LMK

CABLE SYSTEM FOR STAYED CABLE & ARCHED BRIDGES

HiSCS SMSA


CERTIFICATE

TÜV AUSTRIA

Management System as per
EN ISO 14001 : 2015

In accordance with TÜV AUSTRIA procedures, it is hereby certified that

HISCS S.M.S.A.
16 Kifisias Ave.
GR-115 26 ATHENS, GREECE

Applies an Environmental Management System in line with the above Standard for the following Scope

- CONSTRUCTION (SITE PREPARATION, COMPLETE OR PARTIAL CONSTRUCTION OF BUILDINGS, INFRASTRUCTURE AND CIVIL WORKS).
- INSTALLATION-MAINTENANCE-REHABILITATION OF BRIDGE EXPANSION JOINTS.
- INSTALLATION-MAINTENANCE-REHABILITATION OF BUILDING AND BRIDGE BEARINGS.
- LIFTING OF STRUCTURES (BUILDINGS AND BRIDGES).
- INSPECTION OF STRUCTURAL ELEMENTS (BEARINGS- EXPANSION JOINTS-OTHER BRIDGE AND ROAD ELEMENTS).
- TRADE OF CONSTRUCTION MATERIALS (LMK POST-TENSIONING SYSTEM).
- DESIGN-INSTALLATION-SUPERVISION OF WORKS FOR LMK POST-TENSIONING SYSTEM.

Certificate Registration No.: 20001180000080
Valid until: 2024-09-25
Initial certification: 2018-09-26

Maria Agapiou
Head of Management Systems & Products Certification Division
Certification Body
at TÜV AUSTRIA
Athens, 2022-07-25

This certification was conducted in accordance with TÜV AUSTRIA auditing and certification procedures and is subject to regular surveillance audits.


CERTIFICATE

TÜV AUSTRIA

Management System as per
ISO 45001 : 2018

In accordance with TÜV AUSTRIA procedures, it is hereby certified that

HISCS S.M.S.A.
16 Kifisias Ave.
GR-115 26 ATHENS, GREECE

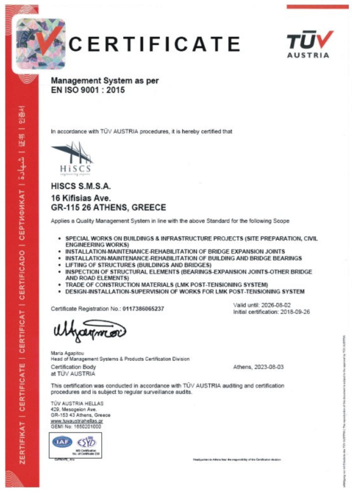
Applies an Occupational health and safety management system in line with the above Standard for the following Scope

- SPECIAL WORKS ON BUILDINGS & INFRASTRUCTURE PROJECTS (SITE PREPARATION, CIVIL ENGINEERING WORKS)
- INSTALLATION-MAINTENANCE-REHABILITATION OF BRIDGE EXPANSION JOINTS
- INSTALLATION-MAINTENANCE-REHABILITATION OF BUILDING AND BRIDGE BEARINGS
- LIFTING OF STRUCTURES (BUILDINGS AND BRIDGES)
- INSPECTION OF STRUCTURAL ELEMENTS (BEARINGS-EXPANSION JOINTS-OTHER BRIDGE AND ROAD ELEMENTS)
- TRADE OF CONSTRUCTION MATERIALS (LMK POST-TENSIONING SYSTEM)
- DESIGN-INSTALLATION-SUPERVISION OF WORKS FOR LMK POST-TENSIONING SYSTEM

Certificate Registration No.: 20152200003584
Valid until: 2026-06-02
Initial certification: 2018-09-26

Maria Agapiou
Head of Management Systems & Products Certification Division
Certification Body
at TÜV AUSTRIA
Athens, 2023-06-03

This certification was conducted in accordance with TÜV AUSTRIA auditing and certification procedures and is subject to regular surveillance audits.


CERTIFICATE

TÜV AUSTRIA

Management System as per
EN ISO 9001 : 2015

In accordance with TÜV AUSTRIA procedures, it is hereby certified that

HISCS S.M.S.A.
16 Kifisias Ave.
GR-115 26 ATHENS, GREECE

Applies a Quality Management System in line with the above Standard for the following Scope

- SPECIAL WORKS ON BUILDINGS & INFRASTRUCTURE PROJECTS (SITE PREPARATION, CIVIL ENGINEERING WORKS)
- INSTALLATION-MAINTENANCE-REHABILITATION OF BRIDGE EXPANSION JOINTS
- INSTALLATION-MAINTENANCE-REHABILITATION OF BUILDING AND BRIDGE BEARINGS
- LIFTING OF STRUCTURES (BUILDINGS AND BRIDGES)
- INSPECTION OF STRUCTURAL ELEMENTS (BEARINGS-EXPANSION JOINTS-OTHER BRIDGE AND ROAD ELEMENTS)
- TRADE OF CONSTRUCTION MATERIALS (LMK POST-TENSIONING SYSTEM)
- DESIGN-INSTALLATION-SUPERVISION OF WORKS FOR LMK POST-TENSIONING SYSTEM

Certificate Registration No.: 01173060065237
Valid until: 2026-06-02
Initial certification: 2018-09-26

Maria Agapiou
Head of Management Systems & Products Certification Division
Certification Body
at TÜV AUSTRIA
Athens, 2023-06-03

This certification was conducted in accordance with TÜV AUSTRIA auditing and certification procedures and is subject to regular surveillance audits.


Dedal Attestation & Certification

Notified body No. 1922
Bulgaria, 8230 Nesebar
Mladost #50

CERTIFICATE
of constancy of performance
1922 - CPR - 1586

In compliance with Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 (the Construction Products Regulation or CPR), this certificate applies to the construction product

LMK Post Tensioning System with 2 to 37 strands for internal and external prestressing of structures with bonded and unbonded strands

(For list of controlled characteristics of the product see Annex 1 to 1922-CPR-1586 that is an inseparable part of this certificate)

placed on the market under the name or trade mark of

HiSCS S.M.S.A - Highway Special Construction Systems
16, Kifissias Ave., PC 11526 Athens, Greece

and produced in the manufacturing plant

Liuzhou Jinxin Technology Co. Ltd.
No.1 Industrial Park, Liujiang District, Liuzhou City, Guangxi, China

This certificate attests that all provisions concerning the assessment and verification of constancy of performance described in the

ETA-20/0837, issued on 17.11.2020
and
EAD 160004-00-0301

under system 1+ for the performance set out in this certificate are applied and that the factory production control conducted by the manufacturer is assessed to ensure the constancy of performance of the construction product.

This certificate was first issued on 23.07.2021 and will remain valid as long as neither the ETA, the EAD, the construction product, the AVCP methods nor the manufacturing conditions in the plant are modified significantly, unless suspended or withdrawn by the notified factory production control certification body. The certificate is supported through surveillance audits. The validity of the certificate may be confirmed in the CE register at the web address www.dedal-bg.net.

Issued:
Burgas, 01 September 2022
Ref No. 02-00

Manager:
dipl. eng. Anna Vasileva


OIB

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Member of EOTA
www.eota.eu

European Technical Assessment
ETA-20/0837
of 17.11.2020

General part

Technical Assessment Body issuing the European Technical Assessment	Österreichisches Institut für Bautechnik (OIB) Austrian Institute of Construction Engineering
Trade name of the construction product	LMK Post Tensioning System with 2 to 37 strands
Product family to which the construction product belongs	Post-tensioning kit for prestressing of structures with internal bonded strands
Manufacturer	HiSCS S.A. 1, Georgiou Mpakou Street 11524 Athens Greece
Manufacturing plant	HiSCS S.A. 1, Georgiou Mpakou Street 11524 Athens Greece
This European Technical Assessment contains	39 pages including Annexes 1 to 17, which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Regulation (EU) № 305/2011, on the basis of	European Assessment Document (EAD) 160004-00-0301 – Post-Tensioning Kits for Prestressing of Structures.


Zhongjian Certification Co., Ltd.

CERTIFICATE OF CONFORMITY OF QUALITY
MANAGEMENT SYSTEM CERTIFICATION

LIUZHOU JINXIN TECHNOLOGY CO., LTD.

GB/T 19001-2016/ISO9001:2015 Standard

PRODUCTION OF ANCHORAGE FOR STAY CALBE, PRESTRESSED ANCHORAGE AND MECHANICAL PARTS

Date of issue 2021-05-25

Representative of The Company

IAF CNAS

Contents

Company Profile

The LMK prestressed anchorage system derives from a collaboration between:

Highway Special Construction Systems (HiSCS) Engineering Company (from Greece).

And

Liuzhou Jinxin Technology (LJT) Co., Ltd.

Extensive research, testing and development efforts have been performed in the field of post–tensioning and stayed cable applications to assure LMK's highest quality. All components are subjected to the most stringent testing and qualityassurance procedures, based on internationally recognized codes and recommendations.

The LMK anchorage system combines LJT's advanced production experience, by emerging a product among the fastest international developments in China, meeting the requirements of international EAD/ETAG (European Assessment Documentation–former European Technical Approval Guideline), CE (European Union Consortium Product Quality Certification), AASHTO LRFD (American Highway Standards), FIB (International Federation for Structural Concrete) & PTI (Post Tensioning and Prestressing Institute) standards.

The LMK anchorage system includes all types of anchorage applications, providing at the same time high quality services regarding design, installation–supervision and complete technical & construction support.

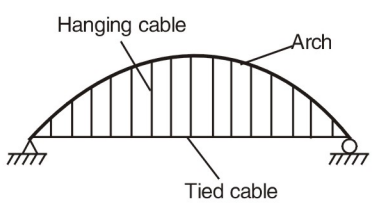
Business Scope:

1. Supply of LMK anchorage system
2. Supply of PC related materials and equipment for infrastructure applications.
3. Supply of strands including epoxy coated strand
4.Supply of cable systems for bridges including installation services.

ABOUT ARCHED BRIDGES

The arched bridge has been being developed since many years because of its aesthetics and elegance. For the bridge with small or medium span, arch concept is favored by designers of bridge, thanks to its beautiful modeling, low construction cost and strong adaptability.

