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Member 2010/11



EHV Oil Filled
Cable & Accessories

taihan
CABLE & SOLUTION

Company Profile

Having led the establishment of the nation's power network for the half-century, TAIHAN has led the development of extra high voltage cables since the 1970s and been recognized for the world class technology in Oil Filled underground cable. We have continued to develop its technology to 275kV and 400kV Oil Filled cables through advancement of technology and facilities. In step with the ever increasing power consumption and the expansion of extra high voltage cable demand, we reinforced the production capacity by equipping the 125 meters high VCV Tower, to produce high quality extra high voltage Oil Filled cable up to 500kV grade. Furthermore, we produce and supply quality accessories and joints materials for extra high voltage cables. From raw materials, production process, testing of products, to network design & installation, we have strictly controlled the quality of products and elevated ourselves to an extra high voltage cable specialist trusted by the world's major markets.

EHV Oil Filled
Cable & Accessories

Introduction of Oil Filled Cable

Through incessant research and development, the excellent functions of Oil Filled cable have been improved since 1900s. Among the many excellent characteristics, some typical ones can be listed as follows.

1 _ No void within insulation and stable electrically

The insulation oil, whose air bubbles and humidity are sufficiently removed by performing degassing treatment, is impregnated in insulating paper layer which is fully dried under high vacuum beforehand and kept under high degree of vacuum, and the cable is made accordingly. Since definitely positive pressure is always kept inside of the finished cable, there is absolutely no void in the cable insulation.

2 _ Operating potential gradient can be large

Since no deterioration takes place in voids in the insulation by ionization as in the case with the solid-type cable, the operating potential gradient can be large. Therefore, the insulation thickness can be selected as thinn.

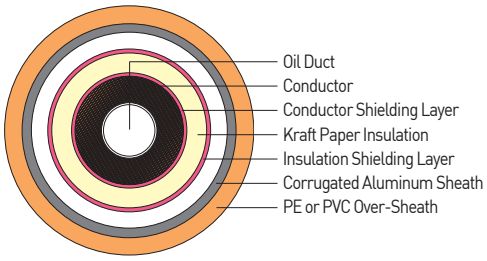
3 _ Expansion and contraction of insulation oil due to temperature change can be compensated by the oil tanks

Expansion and contraction of insulating oil, due to change of load under use or due to change of the external temperature can be fully compensated by the oil tank installed in a suitable position on the cable route. Therefore, there can be no void in the insulation.

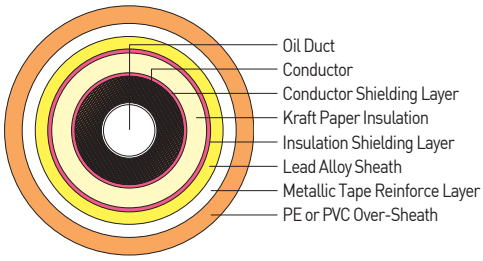
4 _ Cable self-monitoring

The inside of the cable is always kept at positive oil pressure so that no humidity intrudes from the outside in case damage occurs in the cable sheath, or in the joint box. Further, in case of the insulating oil leaks, the trouble is detected earlier as the alarm device actuates and it is possible to repair before occurrence of full-scale trouble in the cable system.

