	8.659*10 ⁻³	5.595*10 ⁻³	500	65	205	φ326*1100	ZB4-500
YZ285-600	850	46	390	260	1.887*10 ⁻²	8.659*10 ⁻³	5.595*10 ⁻³	600	65	230	φ326*1190	ZB4-500
YZ150-300	1500	50	769	412	2.835*10 ⁻²	1.531*10 ⁻²	8.247*10 ⁻³	300	65	198	φ363*1005	ZB4-500

Hydraulic Pump ZB4-500/500S/500SZ/500ZA

ZB4-500 Hydraulic Pump



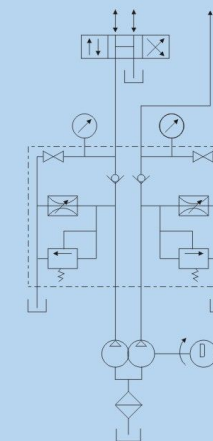
Oil Circuit of ZB4-500 Pump



ZB4-500S Hydraulic Pump



Oil Circuit of ZB4-500S Pump



ZB10/320-4/800 Hydraulic Pump



Parameters of ZB Series Hydraulic Pumps

Type	Nom. Pressure (Mpa)	Nom. Flow (L/min.)	Mass (Kg)	Dimension L*W*H (mm)	Usage
ZB4-500	50	2*2	120	1025*495*745	To provide pressure oil for YCW, YZB5 and YC60 series jacks, as well as GYJC swaging machine etc.
ZB4-500S	50	2*2	130	745*495*1025	Three-way oil feeding, especially for jacks with pressing piston. It can also fulfill the function of ZB4-500 pump.
ZB10/320-4/800	32 80	10 4	270	1090*590*1120	For large tonnage, long stroke and rapid jacks.
ZB4-500ZA	50	2*2	120	1020*530*950	Modified ZB4-500
ZB4-500SZ	50	2*2	130	1020*530*950	Modified ZB4-500S

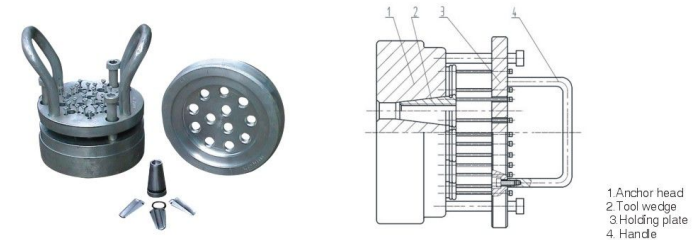
Modified ZB4-500— ZB4-500ZA



Modified ZB4-500S— ZB4-500SZ



Tool Anchorage OVM13G/15G



Parameters of OVM15G/13G Tool Anchorage

Type	Dimension of Tool Anchor Head D*L (mm)	No. of Tool Wedge	Holding plate	Handle	Type	Dimension of Tool Anchor Head D*L (mm)	No. of Tool Wedge	Holding plate	Handle
OVM15G-1	φ49*55	1	F	F	OVM13G-1	φ43*47	1	F	F
OVM15G-2	φ134*60	2	F	F	OVM13G-3	φ134*60	3	F	F
OVM15G-3	φ134*60	3	F	F	OVM13G-4	φ134*60	4	F	F
OVM15G-4	φ134*60	4	F	F	OVM13G-5	φ134*60	5	F	F
OVM15G-5	φ134*60	5	F	F	OVM13G-6	φ134*60	6	F	F
OVM15G-6	φ175*60	6	F	F	OVM13G-7	φ134*60	7	Y/F	Y/F
OVM15G-7	φ175*60	7	Y/F	Y/F	OVM13G-8	φ134*60	8	Y	Y
OVM15G-8	φ175*60	8	Y	Y	OVM13G-9	φ175*60	9	Y	Y
OVM15G-9	φ175*60	9	Y	Y	OVM13G-12	φ175*60	12	Y	Y
OVM15G-10	φ184*70	10	Y	Y	OVM13G-13	φ175*60	13	Y	Y
OVM15G-11	φ184*70	11	Y	Y	OVM13G-15	φ184*70	15	Y	Y
OVM15G-12	φ184*70	12	Y	Y	OVM13G-16	φ184*70	16	Y	Y
OVM15G-13	φ194*70	13	Y	Y	OVM13G-17	φ184*70	17	Y	Y
OVM15G-14	φ194*70	14	Y	Y	OVM13G-19	φ184*70	19	Y	Y
OVM15G-15	φ250*80	15	Y	Y	OVM13G-21	φ250*70	21	Y	Y
OVM15G-16	φ250*90	16	Y	Y	OVM13G-22	φ250*70	22	Y	Y
OVM15G-17	φ250*90	17	Y	Y	OVM13G-27	φ250*70	27	Y	Y
OVM15G-18	φ250*90	18	Y	Y	OVM13G-31	φ300*120	31	Y	Y
OVM15G-19	φ250*90	19	Y	Y	OVM13G-43	φ300*110	43	Y	Y
OVM15G-21	φ300*120	21	Y	Y					
OVM15G-22	φ300*100	22	Y	Y					
OVM15G-25	φ300*120	25	Y	Y					
OVM15G-27	φ300*120		Y	Y					
OVM15G-31	φ300*120		Y	Y					
OVM15G-34	φ370*140		Y	Y					
OVM15G-37	φ370*140		Y	Y					