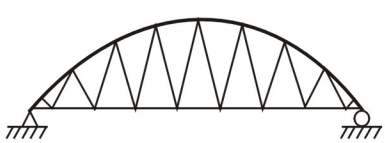
Arch bridge has two types: Arch with thrust and Arch without thrust.



a)

b)

c)



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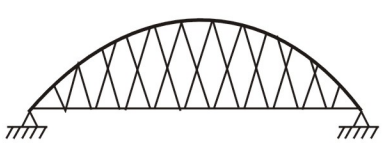
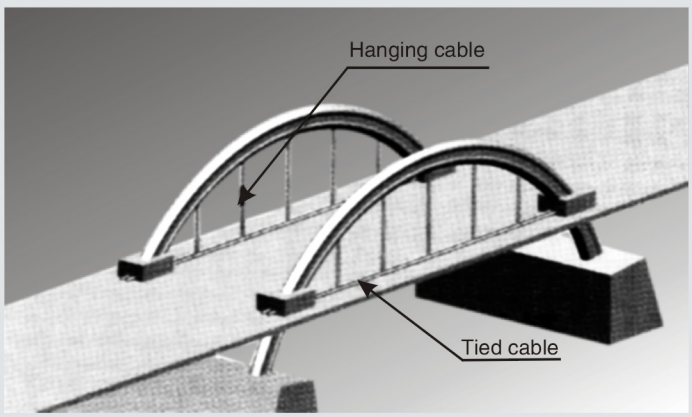


d)–2

a) Langer Bridge(Flexible arch with rigid tie)
b) Nielsen–Lohse Bridge(Rigid arch with rigid tie)
c) Tied Bridge(Flexible tie with rigid arch)
d) Nielsen–Lohse Bridge(Inclined hanging cable)

STRUCTURE SKETCH OF CABLE SYSTEM FOR ARCHED BRIDGE

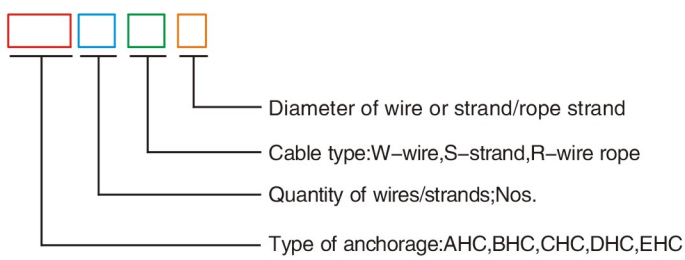


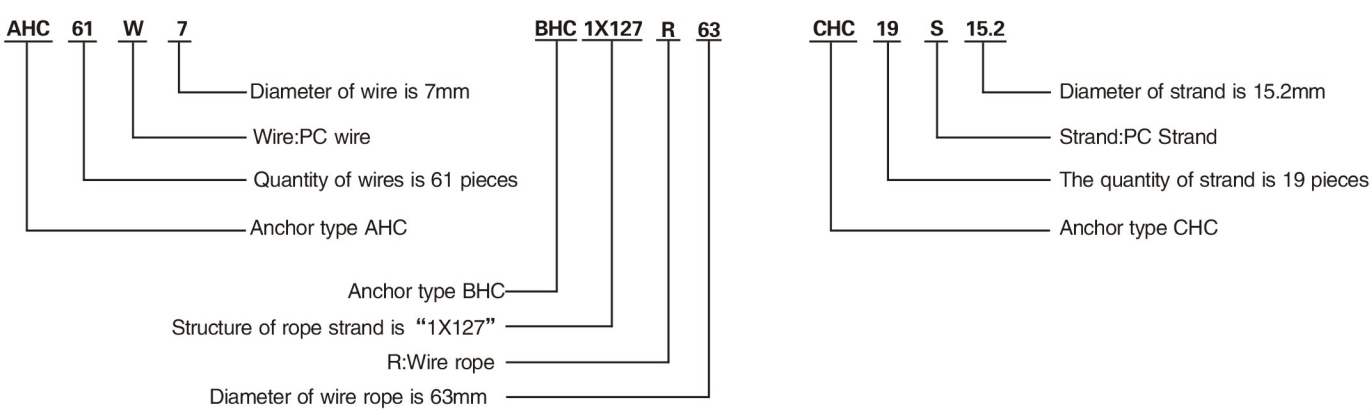
Arched bridge with hanging cables and tied cable

Standard applied to LMK cable system for arch bridge

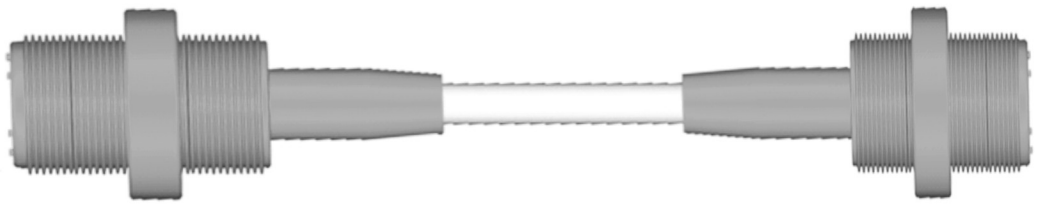
+ Recommendation for Stay Cable Design, Testing and Installation (PTI–USA);
+ Acceptance of Stay Cable Systems Using Prestressing Steels (fib);
+ Acceptance Standards for Post–Tensioning Systems (PTI);
+ ASTM A882/A882M–04a: Standard Specification for Filled Epoxy–Coated Seven–Wire Prestressing Steel Strand;
+ ASTM D3035–12: Standard Specification for Polyethylene (PE) Plastic Pipe (DR–PR) Based on Controlled Outside Diameter;
+ ASTM F714–12a: Standard Specification for Polyethylene (PE) Plastic Pipe (DR–PR) Based on Outside Diameter;
+ ASTM A416/A416M–12a: Standard Specification for Steel Strand, Uncoated Seven–wire for Prestressing Concrete;
+ JIS G3536–2014: Uncoated Stress–Relieved Steel Wires and Strands for Prestressed Concrete;
+ ASTM A586–04a:Standard Specification for Zinc–Coated Parallel and Helical Steel Wire Structural Strand;
+ ASTM A421/A421M 101:Standard Specification for Uncoated Stress–Relieved Steel wire for prestressed Concrete;
+ JIS G 3502–2013:Piano Wire Rods
+ NF A35–035–2001;
+ XP A35–037–2(type P);
+ XP A35–037–3(type SC)
+ GB/T 18365–2001:Technical Condition for Hot–Extruding PE Protection High Strength Wire Cable of Cable–Stayed Bridge.

DESIGNATION OF TYPE FOR HANGING CABLE SYSTEM

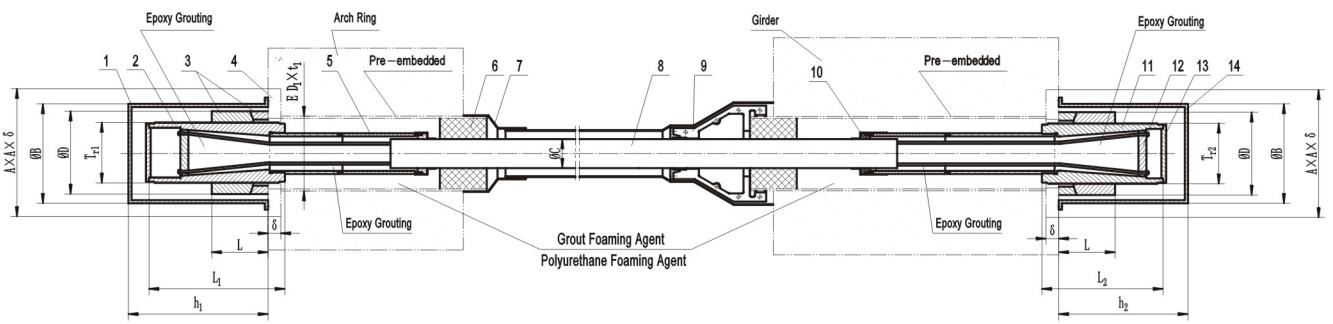




HANGING ANCHORAGE TYPE AHC



Stressing–end　　Dead–end



1.Stressing–end protective cap
2.Stressing–end anchor socket
3.Spherical nut with bearing ring
4.Bearing plate
(pre–set with pre–embedded pipe)
5.Extension Pipe
6.Damper
7.Transition cone
8.Cable body
9.Waterproof funnel
10.Sealing cover
11.Dead–end anchor socket
12.Anchor plate
13.End cover
14.Dead–end protecting cap

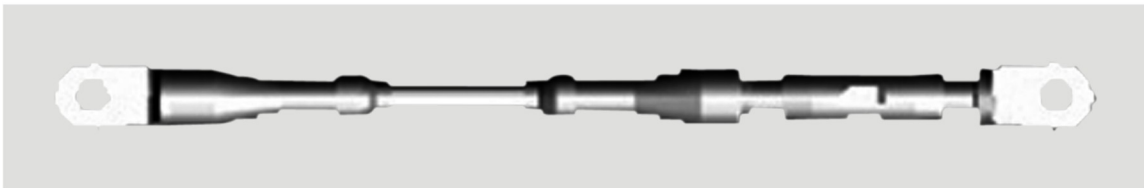
Dimensions of Hanging Anchorage Type AHC

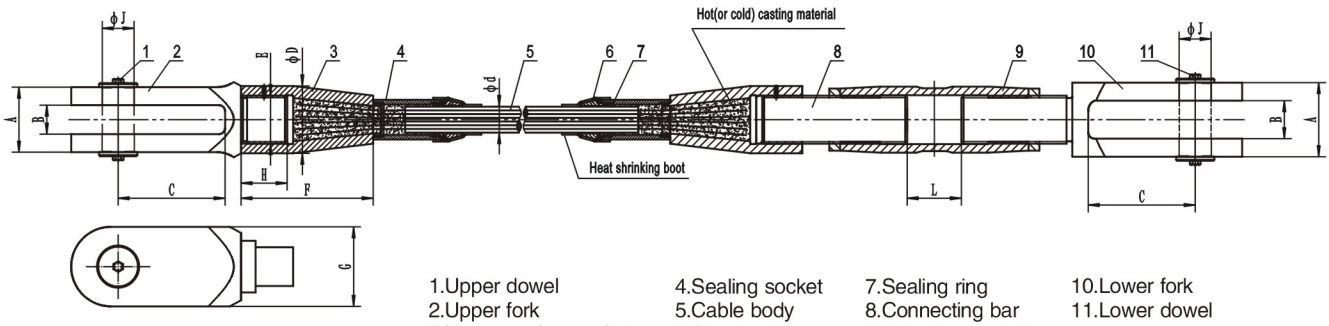
Unit:mm

Dimension / Type	Stressing–end protective cap Φ Bxh$_1$	Stressing–end anchor socket $T_{r1} \times L_1$	Bearing plate A × A × δ	Pre–embedded pipe ED$_1$ × t$_1$	Dead–end anchor socket $T_{r2} \times L_2$	Dead–end protecting cap Φ B × h$_2$	Spherical component Φ D × L	Outer diameter of cable Φ C
AHC37W7	Φ250 × 300	T_{r1}150 × 6 × 285	290 × 290 × 30	Φ180 × 8	T_{r2}120 × 6 × 245	Φ240 × 260	Φ210 × 115	65
AHC55W7	Φ270 × 320	T_{r1}170 × 6 × 345	320 × 320 × 30	Φ194 × 5	T_{r2}140 × 6 × 305	Φ260 × 280	Φ230 × 115	72
AHC61W7	Φ280 × 340	T_{r1}180 × 8 × 360	330 × 330 × 30	Φ203 × 6	T_{r2}140 × 8 × 315	Φ280 × 300	Φ240 × 115	77
AHC73W7	Φ300 × 380	T_{r1}190 × 8 × 410	360 × 360 × 35	Φ219 × 7.5	T_{r2}155 × 8 × 360	Φ290 × 340	Φ260 × 135	82
AHC85W7	Φ310 × 380	T_{r1}190 × 8 × 420	370 × 370 × 40	Φ219 × 7.5	T_{r2}155 × 8 × 360	Φ300 × 340	Φ270 × 140	87
AHC91W7	Φ310 × 400	T_{r1}200 × 8 × 435	390 × 390 × 40	Φ245 × 12	T_{r2}165 × 8 × 375	Φ300 × 360	Φ270 × 140	93
AHC109W7	Φ330 × 410	T_{r1}220 × 8 × 470	420 × 420 × 40	Φ273 × 15	T_{r2}180 × 8 × 410	Φ320 × 360	Φ290 × 160	97
AHC121W7	Φ340 × 460	T_{r1}230 × 10 × 500	440 × 440 × 40	Φ273 × 12	T_{r2}185 × 10 × 415	Φ340 × 390	Φ300 × 160	103
AHC127W7	Φ350 × 460	T_{r1}240 × 10 × 510	460 × 460 × 40	Φ273 × 9	T_{r2}195 × 10 × 425	Φ340 × 390	Φ310 × 160	109
AHC139W7	Φ350 × 480	T_{r1}240 × 10 × 540	480 × 480 × 40	Φ273 × 9	T_{r2}195 × 10 × 455	Φ350 × 420	Φ320 × 165	111
AHC151W7	Φ370 × 500	T_{r1}250 × 10 × 555	500 × 500 × 45	Φ299 × 15	T_{r2}200 × 10 × 470	Φ360 × 440	Φ330 × 185	113
AHC163W7	Φ380 × 510	T_{r1}260 × 10 × 555	520 × 520 × 45	Φ299 × 12	T_{r2}210 × 10 × 470	Φ370 × 440	Φ340 × 190	118
AHC187W7	Φ390 × 540	T_{r1}270 × 10 × 590	550 × 550 × 50	Φ299 × 7.5	T_{r2}220 × 10 × 505	Φ380 × 470	Φ350 × 205	125
AHC199W7	Φ410 × 560	T_{r1}280 × 10 × 620	570 × 570 × 50	Φ325 × 12	T_{r2}230 × 10 × 515	Φ400 × 480	Φ370 × 205	128
AHC211W7	Φ420 × 570	T_{r1}290 × 10 × 635	590 × 590 × 50	Φ325 × 10	T_{r2}240 × 10 × 540	Φ410 × 500	Φ380 × 210	133