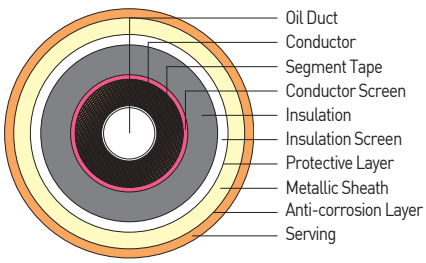
Structure of Oil Filled Cable



Corrugated Aluminum Sheath Cable



Lead Alloy Sheath Cable



PPLP Cable

Construction Date

Copper Conductor 66kV ~ 400kV

Single Core Cable

Voltage	Conductor		Approx. Dia.of Conductor Shield [mm]	Thick . of Insulation	Approx. Dia.of Insulation Shield [mm]	Corrugated AL Sheath Type Cu / Kraft (orPPLP) / CAS / PVC [PE]				Lead Sheath Type Cu / Kraft (orPPLP) / LEAD / PVC [PE]			
	Nominal Area [mm2]	Shape				Thick .of Metallic sheath	Thick . of Jacket	Overall Dia.	Approx . Weight [ton]	Thick .of Metallic sheath	Thick . of Jacket	Overall Dia.	Approx . Weight [ton]
66	1000	H.C	43.12	7.1	58.32	2.0	4.5	80.84	14.7	-	-	-	-
110	300	H.C	27.02	10.0	48.16	-	-	-	-	2.7	4.0	64.26	11.5
110	400	H.C	33.7	10.2	55.02	-	-	-	-	2.8	3.7	70.76	15.0
132	630	H.C	36.02	10.35	57.7	2.7	4.5	84.4	12.0	-	-	-	-
132	900	H.C	41.61	10.35	63.3	2.5	4.5	88.7	14.9	-	-	-	-
150	800	H.C	39.62	14.22	69.28	-	-	-	-	3.55	4.2	98.12	25.3
154	600	H.C	36.12	11.88	61.06	1.9	6.0	78.3	12.6	-	-	-	-
154	1200	S.H	47.32	12.83	74.26	2.2	4.5	89.1	19.5	-	-	-	-
154	2000	S.H	59.02	12.83	86.0	2.4	4.5	113.1	29.0	-	-	-	-
161	1500	S.H	52.4	13.5	80.6	2.3	4.5	107.1	23.2	-	-	-	-
161	2000	S.H	59.42	13.5	87.52	2.41	4.5	114.46	28.4	-	-	-	-
230	630	H.C	36.96	20.3	78.64	2.7	5.5	109.68	16.8	-	-	-	-
230	1000	S.H	44.76	20.3	86.44	2.7	5.5	117.44	14.9	-	-	-	-
230	2000	S.H	59.06	20.3	100.74	2.7	5.5	131.84	32.8	-	-	-	-
230	2500	S.H	65.86	20.3	107.54	2.8	5.5	139.19	40.3	-	-	-	-
275	500	H.C	33.96	19.9	74.72	2.7	6	105.73	16.5	-	-	-	-
275	1000	S.H	45.06	19.8	85.82	-	-	-	-	3.8	5.0	107.04	31.5
275	1600	S.H	54.06	19.8	94.82	-	-	-	-	4.3	5.0	116.98	41.5
275	2000	S.H	59.26	19.8	99.84	2.7	8	135.25	34.2	-	-	-	-
275	2500	S.H	65.76	19.8	106.92	2.8	4	156.7	40.7	-	-	-	-
345	600	H.C	36.36	22.9	82.96	2.3	6	112.46	18.6	-	-	-	-
345	1200	S.H	48.56	22.9	95.06	2.5	6	125.8	26.6	-	-	-	-
345	2000	S.H	59.86	22.56	106.36	2.7	6	137.7	35.9	-	-	-	-
400	2500	S.H	66.56	25.0	118.52	3.0	5.5	151.5	42.5	-	-	-	-
400	2500	S.H	66.56	25.0	118.52	3.0	6	152.7	44.4	-	-	-	-

※ C.C : Circular Compacted H.C : Hollow Compacted S.H : Segmental Hollow PPLP Cable