Grouting Machine

Basic Type

Mortar Pump UB3



Nom. Transporting Quantity (m³/h)	3
Working Pressure (MPa)	2
Power of Electromotor (KW)	4
Rev of Electromotor (r/min)	1440
Weight of Water / Weight of Concrete = 0.43	Horizontal Quantity (m)
	Vertical Quantity (m)
Inner Dia. of Grouting Entrance of Glue Pipe (mm)	64
Inner Dia. of Effusing Exit of Glue Pipe (mm)	38
Mass (Kg)	250
Shape Dimension L*W*H (mm)	1033*474*940

Grout Mixer JW180

Nom. Volume (L)	180
Mixing Capability (m³/h)	6
Power of Electromotor (KW)	2.2
Inner Dia of Effusing Exit of Glue Pipe (mm)	70
Mixing Speed (r/min)	64
Loading High	900
Mass (Kg)	200
Shape Dimension D*H (mm)	φ 900*1146



Advanced Type

Grouting Machine MR-60



Electric Data	380V-3 phase-50Hz AC 5-Pin 6h, fuse 32A
Grouting Platform Dimension (L*W*H)	2150 * 1180 * 2010 mm
Weight	880Kg
Max Pumping Capacity at 200rpm	53 liter/Min. -at 3 Bar
Max Output Pressure at 200 rpm	60Bar
Type of Pump	Eccentric screw (Made in Germany)
Suction Hose (Dia)	1 inch Fast Coupling

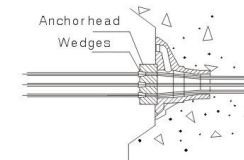
Items	Mixer Data	Agitator Data
Drive Unit	Electric drive	
Drive Power	7.5HP 380V-3-50Hz 8.8A with Ip54	
Drive Speed	1440 rpm	200 rpm
Capacity Dia *	φ 85 cm * 60 cm	φ 60cm-70cm
Height-Liters	-135 liters	170 liters
with Cover	Max	Max

HP15/HP30 Strand Pushing Machine

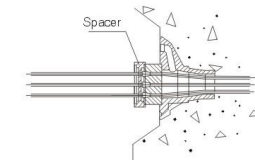


Parameters	HP15	HP30
Electric Data	380 volts, 3 phases, 50 Hz	
	220 volts, 3 phases, 60 Hz	
Fuse	>100A	>125A
Pushing Capacity	80 M/Min	160M/Min
Rotational Speed of Motor	940 RPM	1450RPM
Hydraulically Pump Max Pressure	210 kg/cm ²	210 kg/cm ²
Overall Dimension LxWxH	1220x1280x1000mm	1450x1550x1400mm
Net Weight	480 kg	800 kg

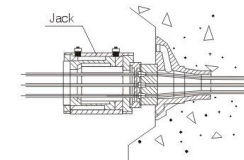
INSTALLATION and STRESSING



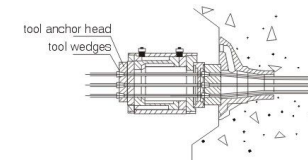
Step 1: Installation of anchor head and wedges



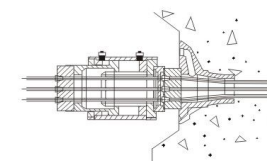
Step 2: Installation of spacer



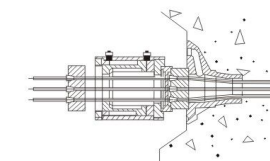
Step 3: Installation of jack



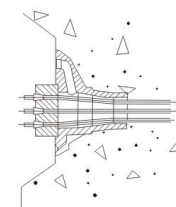
Step 4: Installation of tool anchor head and tool wedges



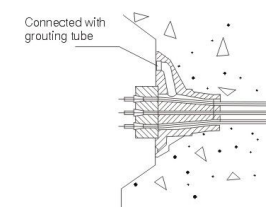
Step 5: stressing



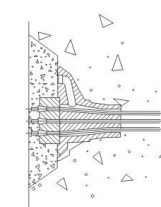
Step 6: Piston returning and anchoring



Step 7: Removal of equipment and cutting of extra strand



Step 8: Grouting



Step 9: Anchorage Sealing

Design Considerations

- Friction losses in anchorage
The coefficient of friction is no more than 0.025.