Note :Can be modified as per project requirements

HANGING ANCHORAGE TYPE BHC





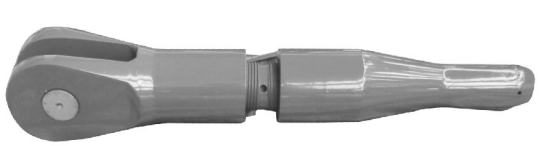
1.Upper dowel
2.Upper fork
3.Upper anchor socket
4.Sealing socket
5.Cable body
6.Stopper ring
7.Sealing ring
8.Connecting bar
9.Adjusting socket
10.Lower fork
11.Lower dowel

Dimensions of Hanging Anchorage Type BHC

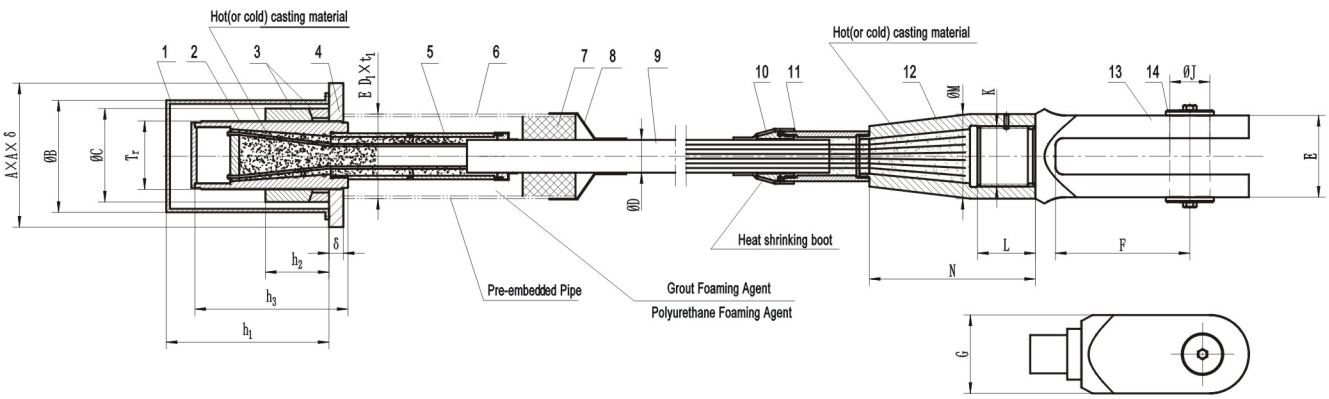
Unit:mm

Dimension / Type	Upper/Lower fork				Upper/Lower dowel	Anchor socket				Outer diameter of cable
	A	B	C	G	ΦJ	ΦD	E	H	F	Φd
BHC37W7	160	65	200	200	70	170	T,115x12	150	400	65
BHC55W7	180	80	250	220	85	185	T,130x14	165	420	72
BHC61W7	195	90	260	230	90	190	T,135x14	170	430	77
BHC73W7	200	95	265	235	95	195	T,140x14	175	435	82
BHC85W7	210	100	270	240	105	200	T,145x14	180	440	87
BHC91W7	225	110	270	245	110	200	T,145x14	185	440	93
BHC109W7	240	120	285	255	120	210	T,150x16	190	450	97
BHC121W7	260	140	290	265	130	220	T,150x16	200	460	103
BHC127W7	280	145	295	280	135	230	T,160x16	210	470	109
BHC139W7	320	160	310	300	150	250	T,175x16	230	490	111
BHC151W7	370	185	320	310	170	270	T,190x18	250	520	113
BHC163W7	400	195	330	340	190	285	T,200x18	270	540	118
BHC187W7	450	225	350	360	210	310	T,220x20	290	560	125

Note :
1.Can be modified as per project requirements
2.The adjusting range "L"



HANGING ANCHORAGE TYPE CHC



1.Protective cap
2.Stressing–end anchor socket
3.Spherical nut with bearing ring
4.Bearing plate
5.Extension Pipe
6.Pre–embedded pipe
7.Damper
8.Transition funnel
9.Cable body
10.Stopper ring
11.Sealing ring
12.Dead–end anchor socket
13.Anchoring fork
14.Dowel

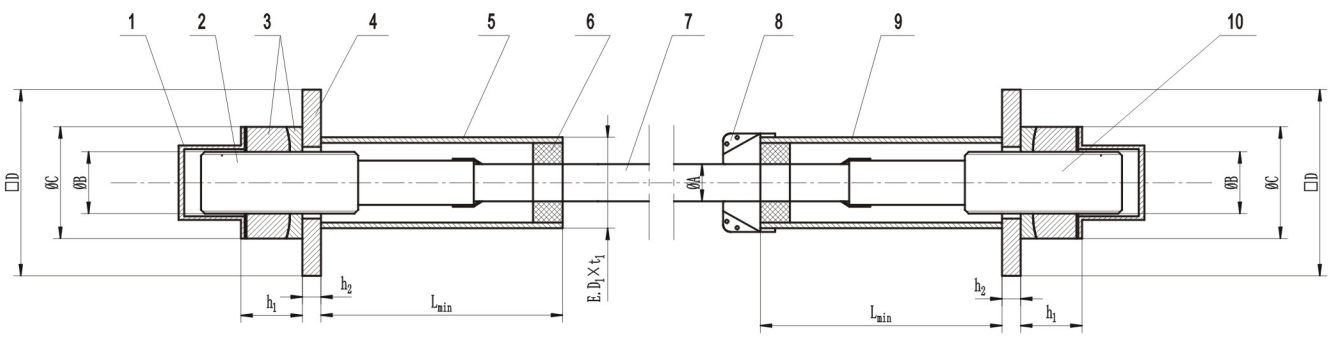
Dimensions of Hanging Anchorage Type CHC

Unit:mm

Dimension / Type	Protective cap ΦB × h_1	Stressing–end anchor socket T_r × h_3	Spherical component ΦC × h_2	Bearing plate A × A × δ	Pre–embedded pipe ED_1 × t_1	Outer diameter of cable ΦD	Dead–end Anchor socket				Anchoring fork			Dowel
							L	ΦM	N	K	E	F	G	ΦJ
CHC37W7	Φ250 × 300	T_r150 × 6 × 285	Φ210 × 115	290 × 290 × 30	Φ180 × 8	65	150	170	400	T_r115x12	215	200	240	Φ110
CHC55W7	Φ270 × 320	T_r170 × 6 × 345	Φ230 × 115	320 × 320 × 30	Φ194 × 5	72	165	185	420	T_r130x14	230	250	260	Φ120
CHC61W7	Φ280 × 340	T_r180 × 8 × 360	Φ240 × 115	330 × 330 × 30	Φ203 × 6	77	170	190	430	T_r135x14	230	260	260	Φ120
CHC73W7	Φ300 × 380	T_r190 × 8 × 410	Φ260 × 135	360 × 360 × 35	Φ219 × 7.5	82	175	195	435	T_r140x14	260	265	300	Φ130
CHC85W7	Φ310 × 380	T_r190 × 8 × 420	Φ270 × 140	370 × 370 × 40	Φ219 × 7.5	87	180	200	440	T_r145x14	260	270	300	Φ140
CHC91W7	Φ310 × 400	T_r200 × 8 × 435	Φ270 × 140	390 × 390 × 40	Φ245 × 12	93	185	200	440	T_r145x14	275	270	320	Φ150
CHC109W7	Φ330 × 410	T_r220 × 8 × 470	Φ290 × 160	420 × 420 × 40	Φ273 × 15	97	190	210	450	T_r150x16	295	285	360	Φ160
CHC121W7	Φ340 × 460	T_r230 × 10 × 500	Φ300 × 160	440 × 440 × 40	Φ273 × 12	103	200	220	460	T_r150x16	325	290	400	Φ175
CHC127W7	Φ350 × 460	T_r240 × 10 × 510	Φ310 × 160	460 × 460 × 40	Φ273 × 9	109	210	230	470	T_r160x16	325	295	400	Φ175
CHC139W7	Φ350 × 480	T_r240 × 10 × 540	Φ320 × 165	480 × 480 × 40	Φ273 × 9	111	230	250	490	T_r175x16	365	310	430	Φ190
CHC151W7	Φ370 × 500	T_r250 × 10 × 555	Φ330 × 185	500 × 500 × 45	Φ299 × 15	113	250	270	520	T_r190x18	365	320	430	Φ200
CHC163W7	Φ380 × 510	T_r260 × 10 × 555	Φ340 × 190	520 × 520 × 45	Φ299 × 12	118	270	285	540	T_r200x18	380	330	440	Φ210
CHC187W7	Φ390 × 540	T_r270 × 10 × 590	Φ350 × 205	550 × 550 × 50	Φ299 × 7.5	125	290	310	560	T_r220x20	400	350	480	Φ230

Note :Can be modified as per project requirements

HANGING ANCHORAGE TYPE DHC



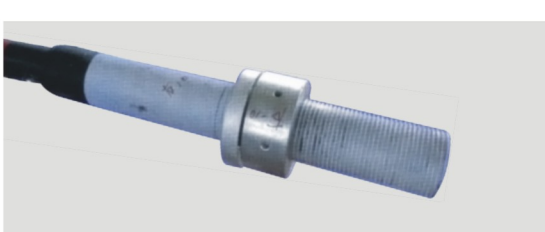
1. Protective cap
2. Upper swaged anchorage
3. Spherical nut with bearing ring
4. Bearing plate
5. Pre-embedded pipe in arch
6. Damper
7. Cable body
8. Waterproof transition cone
9. Pre-embedded pipe in girder
10. Lower swaged anchorage

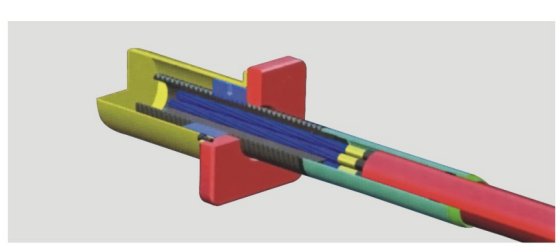
Dimensions of Hanging Anchorage Type DHC