Three Core Cable

Voltage	Conductor		Approx. Dia.of Conductor Shield [mm]	Thick . of Insulation	Approx. Dia.of Insulation Shield [mm]	Corrugated AL Sheath Type Cu / Kraft (orPPLP) / CAS / PVC [PE]				Lead Sheath Type Cu / Kraft (orPPLP) / LEAD / PVC [PE]			
	Nominal Area [mm2]	Shape				Thick .of Metallic sheath	Thick . of Jacket	Overall Dia.	Approx . Weight [ton]	Thick .of Metallic sheath	Thick . of Jacket	Overall Dia.	Approx . Weight [ton]
69	305	H.C	21.52	6.86	37.18	2.3	3.5	105.3	17.5	-	-	-	-
132	340	C.C	22.72	10.6	45.12	2.6	4.0	125.9	22.8	-	-	-	-
132	400	C.C	24.62	10.6	46.82	2.7	4.0	130.3	25.1	-	-	-	-
150	240	C.C	25.12	14.22	54.78	-	-	-	-	3.55	4.2	80.62	16.0
154	200	H.C	17.52	12.4	43.46	2.5	4.5	112.4	17.4	-	-	-	-
154	250	H.C	19.52	12.0	44.46	2.6	4.5	124.6	19.3	-	-	-	-
154	325	H.C	22.22	12.0	47.16	2.7	4.5	132.0	22.6	-	-	-	-

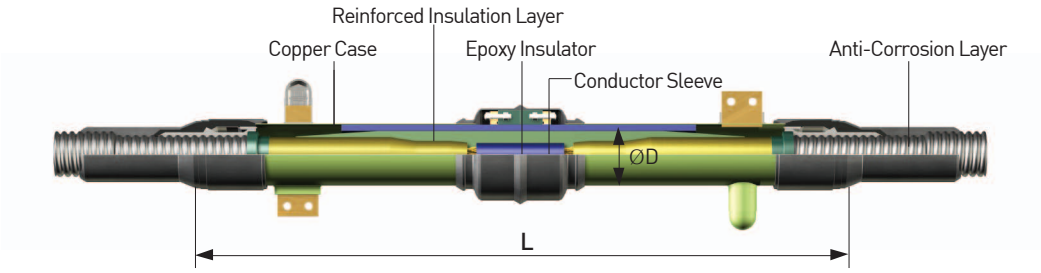
※ C.C : Circular Compacted H.C : Hollow Compacted

Accessories
Joint & Termination

Straight Through Joint (NJ, IJ)

Straight through Joint is used for jointing cables electrically and hydraulically. This joint has same quality as or better than cable itself. Insulated joint is almost same as straight through joint and the difference between them is to put an insulator flange at the center of copper casing. This box is used for jointing cable and at the same time for insulating metal sheath from the other metal sheath to reduce sheath voltage to safety level.

IJ

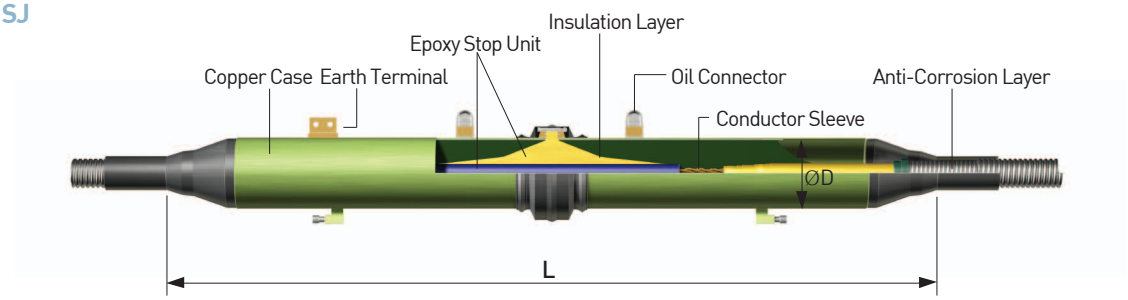


Rated Voltage (kV)	Nominal Area of Conductor (mm2)	Dimension (mm)	
		L	D
110 - 161	Less than 1000	1300	130
	1200 ~ 2500	1530	180
220 - 287	Less than 2500	2000	200
330 - 400	Less than 2500	2400	240

Stop Joint (SJ, SIJ)

This joint is used for dividing the oil feeding section in case that route lenght is too long or oil pressure change is too excessive at static or transient operation. This joint is also used for connecting the cables electrically and at the same time, separating the oil feeding section of both cables. Insulated stop joint has an epoxy insulator to divide the metal sheath section.