- Stress losses due to draw-in of wedges
The draw-in value of OVM anchorage is $\lambda \leq 5\text{mm}$, and $\lambda \leq 6\text{mm}$ is recommended for calculation of the stress losses due to draw-in action.

- Friction losses along tendon
Friction losses along the tendon are actually the stress losses due to the friction between tendon and duct, which can be determined with the following formula.

$$\sigma_{11} = \sigma_{con} \left(1 - \frac{1}{e^{kx + \mu \theta}} \right)$$

σ_{11} --- Stress value excluding the friction losses.

σ_{con} --- Section stress without losses.

k --- Wobble friction coefficient due to minor unavoidable tendon curvatures (placing tolerance), see the table 1 and table 2.



X --- Duct length between stressing end and calculated cross section. (Unit: m)

μ --- Friction coefficient between prestressed tendon and duct wall, see table 1 and table 2.

θ --- Angularity of tangent line of curved duct between stressing end and calculated cross section (rad)

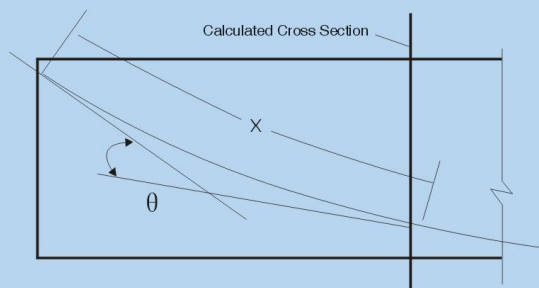


Table1: Coefficient when using strand and duct

Duct Mode	K	μ	
		Wire, Strand, Bare Steel Bar	Deformed Bar
Embedded Steel Pipe	0.003	0.35	0.40
Embedded Corrugated Pipe	0.0015	0.25	-
Core-Pulling Formed	0.0015	0.55	0.60
Plastic Corrugated Pipe	0.001-0.003	0.14	-

When GZ anchorage or Similar anchorages are used, the anchoring port friction loss would be taken into consideration, which can be determined by the actual data measured.

Table 2: Coefficient when using unbonded strand

Unbonded Prestressed Tendon	K	μ
7 ϕ 5 Carbon Steel Wire	0.035	0.10
ϕ 15 Steel Strand	0.040	0.12

The friction coefficients of strands with other diameters refer to that of ϕ 15mm strand.

■ Calculation of Strand length

- When using anchorage with wedges on both side and tensioning on one side, as the diagram as follows, L (length of strand) can be determined with the formula:
 $L = L_1 + 2 \cdot L_2 + L_3 + L_4 + 100 \sim 150\text{mm}$

- When using anchorage with wedges on both side and tensioning on both side, L (length of strand) can be de-

termined with the formula:
 $L = L_3 + 2 \cdot (L_2 + L_4) + 200 \sim 300\text{mm}$

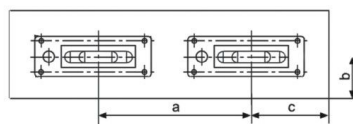
- When using dead-end anchorage type P or type H on one side of tendon, the length of strand shall be considered up to the embedding position of anchorage.



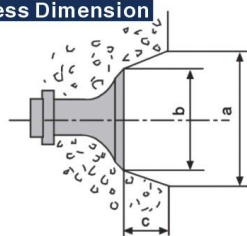
Diagram for calculation of length of strand (tensioning on one side)

Minimum Interval of Anchorage

Slab Anchorage



Recess Dimension



Slab Anchorage

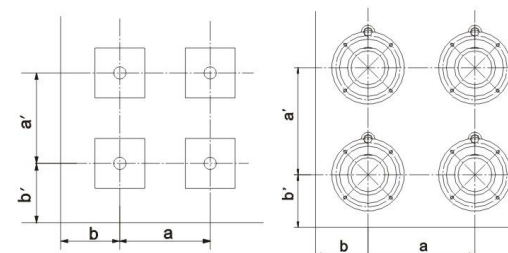
Specification	Actual Concrete Strength (Cube Sample)					
	40(MPa)			50(MPa)		
	a	b	c	a	b	c
BM15-2	230	75	115	220	70	110
BM15-3	270	80	135	240	75	130
BM15-4	340	95	170	330	90	165
BM15-5	370	95	185	360	90	180