Unit:mm

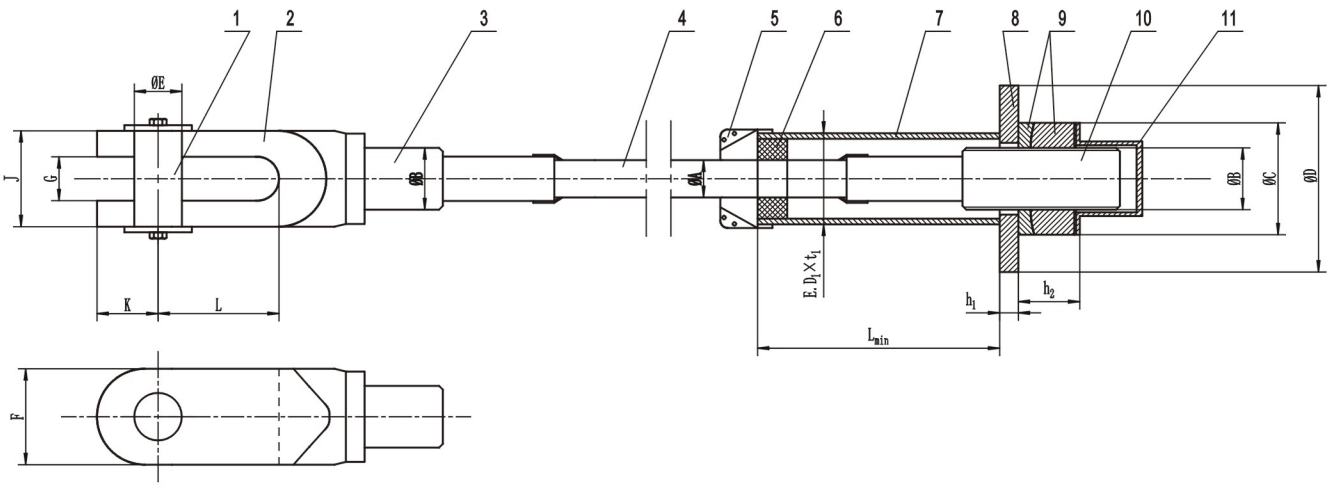
Dimension / Type	Anchorage			Bearing plate		Pre-embedded pipe			Cable
	ΦB	ΦC	h_1	D	h_2	E.D_1	t_1	L_{min}	ΦA
DHC3S15.2	Φ68	Φ100	60	180	30	Φ89	5.5	1020	Φ48
DHC4S15.2	Φ75	Φ110	70	200	30	Φ95	5	1020	Φ52
DHC5S15.2	Φ82	Φ122	70	240	40	Φ102	5	1035	Φ58
DHC6S15.2	Φ90	Φ140	80	240	40	Φ114	7	1045	Φ63
DHC7S15.2	Φ90	Φ140	80	240	40	Φ114	7	1045	Φ63
DHC9S15.2	Φ118	Φ180	100	310	50	Φ146	9	1175	Φ79
DHC12S15.2	Φ118	Φ180	100	310	50	Φ146	9	1195	Φ81
DHC15S15.2	Φ142	Φ215	115	370	50	Φ168	8	1320	Φ98
DHC16S15.2	Φ142	Φ215	115	370	50	Φ168	8	1320	Φ98
DHC19S15.2	Φ148	Φ220	115	370	50	Φ180	10	1320	Φ98
DHC22S15.2	Φ148	Φ240	125	420	50	Φ194	10	1500	Φ111
DHC24S15.2	Φ162	Φ255	130	450	50	Φ203	9	1500	Φ118
DHC25S15.2	Φ175	Φ255	130	450	50	Φ203	9	1500	Φ118
DHC27S15.2	Φ175	Φ265	145	450	50	Φ203	9	1500	Φ118
DHC31S15.2	Φ200	Φ275	145	540	60	Φ245	10	1600	Φ123
DHC37S15.2	Φ210	Φ290	165	550	60	Φ245	10	1700	Φ136

Note :Can be modified as per project requirements





HANGING ANCHORAGE TYPE EHC



1.Upper dowel
2.Upper fork
3.Upper swaged anchorage
4.Cable body
5.Waterproof transition cone
6.Damper
7.Pre–embedded pipe
8.Bearing plate
9.Spherical nut with bearing
10.Lower swaging anchorage
11.Protectve cap

Dimensions of Hanging Anchorage Type EHC

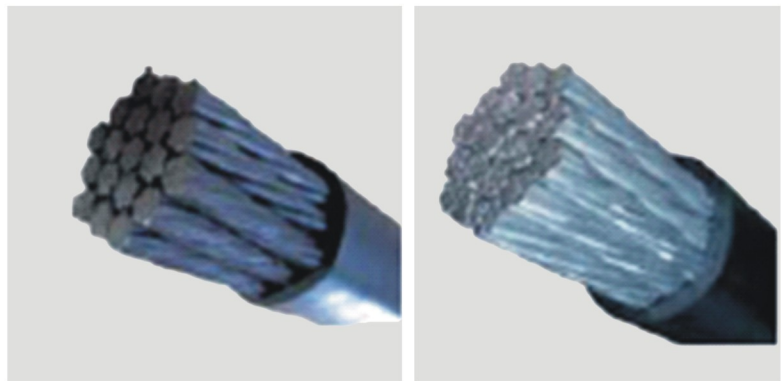
Unit:mm

Dimension / Type	Upper dowel	Upper fork					Upper/Lower Anchorage			Bearing plate		Pre–embedded pipe			Upper dowel
	ΦE	F	G	J	K	L	ΦB	ΦC	h_2	D	h_1	E.D_1	t_1	L_{min}	ΦE
EHC3S15.2	Φ50	105	50	95	68	135	Φ68	100	60	180	30	Φ89	5.5	1020	Φ50
EHC4S15.2	Φ55	125	55	105	80	150	Φ75	110	70	200	30	Φ95	5	1020	Φ55
EHC5S15.2	Φ65	130	55	115	90	175	Φ82	122	70	240	40	Φ102	5	1035	Φ65
EHC6S15.2	Φ70	152	60	120	105	190	Φ90	140	80	240	40	Φ114	7	1045	Φ70
EHC7S15.2	Φ75	165	65	130	110	200	Φ90	140	80	240	40	Φ114	7	1045	Φ75
EHC9S15.2	Φ90	180	85	165	115	215	Φ118	180	100	310	50	Φ146	9	1175	Φ90
EHC12S15.2	Φ100	205	90	180	135	245	Φ118	180	100	310	50	Φ146	9	1195	Φ100
EHC15S15.2	Φ115	235	100	200	155	270	Φ142	215	115	370	50	Φ168	8	1320	Φ115
EHC16S15.2	Φ115	245	100	200	160	285	Φ142	215	115	370	50	Φ168	8	1320	Φ115
EHC19S15.2	Φ125	270	110	215	180	310	Φ148	220	115	370	50	Φ180	10	1320	Φ125
EHC22S15.2	Φ135	285	120	240	190	330	Φ148	240	125	420	50	Φ194	10	1500	Φ135
EHC24S15.2	Φ145	295	135	265	195	340	Φ162	255	130	450	50	Φ203	9	1500	Φ145
EHC25S15.2	Φ145	300	135	265	195	340	Φ175	255	130	450	50	Φ203	9	1500	Φ145
EHC27S15.2	Φ155	310	145	285	205	355	Φ175	265	145	450	50	Φ203	9	1500	Φ155
EHC31S15.2	Φ165	330	155	305	215	375	Φ200	275	145	540	60	Φ245	10	1600	Φ165
EHC37S15.2	Φ180	365	165	320	240	410	Φ210	290	165	550	60	Φ245	10	1700	Φ180

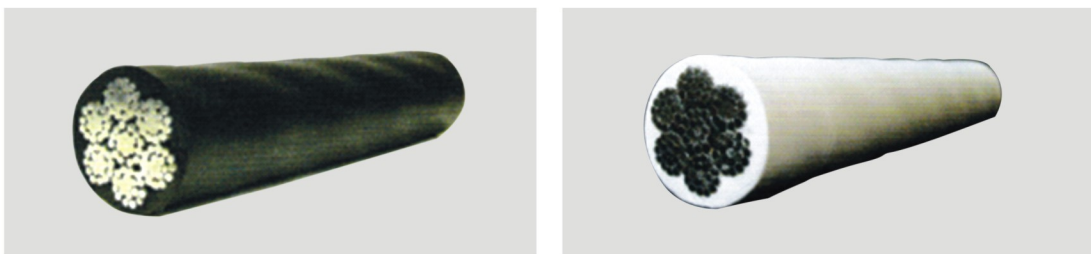
Note :Can be modified as per project requirements

CABLE OF HANGING CABLE SYSTEM

Parallel Wire Cable
(JSS II 11–1994)
(JIS G3502–2013)

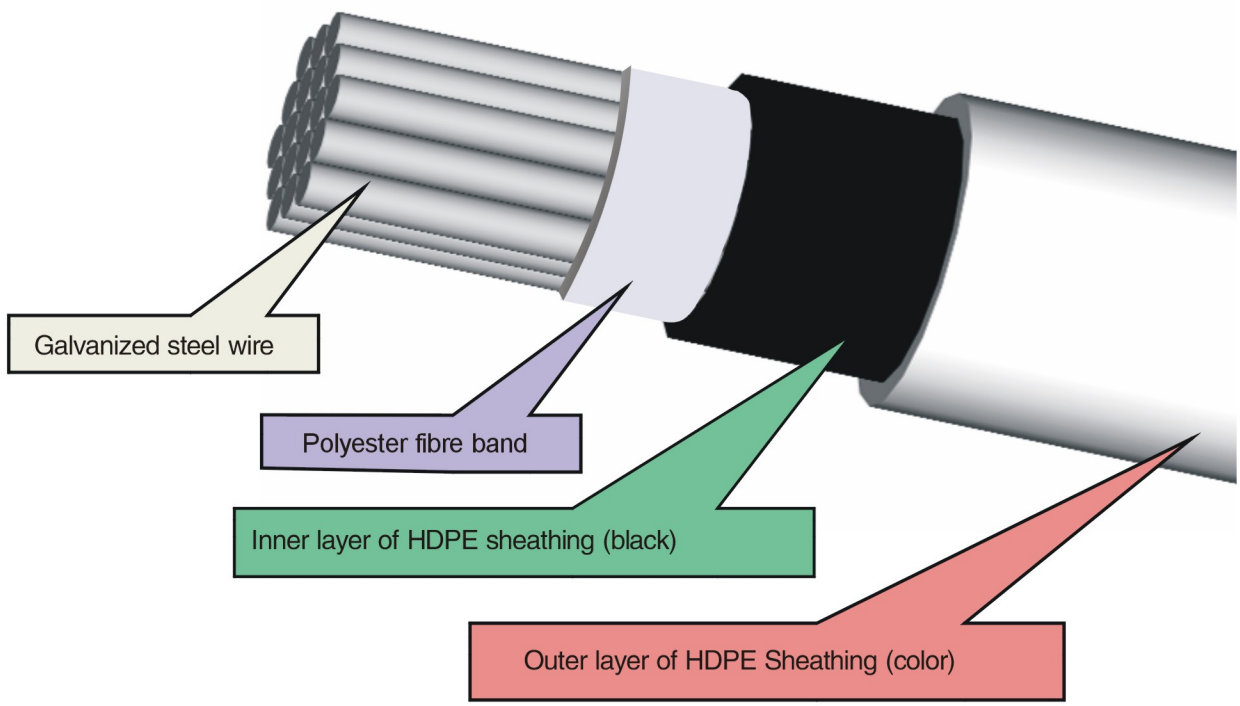


Multi Strand Cable
(Epoxy strand– ASTM A882a)
(Supro–Strand)(Galvanized strand)



Wire ropes (ASTM A586)(JIS G3549)

STRUCTURE OF PARALLEL WIRE STRAND



Hanging cable system type NTPWS, with the fillowing properties;

(1) Galvanized high–strength wire with low–relaxation, Grades 1670–1860MPa

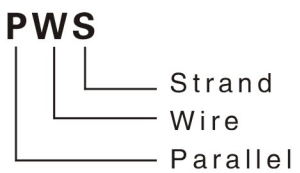
(2) High elastic modulus steel wire: 190~210GPa(200,000MPa ± 5%–PTI)

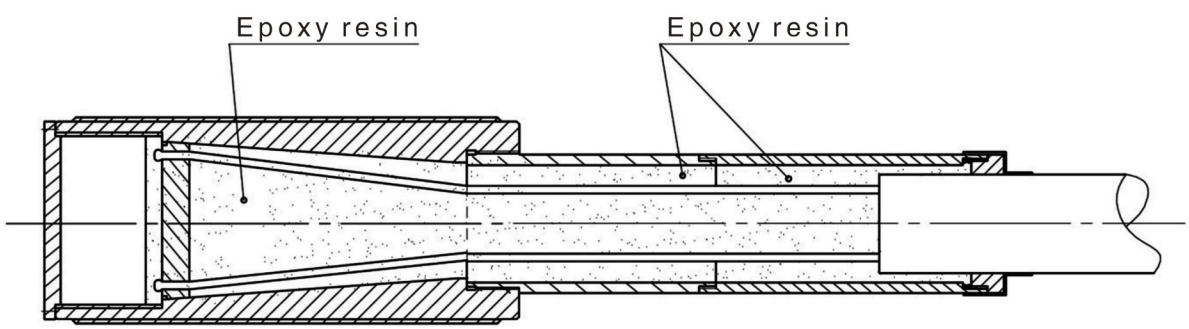
(3) Are stranded with 2°~4° to facilitate coiling for transportation whilst not to decline the elastic modulus and tensile load of wires as well as the cable;

(4) Special epoxy resin in the anchoring socket, ensuring excellent fatigue resistance

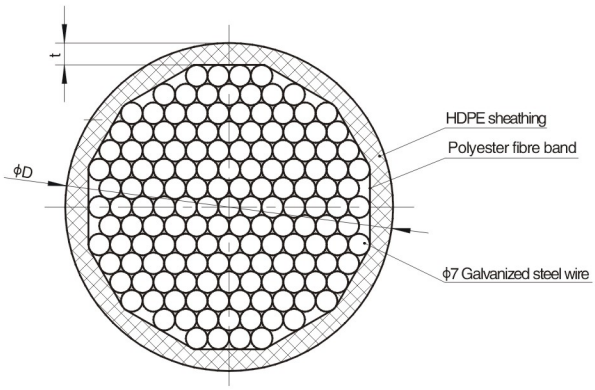
(5) Excellent durability.