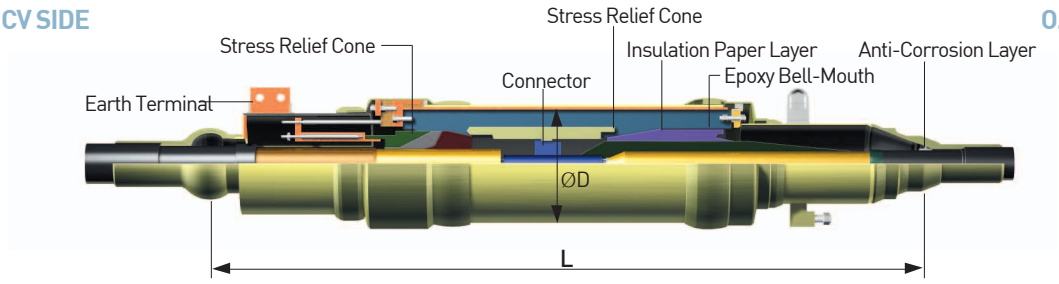
SJ



Rated Voltage (kV)	Nominal Area of Conductor (mm2)	Dimension (mm)	
		L	D
110 - 161	Less than 2500	2900	250
220 - 287	Less than 2500	3400	350
330 - 400	Less than 2500	4100	350

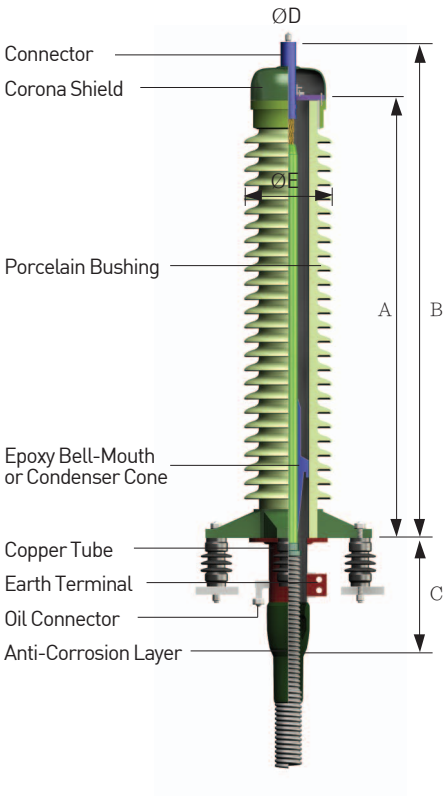
Transition Joint (TNJ, TIJ)

This joint is used for connecting the oil filled cable and XLPE cable. On the side of XLPE cable, we have applied prefabricated type joint to secure the confidence. The stress cone is made of EPDM and in order to maintain the surface pressure between stress cone and XLPE or epoxy unit, we adopt springs. On the other side, we have used epoxy bell mouth to control the electric field.