Recess Dimension

Specs	a(mm)	b(mm)	c(mm)
OVM.M15(13)-2~4	265(265)	160(160)	90(90)
OVM.M15(13)-5	335(265)	230(160)	90(90)
OVM.M15(13)-6~7	430(275)	290(160)	120(100)
OVM.M15(13)-8~11(8~12)	430(370)	290(220)	120(130)
OVM.M15(13)-12~14	490	340	130
OVM.M15(13)-15~19(13~19)	520(437)	360(275)	140(140)
OVM.M15(13)-20~22	575(500)	400(330)	150(150)
OVM.M15(13)-23~29(23~31)	620(535)	440(340)	150(170)
OVM.M15(13)-30~37(32~37)	710(600)	510(385)	170(190)
OVM.M15(13)-38~44	760(710)	540(470)	190(210)
OVM.M15(13)-45~55	860(775)	620(520)	210(220)

Conventional Anchorage

$a, a' \geq a_0$; $b, b' \geq b_0$;
 a_0 —minimum interval
between bearing plates
 b_0 —minimum distance
between bearing plate
centre and side face of
concrete.



Specs	Actual Concrete Strength of Anchored Area.(Cube Sample)					
	40(MPa)		50(MPa)		60(MPa)	
	a_0 (mm)	b_0 (mm)	a_0 (mm)	b_0 (mm)	a_0 (mm)	b_0 (mm)
OVM.M15(13)-2	140(120)	90(85)	135(120)	85(85)	130(120)	85(85)
OVM.M15(13)-3	170(145)	110(95)	155(135)	95(90)	145(125)	95(90)
OVM.M15(13)-4	198(180)	120(115)	176(150)	110(100)	168(140)	107(100)
OVM.M15(13)-5	220(195)	135(115)	200(170)	120(105)	184(155)	117(105)
OVM.M15(13)-6	240(200)	155(125)	224(180)	135(115)	224(180)	132(115)
OVM.M15(13)-7	260(220)	160(135)	235(200)	140(115)	224(190)	132(115)
OVM.M15(13)-8	275(235)	165(140)	250(210)	150(120)	246(200)	147(120)
OVM.M15(13)-9	295(245)	175(155)	265(225)	155(130)	256(210)	153(128)
OVM.M15(13)-10	310(260)	180(155)	280(235)	170(141)	290(232)	170(141)
OVM.M15(13)-11	325(270)	185(165)	295(245)	170(145)	290(232)	170(141)
OVM.M15(13)-12	340(285)	190(180)	310(260)	170(150)	290(245)	170(141)
OVM.M15(13)-13	355(300)	195(190)	320(270)	175(160)	300(255)	170(150)
OVM.M15(13)-14	365(310)	210(195)	330(280)	180(165)	320(255)	178(150)
OVM.M15(13)-15	380(316)	220(195)	345(290)	185(165)	330(275)	185(155)
OVM.M15(13)-16	390(330)	235(200)	355(300)	195(170)	335(285)	185(155)
OVM.M15(13)-17	405(340)	250(205)	370(210)	210(175)	345(295)	187(155)
OVM.M15(13)-18	445(350)	255(205)	380(315)	215(175)	355(300)	190(170)
OVM.M15(13)-19	430(380)	255(215)	390(325)	215(180)	365(310)	190(170)
OVM.M15(13)-21	455(380)	268(225)	410(345)	223(190)	390(325)	205(180)
OVM.M15(13)-22	485(390)	270(230)	415(350)	225(195)	410(330)	205(180)
OVM.M15(13)-25	500(410)	285(240)	450(375)	235(200)	425(350)	220(190)
OVM.M15(13)-27	510(430)	295(250)	460(390)	245(210)	435(370)	220(190)
OVM.M15(13)-37	600(500)	350(285)	545(460)	295(250)	510(430)	270(221)
OVM.M15(13)-43	645(545)	405(320)	585(495)	340(270)	555(465)	300(240)
OVM.M15(13)-55	730(610)	440(360)	660(555)	370(300)	620(520)	330(270)

Characteristics of OVM External Prestressing System

■ Be up to the *Recommendations for the Acceptance of Post-tensioning Systems & External Prestressing Material and System* by the international FIP and Chinese National Standard of GB/T14370-2000 *Anchor, Grip and Coupler for Prestressing Tendons*.

■ Secure and reliable, with excellent anti-corrosion and anti-fatigue capacity. Special damping devices in the system are available to reduce the damages

caused by the tendon vibration.

■ Convenient for inspection, maintaining and replacing tendons if needed.

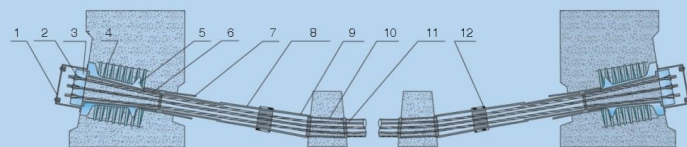
■ The radius of the individual strand deviation is very small, which can further decrease dimensions of diaphragms. Forces on every strand are individual at one deviation, so stress concentrations are greatly lessened.