What is structure of NTPWS?

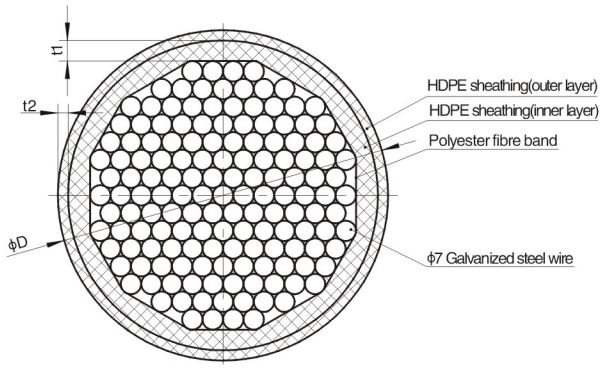




Parameters for cable of structure PWS



Cross–section of type H

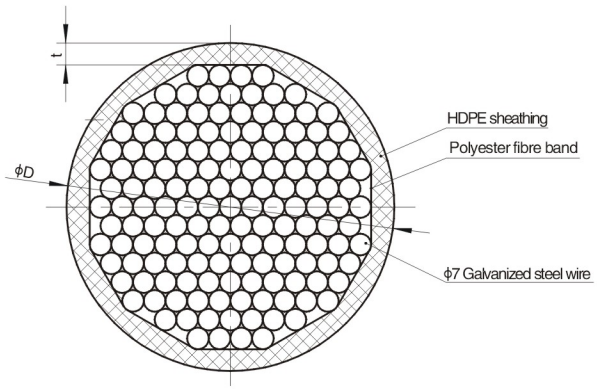


Cross–section of type C

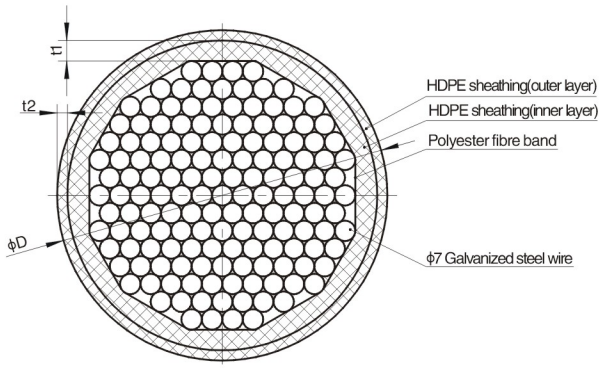
The parameter of cable(PWS with wire grade:1670MPa)

Type	Nominal cross–sectional area of steel wire cm^2	Unit weight of steel wire kg/m	Black single layer (Type H)			Black inner layer and color outer layer (Type C)					Nominal breaking load of cable P_b	Design load of cable K=2.5KN
			Thickness of black sheathing mm t	Dia. of cable mm D	Unit weight of cable kg/m	Thickness of black sheathing mm t1	Thickness of color sheathing mm t2	Total thickness of sheathing mm	Dia. of cable mm D	Unit weight of cable kg/m		
37W7	14.24	11.2	5	59	12.5	4	3	7	63	13.0	2378	950
55W7	21.17	16.6	5	68	17.9	4	3	7	72	18.3	3535	1414
61W7	23.48	18.4	5	73	20.0	4	3	7	77	20.5	3920	1568
73W7	28.09	22.1	5	78	23.7	4	3	7	82	24.2	4692	1877
85W7	32.71	25.7	6	83	27.5	5	3	8	87	28.0	5463	2185
91W7	35.02	27.5	6	89	29.8	5	3	8	93	30.4	5848	2339
109W7	41.95	32.9	6	95	35.1	5	3	8	97	35.7	7005	2802
121W7	46.57	36.6	7	99	39.1	6	3	9	103	39.7	7777	3111
127W7	48.88	38.4	7	101	41.6	6	3	9	105	42.2	8162	3265
139W7	53.49	42.0	7	106	45.1	6	3	9	110	45.7	8993	3573
151W7	58.11	45.6	7	108	48.5	6	3	9	112	49.2	9705	3882
163W7	62.73	49.2	8	115	52.5	7	3	10	119	53.2	10476	4190
187W7	71.97	56.5	8	121	60.0	7	3	10	125	60.8	12018	4807
199W7	76.58	60.1	8	124	63.7	7	3	10	128	64.5	12790	5116
211W7	81.20	63.7	9	131	67.8	7	3	10	133	68.6	13561	5424

Parameters for cable of structure PWS



Cross–section of type H

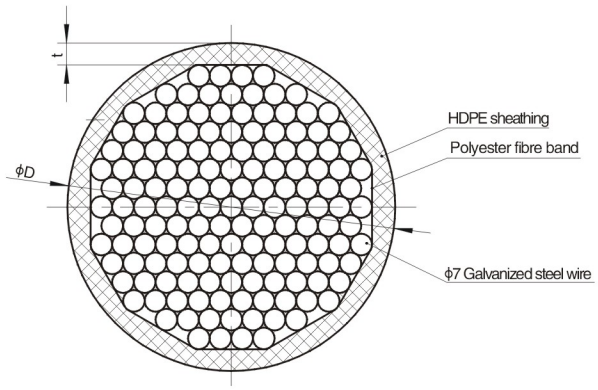


Cross–section of type C

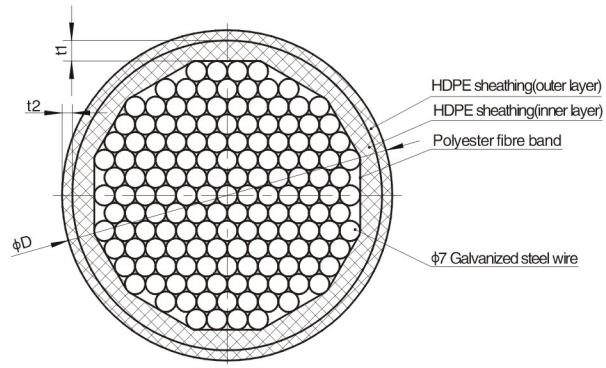
The parameter of cable(PWS with wire grade:1860MPa)

Type	Nominal cross–sectional area of steel wire cm^2	Unit weight of steel wire kg/m	Black single layer (Type H)			Black inner layer and color outer layer (Type C)					Nominal breaking load of cable P_b	Design load of cable K=2.5KN
			Thickness of black sheathing mm t	Dia. of cable mm D	Unit weight of cable kg/m	Thickness of black sheathing mm t1	Thickness of color sheathing mm t2	Total thickness of sheathing mm	Dia. of cable mm D	Unit weight of cable kg/m		
37W7	14.24	11.2	5	59	12.5	4	3	7	63	13.0	2650	1060
55W7	21.17	16.6	5	68	17.9	4	3	7	72	18.3	3938	1575
61W7	23.48	18.4	5	73	20.0	4	3	7	77	20.5	4367	1747
73W7	28.09	22.1	5	78	23.7	4	3	7	82	24.2	5225	2090
85W7	32.71	25.7	6	83	27.5	5	3	8	87	28.0	6084	2434
91W7	35.02	27.5	6	89	29.8	5	3	8	93	30.4	6514	2605
109W7	41.95	32.9	6	95	35.1	5	3	8	97	35.7	7803	3121
121W7	46.57	36.6	7	99	39.1	6	3	9	103	39.7	8662	3465
127W7	48.88	38.4	7	101	41.6	6	3	9	105	42.2	9092	3637
139W7	53.49	42.0	7	106	45.1	6	3	9	110	45.7	9940	3980
151W7	58.11	45.6	7	108	48.5	6	3	9	112	49.2	10808	4323
163W7	62.73	49.2	8	115	52.5	7	3	10	119	53.2	11668	4667
187W7	71.97	56.5	8	121	60.0	7	3	10	125	60.8	13386	5355
199W7	76.58	60.1	8	124	63.7	7	3	10	128	64.5	14244	5698
211W7	81.20	63.7	9	131	67.8	7	3	10	133	68.6	15103	6041

Parameters for cable of structure PWS



Cross–section of type H

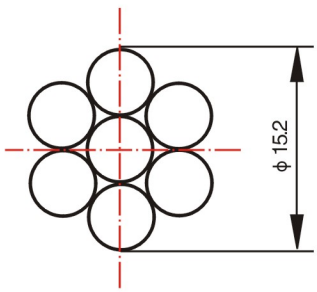


Cross–section of type C

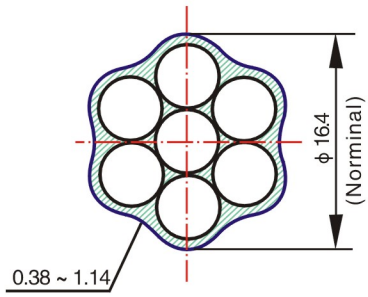
The parameter of cable(PWS with wire grade:1770MPa)

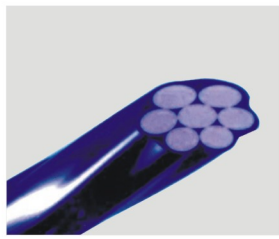
Type	Nominal cross–sectional area of steel wire cm^2	Unit weight of steel wire kg/m	Black single layer (Type H)			Black inner layer and color outer layer (Type C)					Nominal breaking load of cable P_b	Design load of cable K=2.5KN
			Thickness of black sheathing mm t	Dia. of cable mm D	Unit weight of cable kg/m	Thickness of black sheathing mm t1	Thickness of color sheathing mm t2	Total thickness of sheathing mm	Dia. of cable mm D	Unit weight of cable kg/m		
37W7	14.24	11.2	5	59	12.5	4	3	7	63	13.0	2520	1008
55W7	21.17	16.6	5	68	17.9	4	3	7	72	18.3	3750	1500
61W7	23.48	18.4	5	73	20.0	4	3	7	77	20.5	4160	1664
73W7	28.09	22.1	5	78	23.7	4	3	7	82	24.2	4970	1988
85W7	32.71	25.7	6	83	27.5	5	3	8	87	28.0	5790	2316
91W7	35.02	27.5	6	89	29.8	5	3	8	93	30.4	6200	2480
109W7	41.95	32.9	6	95	35.1	5	3	8	97	35.7	7420	2968
121W7	46.57	36.6	7	99	39.1	6	3	9	103	39.7	8240	3296
127W7	48.88	38.4	7	101	41.6	6	3	9	105	42.2	8650	3460
139W7	53.49	42.0	7	106	45.1	6	3	9	110	45.7	9470	3788
151W7	58.11	45.6	7	108	48.5	6	3	9	112	49.2	10290	4116
163W7	62.73	49.2	8	115	52.5	7	3	10	119	53.2	11100	4440
187W7	71.97	56.5	8	121	60.0	7	3	10	125	60.8	12740	5096
199W7	76.58	60.1	8	124	63.7	7	3	10	128	64.5	13560	5424
211W7	81.20	63.7	9	131	67.8	7	3	10	133	68.6	14370	5748