Rated Voltage (kV)	Dimension (mm)	
	L	D
110 - 161	1750	320
220 - 287	1955	320

Outdoor Sealing End

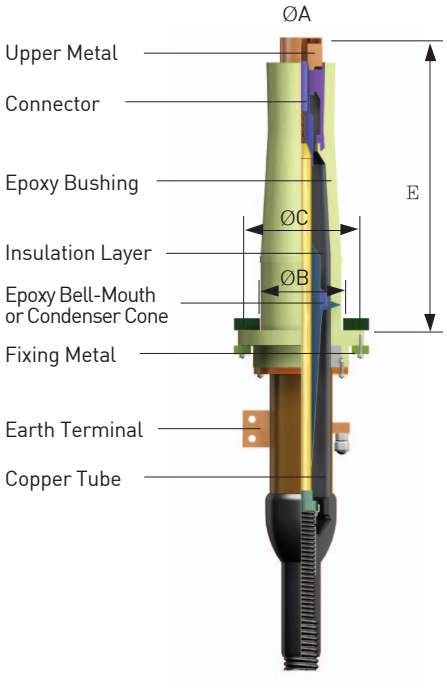


Sealing end is used for sending and taking electric power into or out of underground cable. This sealing end has stress relief cone formed of wide width paper and above it, there is a condenser cone formed of paper and metal foil or a bellmouth made of epoxy resin to control the electric field. Connector is fastened to the cable condutor by compression method and flexible terminal lug is placed between the conductor and the lead wire to avoid applying unnecessary external force against the sealing end.

Rated Voltage (kV)	Dimension (mm)				
	A	B	C	D	E
110	1480	1725	435	360	315
161	1830	2075	435	360	470
220	2940	3290	500	480	470
287	3350	3700	500	480	470
400	3975	4250	600	550	510

Accessories
Joint & Termination

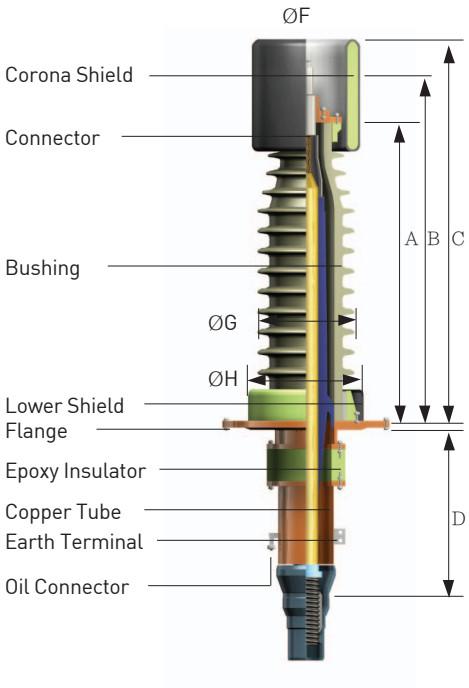
SF6 Gas Immersed Sealing End



This sealing end is used for terminating the underground cable for the SF6 gas switchaear. Epoxy bushings are needed to insulate between the earth potential parts and the high voltage parts. The inner construction of this sealing end is similar to that of an indoor and outdoor sealing end except that this sealing end is completely enclosed and immersed in gas to prevent dust from collecting and to secure the electric capability, etc.

Rated Voltage (kV)	Dimension (mm)				
	A	B	C	D	E
110 - 161	112	220	298	320	757
220 - 287	202	4801	559	582	960
330 - 400	252	540	617	640	1400

Oil Immersed Sealing End



The construction of this sealing end is similar to that of an indoor and outdoor sealing end except that the sealing end is completely enclosed and immersed in oil to prevent dust from collecting, and the size of Oil Immersed Sealing End is much smaller than the one of Outdoor Sealing End. This type of sealing end is for connecting underground cable to transformer.

Rated Voltage (kV)	Dimension (mm)							
	A	B	C	D	E	F	G	H
110 - 161	990	1170	1260	585	375	340	320	380
220 - 362	1350	1550	1700	900	420	390	420	550

Certificates

The outstanding quality of TAIHAN EHV Oil Filled cables are verified by internationally accredited certification institutes.