Basic Components of OVM External Prestressing System

The basic components of external prestressing system include:

- External cables, ducts and grouting materials
- Anchorage system
- Deviating device
- Anti-corrosion system
- Damping device

OVM External Prestressing System

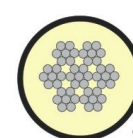


1. Protective Cap 2. Working Anchorage 3. Anchor Head 4. Spiral Reinforcement 5. Anchor Plate 6. Liner
7. Duct 8. HDPE Sheath 9. Coupler Sleeve 10. Deviator 11. Prestressing Tendon 12. Damping device

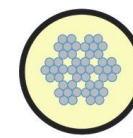
Anti-corrosion System of External Prestressing Cables

There are six types of OVM external prestressing cables:

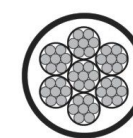
OVM-S1, OVM-S2, OVM-S3, OVM-S4, OVM-S5 and OVM-S6.



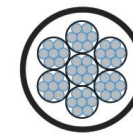
OVM-S1



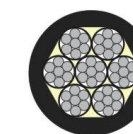
OVM-S2



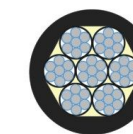
OVM-S3



OVM-S4



OVM-S5



OVM-S6

Basic components of external prestressing cables

Type	OVM-S1	OVM-S2	OVM-S3	OVM-S4	OVM-S5	OVM-S6
Strand Type	Bare strand	Epoxy-coated strand	Unbonded Strand	Epoxy-coated unbonded strand	Unbonded tendon	Epoxy-coated unbonded tendon
Duct	HDPE sheath		HDPE sheath		Hot extruded HDPE	
Grouting	Mortar, epoxy, grease		No grout on free length		No grout on free length	

OVM-S3 and OVM-S4 is the type without grouting material. These 2 kinds of cables can be removed and replaced. The cables on free length can be inspected at any time. The cable is self-protective with each strand's anti-corrosion capacity. The

external HDPE sheath is to prevent internal unbonded tendons from being damaged by external factors. The HDPE sheath is made up of one big and one small retractable pipes.

Deviating Device

Stress condition of strand will be better as the radius of deviator of external cable is increasing. But bigger radius will result in bigger structural dimension and bigger deadweight of bridge. So a proper radius is needed on condition of essential safety. Additional stress created by installation and construction can be eliminated by smooth mouth of deviator, and would decrease the abrasion of HDPE sheath as well.

$$V_m = \frac{d}{2R} E$$

d--diameter of wire

R--bending radius

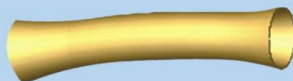
E--elastic modulus of strand

Fatigue strength of bending external prestressing cable is decreased to some extent because of additional flexural stress. So it is needed to check the strand stress plus flexural stress. It is difficult to accurately calculate the flexural stress of strands. But this can be done with the following formula if assuming no friction between steel wires.

The minimum radius of deviator

Strand Type	Min Radius(m)
7- ϕ 5.2	2.0
12- ϕ 5.2	2.5
19- ϕ 5.2	3.0
27- ϕ 5.2	3.5
31- ϕ 5.2	4

Conventional Deviator



Stress loss due to friction between prestressing steels and ducts can be classified into 2 parts. One is due to friction between prestressing steels and ducts by vertical pressure of the curving section. The other one is caused by warp and tough surfaces of ducts. The formula is shown below:

$$\sigma_{st} = \sigma_k [1 - e^{-(\mu \theta + kx)}]$$

μ : Friction coefficient between prestressing steel and duct.

k : Coefficient for local warp of every meter duct.

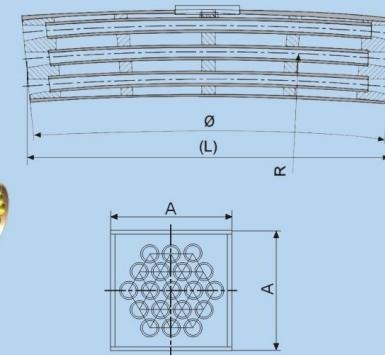
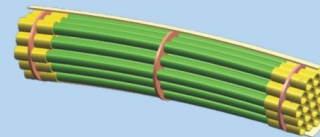
External prestressing cables are outside the concrete structures, made up of bending lines at deviator or anchor zones and straight lines between them. Friction effect due to warp of ducts is so weak on straight lines as to be ignored. Length of ducts on bending lines is short in general. So prestressing loss due to warp and tough surface of ducts can also be ignored.