EPOXY FILLING COATED STRAND

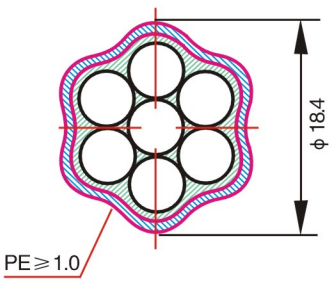


Bare strand

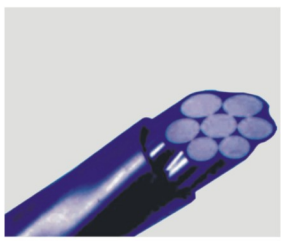


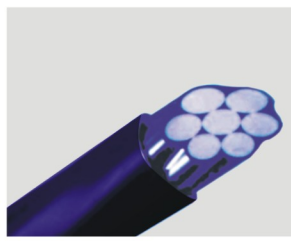


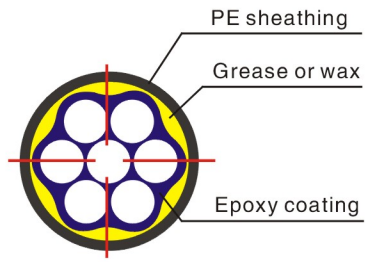
Epoxy filling coated strand



Epoxy filling coated strand with PE sheath （without grease）







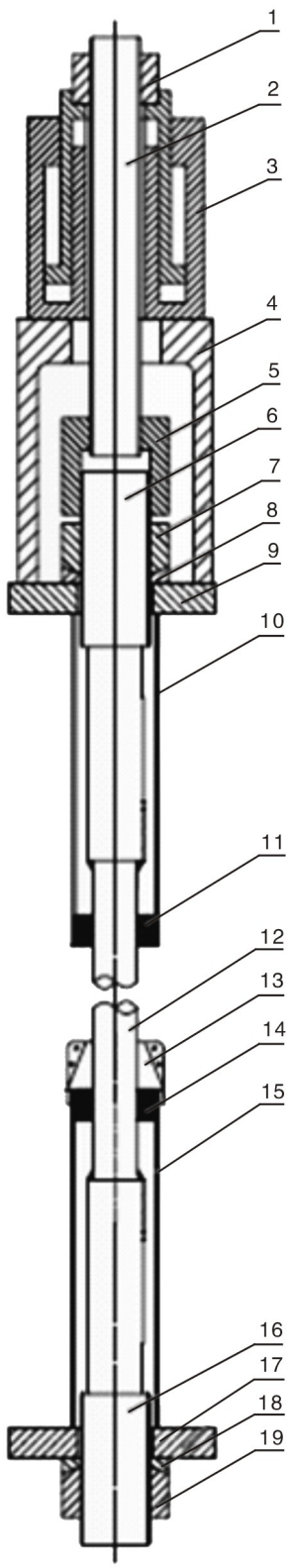
Epoxy filling coated strand with PE sheath （with grease）

Parameters of epoxy coated strand(ASTM A882/A882M–04a)

Unit:mm

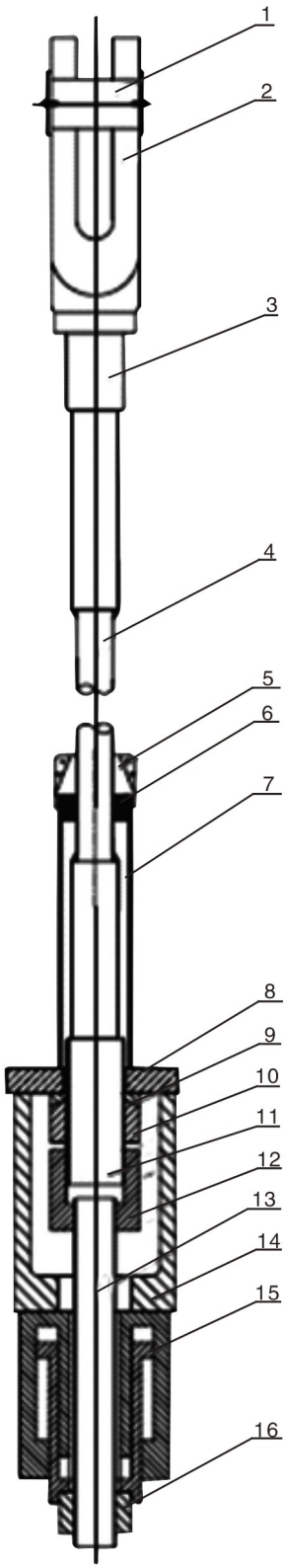
Index products	Nominal diameter (mm)	Overall diameter (mm)	Section area (mm^2)	Unit weight (Kg/m)	Coating thickness (mm)	Tensile strength (MPa) ⩾	Breaking load (KN) ⩾	Yield load (KN) ⩾	Elongation (%) ⩾	Relaxation (70% of specified minimum breaking strength at 1000h) (%) ⩽	Weight of grease (g/m)	Remarks
Epoxy filling coated strand	16.4	15.8–17.4	140	1.155	0.38 ~ 1.14	1860	260	234	3.5	6.0	/	/
Epoxy filling coated strand with PE sheath	18.4	18.0–20.5	140	1.225	PE⩾1.0	1860	260	234	3.5	6.0	/	Without grease
Epoxy filling coated strand with PE sheath	18.8	18.2–20.8	140	1.255	PE⩾1.0	1860	260	234	3.5	6.0	20 ~ 50	Filled with grease

SKETCH OF STRESSING AND ADJUSTING HANGING CABLE



1. Stressing Nut
2. Stressing Bar
3. Jack
4. Support Frame
5. Connecting Member
6. Upper Anchorage (Anchoring Socket)
7. Spherical Ring Nut
8. Spherical Bearing
9. Bearing Plate
10. Arch Rib Duct
11. Damper
12. Cable Body
13. Waterproof transition cone
14. Damper
15. Girder Duct
16. Lower Anchorage (Anchoring Socket)
17. Bearing Plate
18. Spherical Bearing
19. Spherical Ring Nut

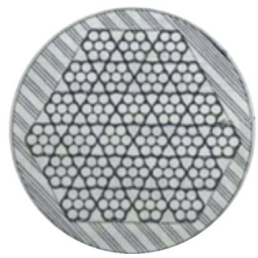
SKETCH OF STRESSING AND ADJUSTING HANGING CABLE



1. Dowel
2. Fork
3. Upper Anchorage
4. Cable
5. Waterproof transition cone
6. Damper
7. Girder Duct
8. Bearing Plate
9. Spherical Bearing
10. Spherical Ring Nut
11. Lower Anchorage
12. Connecting Member
13. Stressing Bar
14. Support Frame
15. Jack
16. Stressing Nut

TIED CABLE SYSTEM

Tied cable Hanging cable



Cable Type MSS–Multi cable
(Twisted strand bundle with PE sheathing)

NOTATION OF TYPE FOR TIED CABLE SYSTEM

Diameter of strand

Cable type:S–strand(bare strand/galvanized strand/epoxy strand)

Quantity of strand:7~37 or more

Type of anchorage for Tied Cable System: TSA,TSB,TSC,TSD,TSE

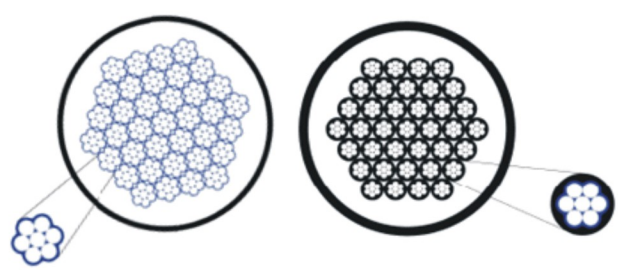
TSC 19 S 15.2

Diameter of strand is 15.2mm

Strand:PC Strand

The quantity of strand is 19 pieces

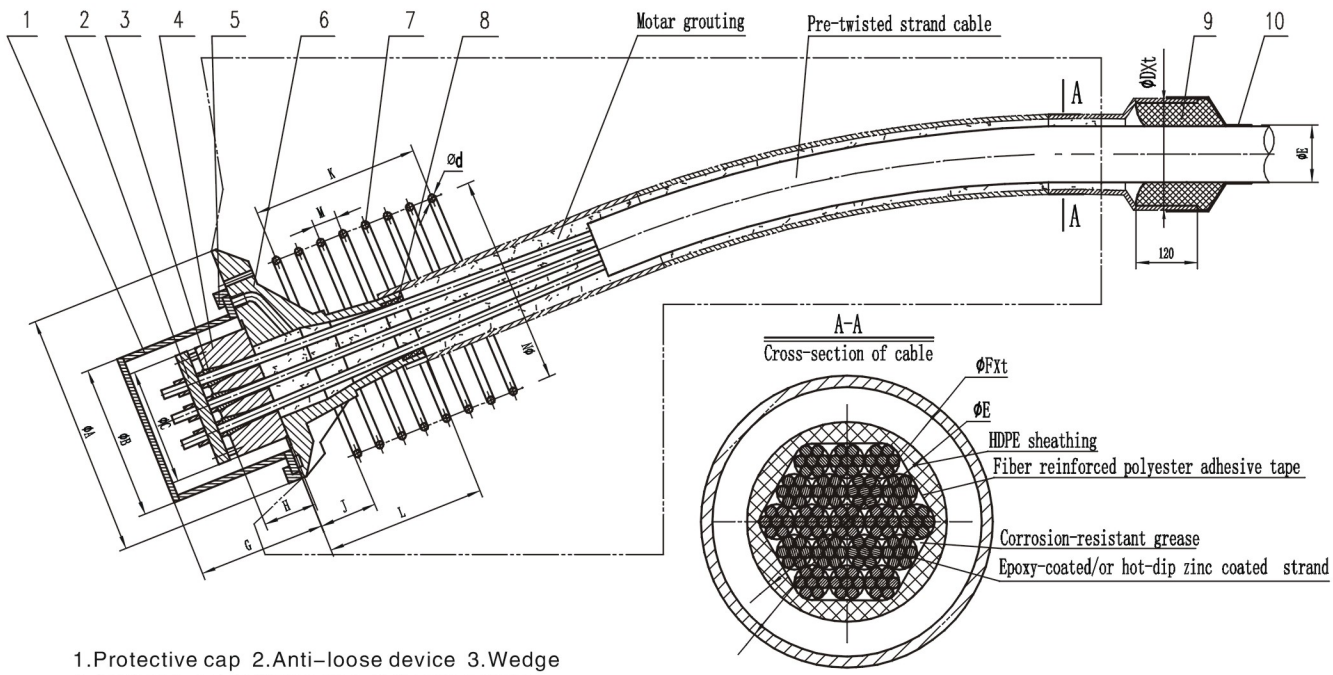
Anchor type TSC



Cable Type PSP–Parallel
(Individual strand + HDPE pipe)

HDPE pipe for tied cable system (for cable type PSP)