Type Test List of Extra High Voltage Oil Filled Cable & Accessories

No.	Description of Cable & Accessories	Institute	Date	Specification	Results of Test	BIL (kV)
1	154kV Oil Filled Cable 1C x 600sqmm (CU)	KERI	Aug-78	KEPCO	Good	750
2	154kV Oil Filled Cable 1C x 1200sqmm (CU)	KERI	Jul-97	KEPCO	Good	750
3	154kV Oil Filled Cable 1C x 2000sqmm (CU)	KERI	Oct-83	KEPCO	Good	750
4	154kV Oil Filled Cable 3C x 250sqmm (CU)	KERI	Dec-84	POSCO	Good	750
5	154kV Oil Filled Cable 3C x 200sqmm (CU)	KERI	Dec-84	POSCO	Good	750
6	150kV Oil Filled Cable 1C x 1200sqmm (CU)	KEMA	May-85	IEC 141-1	Good	750
7	150kV Oil Filled Cable 1C x 800sqmm (CU)	KEMA	May-85	IEC 141-1	Good	750
8	132kV Oil Filled Cable 1C x 800sqmm (CU)	KENNEDY & DONKIN	Jul-85	IEC 141-1	Good	650
9	154kV Oil Filled Cable 3C x 325sqmm (CU)	KERI	Nov-85	POSCO	Good	750
10	154kV Oil Filled Cable 1C x 600sqmm (CU)	KERI	Aug-86	KEPCO	Good	750
11	154kV Oil Filled Cable 1C x 1200sqmm (CU)	KERI	Aug-86	KEPCO	Good	750
12	154kV Oil Filled Cable 1C x 2000sqmm (CU)	KERI	Aug-86	KEPCO	Good	750
13	132kV Oil Filled Cable 1C x 960sqmm (CU)	CROWN AGENTS	Nov-87	IEC 141-1	Good	650
14	150kV Oil Filled Cable 1C x 600sqmm (CU)	NEW-JEC	Dec-88	IEC 141-1	Good	750
15	154kV Oil Filled Cable 1C x 2000sqmm (CU)	KERI	Jan-89	KEPCO	Good	750
16	150kV Oil Filled Cable 1C x 800sqmm (CU)	NEW-JEC	May-89	IEC 141-1	Good	750
17	154kV Oil Filled Cable 1C x 2000sqmm (CU)	KERI	May-90	KEPCO	Good	750
18	345kV Oil Filled Cable 1C x 2000sqmm (CU)	KERI	Oct-89	KEPCO	Good	1300
19	345kV Oil Filled Cable 1C x 1600sqmm (CU)	KERI	May-90	KEPCO	Good	1300
20	345kV Oil Filled Cable 1C x 1400sqmm (CU)	KERI	Oct-91	KEPCO	Good	1300
21	275kV Oil Filled Cable 1C x 2000sqmm (CU)	KEMA	Sep-91	IEC 141-1	Good	1050
22	345kV Oil Filled Cable 1C x 1200sqmm (CU)	KERI	Sep-92	KEPCO	Good	1300
23	345kV Oil Filled Cable 1C x 2000sqmm (CU)	KERI	Aug-92	KEPCO	Good	1300
24	150kV Oil Filled Cable 1C x 240sqmm (CU)	PLN	Dec-93	IEC 141-1	Good	750
25	345kV Oil Filled Cable 1C x 2000sqmm (CU)	KERI	Aug-92	KEPCO	Good	1300
26	275kV Oil Filled Cable 1C x 2000sqmm (CU)	KEMA	Dec-99	IEC 141-1	Good	1050
27	230kV Oil Filled Cable 1C x 2000sqmm (CU)	SGS/SPPG	Mar-05	IEC 60141-1	Good	1050
28	400kV PPLP Oil Filled Cable 1C x 2500sqmm (CU)	TAIHAN	Dec-05	IEC 60141-1	Good	1550
29	230kV Oil Filled Cable 1C x 2500sqmm (CU)	SGS/SPPG	Feb-06	IEC 60141-1	Good	1050

* KERI : Korea Electrotechnology Research Institute
* KEPCO : Korea Electricity Power Company (The National Power Utility in Korea)
* POSCO : Pohang Steel Corporation



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