Assume $k=0$,

the formula above will be equal

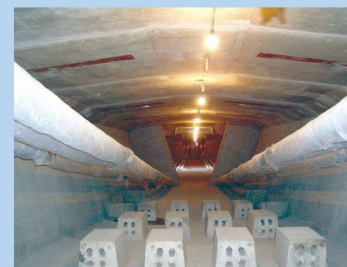
$$\text{to } \sigma_{st} = \sigma_k (1 - e^{-\mu \theta}).$$

Individual Strand Deviator



Individual strand deviator can make strands parallel and replaceable, every strand bears individual forces, ensures tiny abrasions existed between strands and deviator. Each guiding duct connects each other through the linked plates. Cement grout can separate external tendons, fix guiding ducts and bear the pressure between strands due to un-

simultaneous tensioning. Guiding ducts can be reshaped horizontally and vertically for requirements from different directions and bending radius. At both ends of each guiding duct, there is a compensating device with a trumpet to offset the angular deviation in construction process.



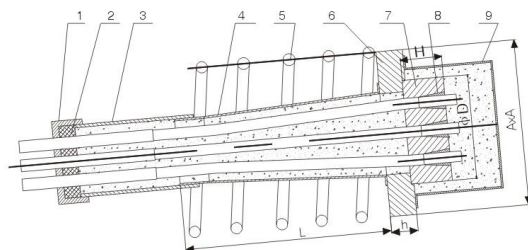
Sutong Bridge, China

OVM External Prestressing Anchorage

Stress amplitude of prestressing tendons is a very important parameter to the design of prestressing anchorage on the condition of live load. External tendons are individual members relative to the whole structure. They only connect with the concrete at anchoring zone and the deviator outside the structure. So the stress am-

plitude of prestressing tendon depends on the whole structure deformation. Based on OVM's mature prestressing anchoring technique, several kinds of external prestressing anchorages are designed to meet some special requirements of different projects.

Type OVM .A



1. End cap 2. Sealing plate 3. Duct 4. External pipe 5. Spiral reinforcement
6. Bearing plate 7. Anchor head 8. Working wedges 9. Protective cap

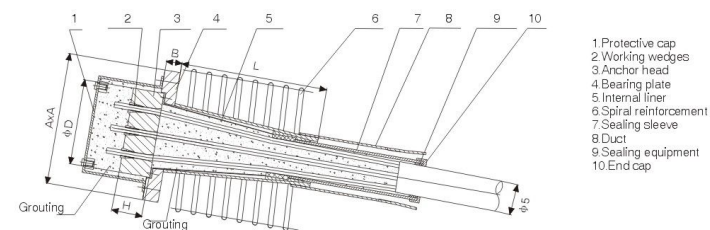
Dimensions of OVM.A External Prestressing Anchorage

Type	ϕD	H	AxAxB	L
OVM.A15-7	$\phi 135$	60	210x210x45	265
OVM.A15-12	$\phi 175$	70	280x280x45	301
OVM.A15-19	$\phi 217$	110	370x370x60	555
OVM.A15-27	$\phi 275$	120	420x420x60	630
OVM.A15-31	$\phi 310$	140	465x465x80	765

Type OVM.AT

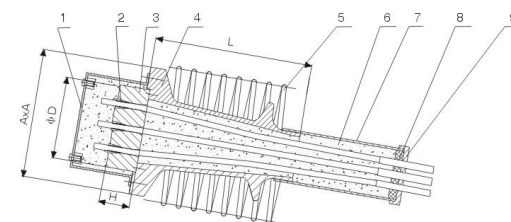
OVM.AT anchorage is derived from OVM.A anchorage by adding a insulating equipment to trumpet. If tendon needs to be replaced, the whole anchorage can

be removed from the end. The structural form is shown below and dimensions are the same as that of OVM.A.



1. Protective cap
2. Working wedges
3. Anchor head
4. Bearing plate
5. Internal liner
6. Spiral reinforcement
7. Sealing sleeve
8. Duct
9. Sealing equipment
10. End cap

Type OVM.TS



1. Protective cap
2. Specialized wedges
3. Anchor head
4. Bearing plate
5. Spiral reinforcement
6. Sealing sleeve
7. Duct
8. Sealing equipment
9. End cap

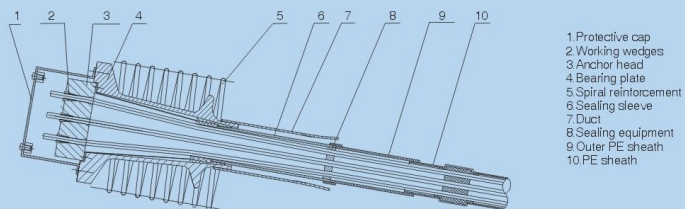
Dimensions of OVM.TS External Prestressing Anchorage

Type	ϕD	H	AxAxL
OVM.TS15-7	$\phi 135$	60	210x210x160
OVM.TS15-12	$\phi 175$	70	285x285x340
OVM.TS15-19	$\phi 217$	90	350x350x470
OVM.TS15-27	$\phi 275$	120	410x410x495
OVM.TS15-31	$\phi 310$	140	465x465x565