TIED CABLE SYSTEM:ANCHORAGE TYPE TSA



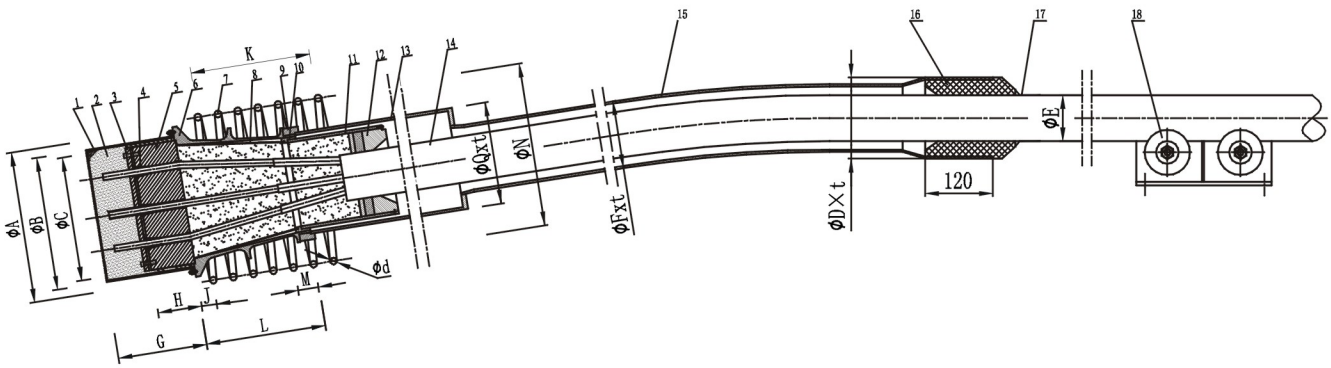
1.Protective cap 2.Anti-loose device 3.Wedge
4.Anchor head 5.Fixing ring 6.Bearing plate
7.Spiral reinforcement 8.Spacing socket 9.Damper
10.Thermal shrinkable sleeve

Dimensions of type TSA

Type	No. of strand	Bearing plate		Protective cap		Anchor head		Spiral reinforcement					Pre-embedded pipe			Cable body
		ΦA	L	ΦB	G	ΦC	H	J	M	K	ΦN	Φd	ΦD	ΦF	t	ΦE
TSA7S15.2	7	210	180	180	225	140	65	50	50	200	220	12	130	105	5	65
TSA9S15.2	9	220	220	180	225	156	65	50	50	200	220	12	140	115	5	84
TSA12S15.2	12	245	280	190	225	165	70	60	60	300	245	14	155	125	5	86
TSA15S15.2	15	270	310	220	225	195	80	60	60	300	270	14	168	140	6	102
TSA16S15.2	16	270	310	220	250	195	80	60	60	300	270	14	168	140	6	102
TSA18S15.2	18	300	320	230	250	205	90	60	60	300	300	16	180	150	6	104
TSA19S15.2	19	300	320	230	250	205	90	60	60	300	300	16	180	150	6	104
TSA22S15.2	22	330	340	250	250	224	100	60	70	350	330	16	180	152	6	114
TSA27S15.2	27	350	360	270	270	244	105	60	70	420	350	16	200	160	6	122
TSA31S15.2	31	385	380	276	280	260	110	60	70	420	390	18	210	170	7	127

Note: 1. All dimensions are in mm;
2. Can be modified as per project requirements

TIED CABLE SYSTEM:ANCHORAGE TYPE TSB



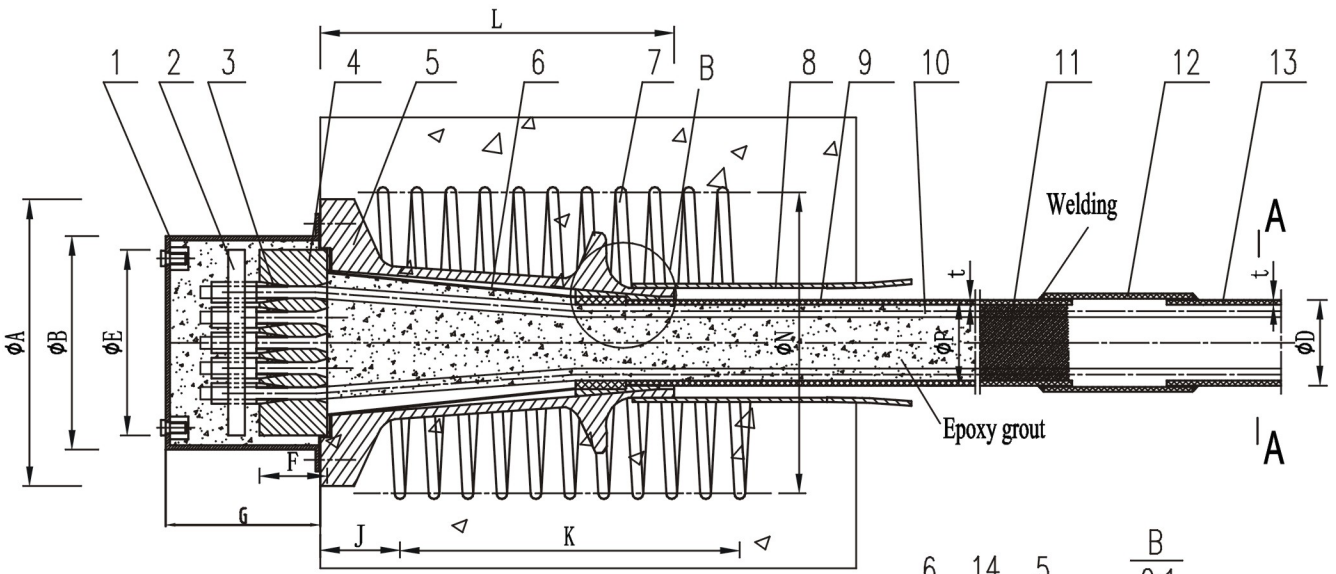
1. Protective cap
2. Anti-corrosion material (grease/cement grout/epoxy grout)
3. Anti-loose device
4. Wedge
5. Anchor head
6. Bearing plate
7. Spiral reinforcement
8. Trumpet sleeve
9. Joint ring
10. Supporting plate
11. Sealing socket
12. Sealing fitting
13. Strainght Pre-embedded pipe
14. Tied tendon(type ZHS3/ZHS4/EFS3/EFS4)
15. Bending pre-embedded pipe
16. Damper
17. Heat shrinkable sleeve
18. Suppprting device

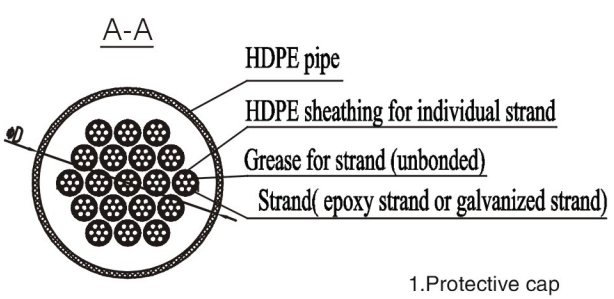
Dimensions of type TSB

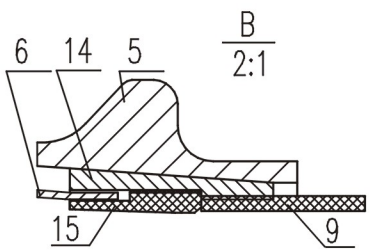
Type	No. of strand	Bearing plate		Protective cap		Anchor head		Spiral reinforcement					Pre-embedded pipe				Cable body
		ΦA	L	ΦB	G	ΦC	H	J	M	K	ΦN	Φd	ΦQ	ΦD	ΦF	t	ΦE
TSB7S15.2	7	210	180	180	225	140	65	50	50	200	220	12	150	130	105	5	65
TSB9S15.2	9	220	220	180	225	156	65	50	50	200	220	12	160	140	115	5	84
TSB12S15.2	12	245	280	190	225	165	70	60	60	300	245	14	180	155	125	5	86
TSB15S15.2	15	270	310	220	225	195	80	60	60	300	270	14	180	168	140	6	102
TSB16S15.2	16	270	310	220	250	195	80	60	60	300	270	14	180	168	140	6	102
TSB18S15.2	18	300	320	230	250	205	90	60	60	300	300	16	200	180	150	6	104
TSB19S15.2	19	300	320	230	250	205	90	60	60	300	300	16	200	180	150	6	104
TSB22S15.2	22	330	340	250	250	224	100	60	70	350	330	16	220	180	152	6	114
TSB27S15.2	27	350	360	270	270	244	105	60	70	420	350	16	240	200	160	6	122
TSB31S15.2	31	385	380	276	280	260	110	60	70	420	390	18	270	210	170	7	127

Note: 1. All dimensions are in mm;
2. Can be modified as per project requirements

TIED CABLE SYSTEM:ANCHORAGE TYPE TSC







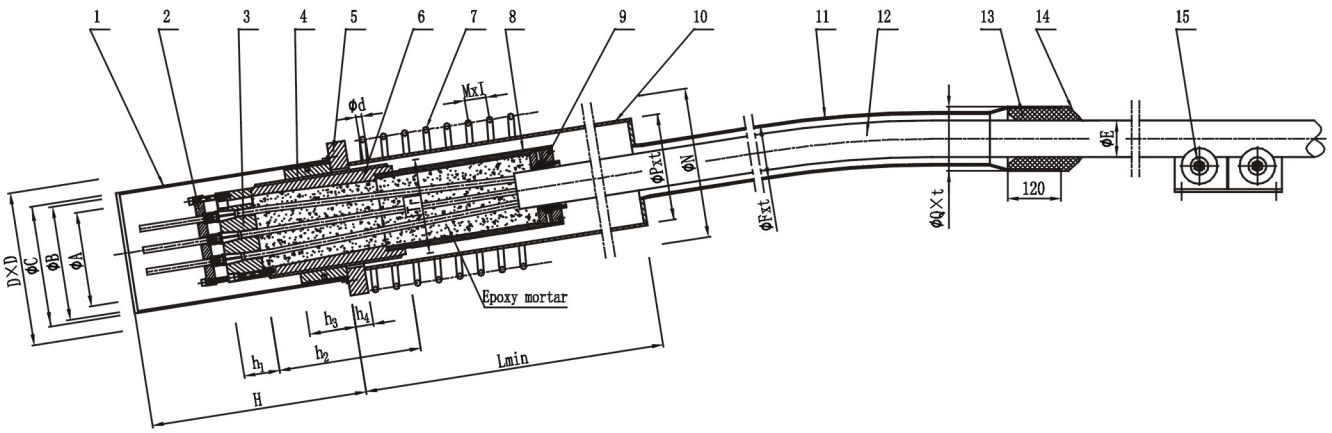
1.Protective cap
2.Anti–loose device
3.Wedge
4.Anchor head
5.Bearing plate
6.Trumpet sleeve
7.Spiral reinforcement
8.Pre–embedded pipe
9.Transit pipe(HDPE)
10.Cable tendon(strsnd)
11.Sealing block
12.Connecting pipe(HDPE)
13.HDPE pipe
14.Connecting ring
15.Fixng ring

Dimensions of type TSC

Type	No. of strand	Bearing plate		Protective cap		Anchor head		Spiral reinforcement			HDPE pipe (O.D.)		
		ΦA	L	ΦB	G	ΦE	F	J	K	ΦN	ΦP	ΦD	t
TSC9S15.2	9	220	220	180	225	156	65	50	200	220	120	120	5
TSC12S15.2	12	245	280	190	225	165	70	60	300	245	140	140	5
TSC15S15.2	15	270	310	220	225	195	80	60	300	270	160	150	6
TSC16S15.2	16	270	310	220	250	195	80	60	300	270	160	150	6
TSC18S15.2	18	300	320	230	250	205	90	60	300	300	180	160	6
TSC19S15.2	19	300	320	230	250	205	90	60	300	300	180	160	6
TSC22S15.2	22	330	340	250	250	224	100	60	350	330	200	180	7
TSC27S15.2	27	350	360	270	270	244	105	60	420	350	210	180	7
TSC31S15.2	31	385	380	276	280	260	110	60	420	390	240	200	8