OVM External Prestressing Anchorage

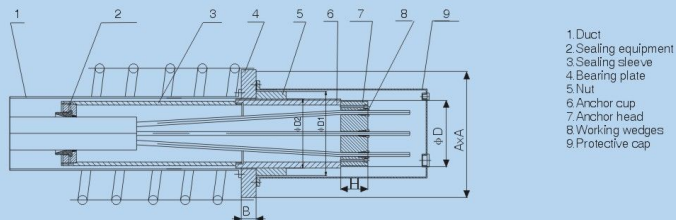
Type OVM.TT

The structural form is shown below and dimensions are the same as OVM.TS.



Type OVM.TSK

The tendon is replaceable and the tendon force can be adjusted when OVM.TSK anchorage is employed.



Dimensions of OVM.TSK External prestressing anchorage

Type	ϕD	H	AxAxC	$\phi D1$	$\phi D2$
OVM.TSK 15-7	$\phi 150$	70	285x285x30	$\phi 210$	$\phi 160$
OVM.TSK 15-12	$\phi 205$	80	360x360x40	$\phi 270$	$\phi 220$
OVM.TSK 15-19	$\phi 230$	100	420x420x60	$\phi 305$	$\phi 245$
OVM.TSK 15-27	$\phi 270$	100	490x490x60	$\phi 240$	$\phi 285$
OVM.TSK 15-31	$\phi 270$	130	500x500x65	$\phi 240$	$\phi 385$

OVM external prestressing anchorage can be properly selected according to design requirements.

Anchorage Type	Cable Type	Grouting Material	Deviator Type	Characteristics
OVM.A OVM.TS	OVM-S1 OVM-S2	Grease	Individual strand deviation	Mono-strand replaceable
	OVM-S3 OVM-S4	Grease in anchor, no grouting on free length.	Individual strand deviation	Mono-strand replaceable
	OVM-S5 OVM-S6	Grease in anchor	Spindly deviation	Replaceable in total
OVM.AT OVM.TT	OVM-S1 OVM-S2	Grease	Individual strand deviation	Mono-strand replaceable
	OVM-S3 OVM-S4	Grease in anchor, no grouting on free length.	Individual strand deviation	Mono-strand replaceable
	OVM-S1 OVM-S2	Cement or epoxy grout	Individual strand deviation	
	OVM-S3 OVM-S4	Grease in anchor, no grouting on free length.	Spindly deviation	Replaceable in total
OVM.TSK	OVM-S5 OVM-S6	Grease in anchor, no grouting on free length.	Spindly deviation	Replaceable in total
	OVM-S5 OVM-S6	Grease in anchor, no grouting on free length.	Spindly deviation	Replaceable and adjustable in total

Damping Device

Traffic load will cause the vibration of structures and cables. If self frequency of the cable is close to that of the structure, sympathetic vibration will occur and hidden problem will be brought to structure safety. To vary frequency of the cable on free length from that of the structure, damping devices should be installed at a proper distance on free length of tendons to shorten vibration zone and damping vibration.



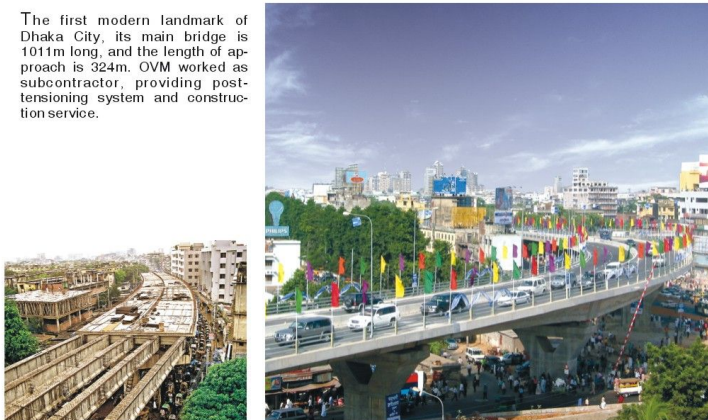
Friendship Bridge, Macau

Friendship Bridge is the second cross-sea bridge connects Macau Peninsula and Taipa, which is the longest bridge, total 4700 meters long. OVM prestressing system was applied to the bridge.



Mohakhali Flyover, Dhaka, Bangladesh

The first modern landmark of Dhaka City, its main bridge is 1011m long, and the length of approach is 324m. OVM worked as subcontractor, providing post-tensioning system and construction service.



Algeria East-West Highway Project---Lot Unique Centre & West, Algeria

Due for completion in 2010, Algeria's \$11.2 billion East-West Highway development is currently the world's largest highway construction project. The development, financed by the Algerian Government, will extend 1,216km and ensure the link between Annaba in the north-east and Tlemcen in the north-west passing directly through 24 provinces and linking Algeria to Tunisia and Morocco. OVM supplies all post-tensioning anchorages and equipments for Lot Unique Centre & West.



The Thanlwin Bridge (Mawlamyine), Myanmar

The Thanlwin Bridge (Mawlamyine), linking Mawlamyine, the capital of Mon State, and Mottama side, is the longest and largest of this kind in Myanmar. It is 11575 feet long and has a 28-foot-wide two-lane motorway with the length of two miles, a 14-foot-wide railroad with the length of four miles, and two six-foot-wide walkways on it. It was opened on 2005. OVM supplies conventional post-tensioning system.



Macau East Asia Games Gymnasium, Macau

It is well known as Macau Egg. 350 meters long, and 240 meters wide. The first floor covers 80,000 square meters. OVM supplies prestressing anchorages for floor slabs and carries out the construction.



Jiangsu Sutong Bridge over Yangtze River, China



Mazu Bridge, Taiwan, China

Mazu Bridge is the first bridge named after divinity in Taiwan. Its total length is 1700m, whose main span is 250m; the bridge is designed to imitate the Mazu, the goddess of the sea. OVM250 Stay Cable System was applied to the bridge.



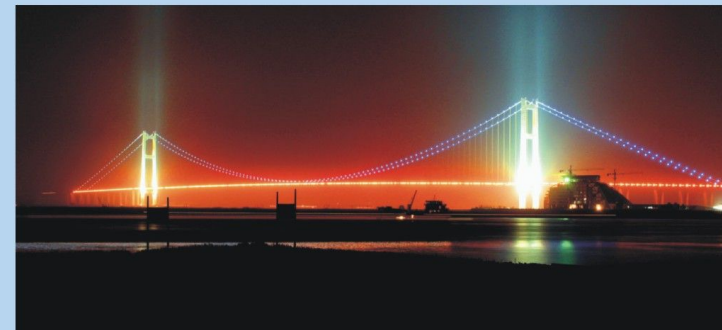
Lupu Bridge, Shanghai, China



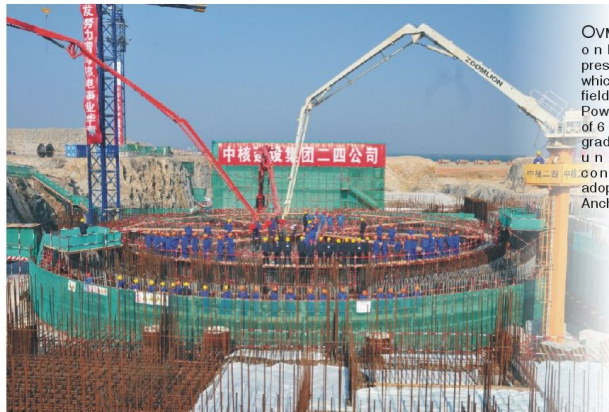
Lupu Bridge is a half-through arch bridge with the main span of 550 meters. OVM250 Parallel Strand Cables are used as provisional stay cables on the coastal region of the arch. The buckle cable is safe and sound although coming through the typhoon.

Runyang Bridge over Yangtze River, China

Total length 35.66km, the south part of bridge is a suspension bridge with a 1490m main span, whose span is the longest in China and the third in the world. OVM supplies the conventional anchorage and anchor block.

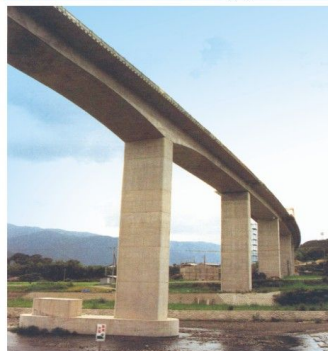


Fuqing Nuclear Power Plant, China



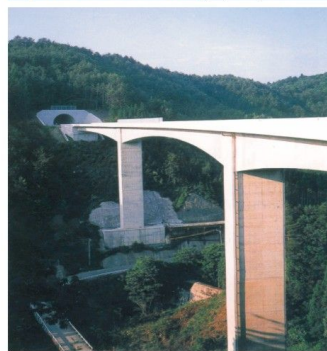
OVM is the first and only Chinese prestressing company which enters nuclear field. Fuqing Nuclear Power Plant consists of 6 sets of million KW grade nuclear power units, whose containments will adopt OVM HM Ring Anchoring System.

Kawachitanikawa Bridge, Japan



At Tokushima Motorway, OVM15-12T External Prestressing System was employed in the construction.

The Yaozou Bridge, Japan



At Toukai-Hokuriku Motorway, main span 118.5m, total length 225.5m. Type OVM15-12 post tensioning anchorages were used.

Certifications of OVM