Note: 1. All dimensions are in mm;
2. Can be modified as per project requirements

TIED CABLE SYSTEM:ANCHORAGE TYPE TSD



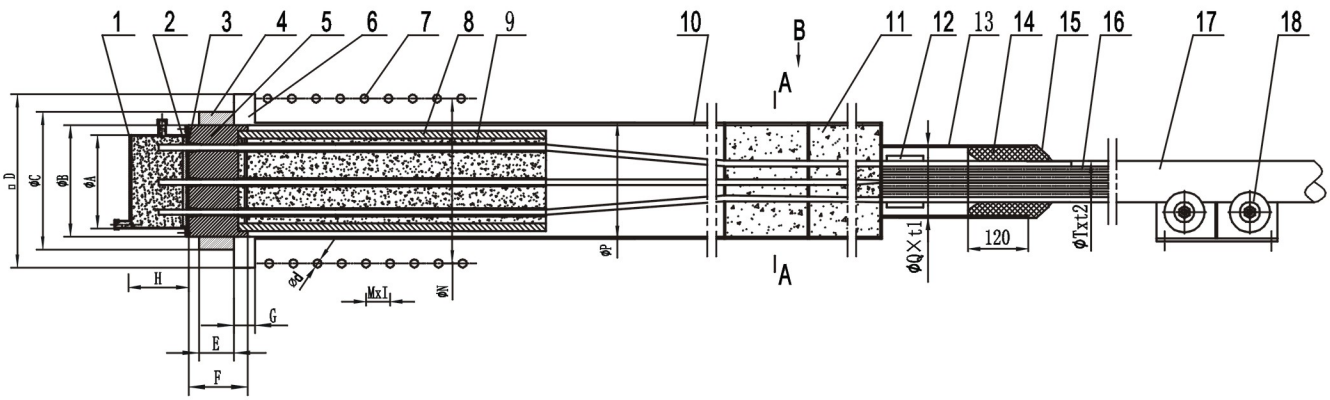
1.Protective sleeve
2.Anti-loose device
3.Anchor head with wedge
4.Nut
5.Bearing plate
6.Supporting socket
7.Spiral reinforcement
8.Sealing socket
9.Sealing device
10.Straight pre-embedded pipe
11.Bending pre-embedded pipe
12.Cable body
13.Damper
14.Thermal shrinkable sleeve
15.Supporting device

Dimensions of type TSD

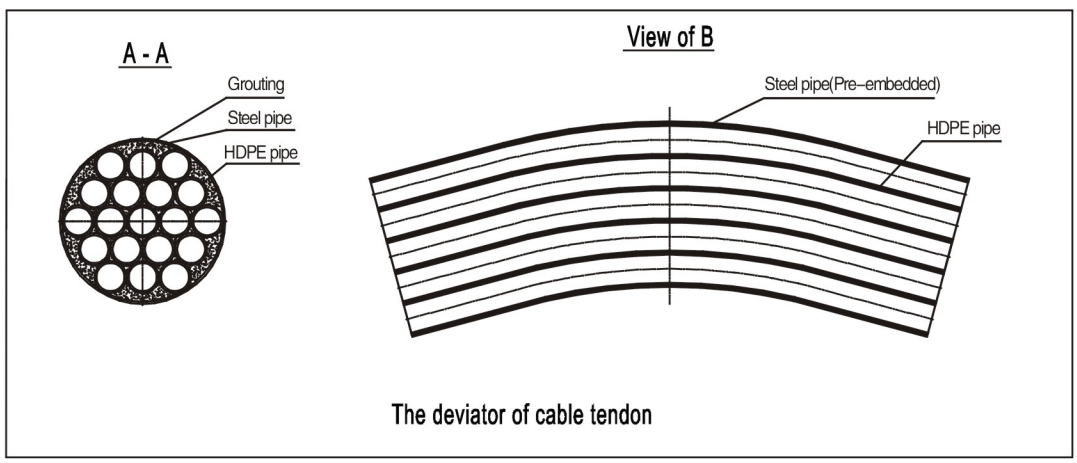
Type	No. of strand	Anchor head		Supporting socket		Nut		Bearing plate		Protective sleeve		Spiral reinforcement				Pre-embedded pipe				Cable body
		ΦA	h_1	Tr	h_2	ΦB	h_3	D	h_4	ΦC	H	l	M	Φd	ΦN	ΦP	ΦQ	ΦF	t	ΦE
TSD9S15.2	9	170	70	180	250	220	80	300	40	240	380	4	50	12	220	220	140	115	5	84
TSD12S15.2	12	190	80	200	300	260	100	320	45	290	410	5	60	14	245	275	155	125	5	86
TSD15S15.2	15	195	80	215	300	270	115	350	50	300	410	5	60	14	270	290	168	140	6	102
TSD16S15.2	16	195	80	215	300	270	115	350	50	300	410	5	60	14	270	290	168	140	6	102
TSD18S15.2	18	225	90	240	350	300	120	380	55	330	430	6	60	16	300	300	180	150	6	104
TSD19S15.2	19	225	90	240	350	300	120	380	55	330	430	6	60	16	300	300	180	150	6	104
TSD22S15.2	22	240	100	255	350	320	130	400	60	350	430	6	60	16	330	325	180	152	6	114
TSD27S15.2	27	270	110	295	400	360	130	420	60	390	450	7	60	16	350	340	190	160	6	122
TSD31S15.2	31	270	120	295	400	360	150	440	60	390	450	7	60	18	390	370	195	170	7	127

Note: 1. All dimensions are in mm;
2. Can be modified as per project requirements

TIED CABLE SYSTEM:ANCHORAGE TYPE TSE



1.Protective cap 2.Anti–loose device 3.Wedge 4.Ring nut 5.Anchor head 6.Bearing plate 7.Spiral reinforcement
8.Sealing socket 9.Guide tube 10.Pre–embedded pipe 11.Deviator 12.Hoop 13.Extension socket 14.Damper
15.Thermal shrinkable sleeve 16.Cable tendon(Parallel strands) 17.HDPE Pipe 18.Supporting device



Dimensions of type TSE

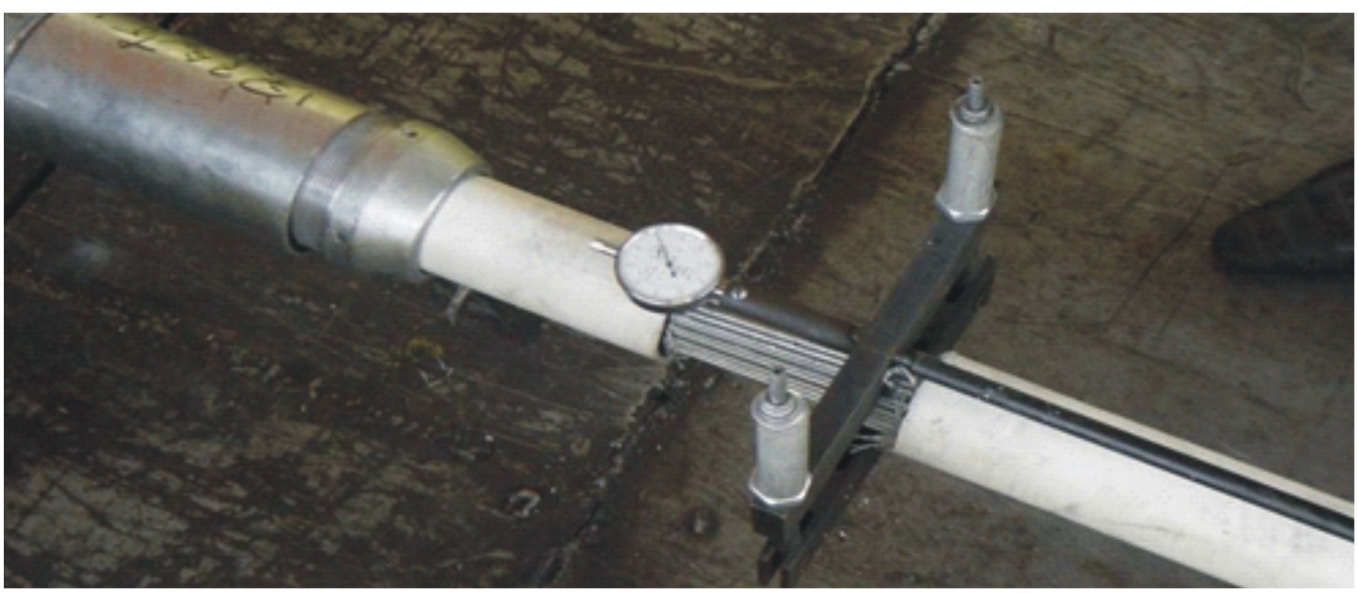
Type	No. of strand	Anchor head		Ring nut		Bearing plate		Protective cap		Spiral reinforcement				Pre–embedded pipe			HDPE pipe	
		ΦB	F	ΦC	E	D	G	ΦA	H	I	M	Φd	ΦN	ΦP	ΦQ	t1	ΦT	t2
TSE9S15.2	9	180	90	250	80	300	40	160	100	4	50	12	260	220	140	5	120	5
TSE12S15.2	12	190	100	260	90	320	45	170	100	5	60	14	280	235	155	5	140	5
TSE15S15.2	15	200	120	270	90	350	50	180	100	5	60	14	310	250	168	6	150	6
TSE16S15.2	16	200	120	270	90	350	50	180	100	5	60	14	310	250	168	6	150	6
TSE18S15.2	18	215	120	295	100	380	55	195	100	6	60	16	340	265	180	6	160	6
TSE19S15.2	19	215	120	295	100	380	55	195	100	6	60	16	340	265	180	6	160	6
TSE22S15.2	22	240	130	320	110	400	60	220	100	6	60	16	360	280	180	6	180	7
TSE27S15.2	27	245	130	325	120	420	60	225	120	7	60	16	360	280	190	6	180	7
TSE31S15.2	31	255	150	340	130	440	60	235	120	7	60	18	380	300	195	7	200	8

Note: 1. All dimensions are in mm;
2. Can be modified as per project requirements

MANUFACTURING FACILITY

MANUFACTURING FACILITY

TEST FACILITY FOR HANGING CABLE

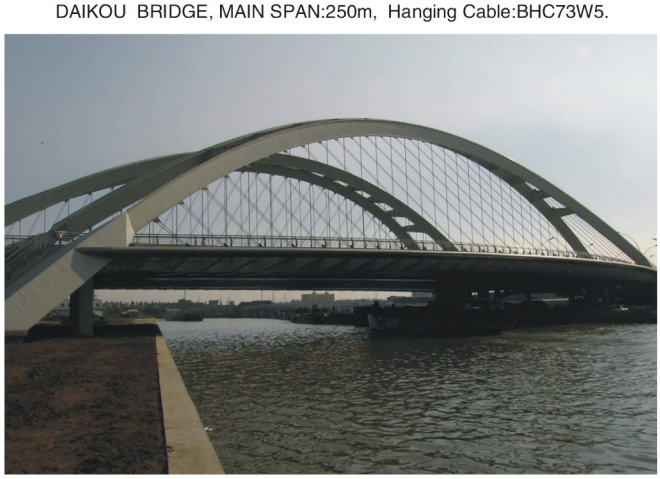


NO.4 BRIDGE OF SHYOKOU RIVER,Main Span:400m. Hanging cable:AHC61W7,Stay Cable:139W7,187W7

Bouka Bridge, Main Span:250m, Hanging Cable:CHC37W5,CHC73W5

DAIKOU BRIDGE, MAIN SPAN:250m, Hanging Cable:BHC73W5.

KITADAIGAI BRIDGE, Main Span:145m,
Hanging Cable:AHC61W7,AHC73W7,AHC85W7,AHC91W7,AHC109W7.



ETSUKAWA BRIDGE, Main Span:329.54m, Hanging Cable:AHC73W5.

LMK

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