

HV CABLE ACCESSORIES for 72~245kV XLPE & OF CABLE

# HV CABLE ACCESSORIES

for 72~245kV XLPE & OF CABLE





# COMPANY PROFILE



## SAUDI TAIHAN, THE BEST CHOICE FOR A PERFECT CABLE SYSTEM.

### We carry the value of technology even to the smallest component.

“Saudi Taihan” is the first manufacturing company of high voltage cable accessories established in Saudi Arabia and the Gulf Cooperation Council (GCC) area. Saudi Taihan is a joint venture company established by and between Taihan Electric Wire Co., Ltd. (hereinafter referred to as ‘Taihan’), a global cable company based in Korea, and Mohammed Al-Ojaimi Group, a Saudi Arabian company. Following its establishment in February 2017, the corporation built a production factory in November 2017 in Riyadh, the capital of Saudi Arabia, and started manufacturing high voltage cable accessory products in earnest.

Its mother company Taihan signed a MOU with SEC (Saudi Electricity Company) / National Grid in order to strengthen their cooperative relationship in the field of electric power, and has endeavored to improve the electricity technology of Saudi Arabia. As a result, Taihan established Saudi Taihan to manufacture high-voltage cable accessories that require advanced technology.

“Saudi Taihan” is a highly competitive company as it has inherited Taihan’s world-leading technology in the electric power cable and solutions field. It was also awarded ISO 9001:2015 certification by the ISO certification body ‘Applus+ Velosi’ in September 2017.

Saudi Taihan will produce accessory products that are highly competitive in terms of quality and price and supply them directly to the market to promote the stable generation, transmission and distribution of electricity in Saudi Arabia. Furthermore, it aims to expand the market to the GCC countries and contribute to establishing a stable electricity network in the Middle East.



### Company Name

Taihan Electric Wire Co., Saudi (Saudi Taihan)

### Establishment

February 2017

### Business Areas

Production of HV/EHV Cable Accessories

### Products and Services

Production of HV/EHV Cable Accessories and Installation Services

### Stockholders

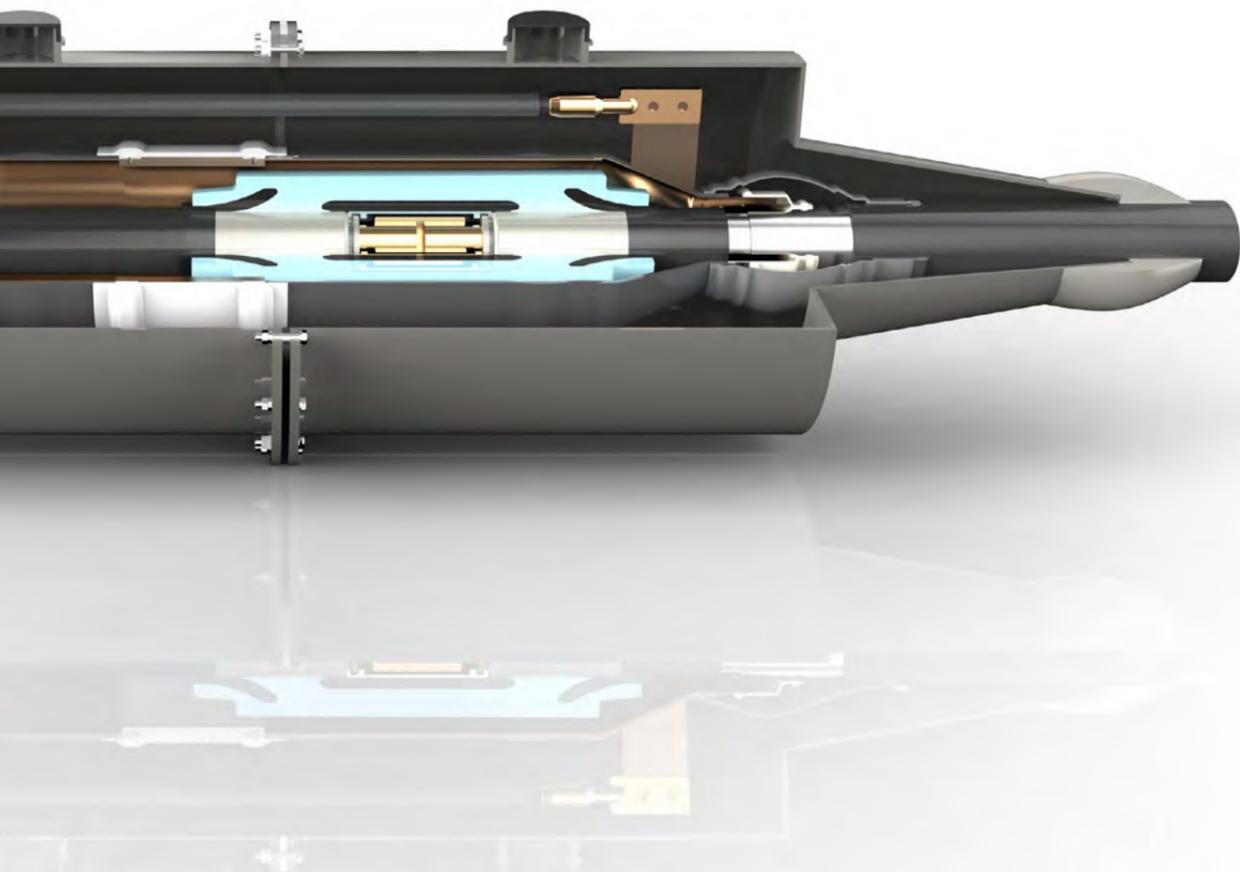
Taihan Electric Wire Co., Ltd.  
Mohammed Salem Al-Ojaimi Factory Co.

### Address

Al-Kharj Road, Exit 12, P.O. Box 31329, Riyadh 11497, KSA

\*Taihan Electric Wire Co., Ltd. was established in 1955 as Korea’s first comprehensive cable company. As a leader of the cable market, the company produces all kinds of cables and accessories including XLPE Cables (up to 500kV) and Oil Filled Cables (up to 345kV) and supplies them all over the world.





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## SHEAR BOLT CONNECTOR

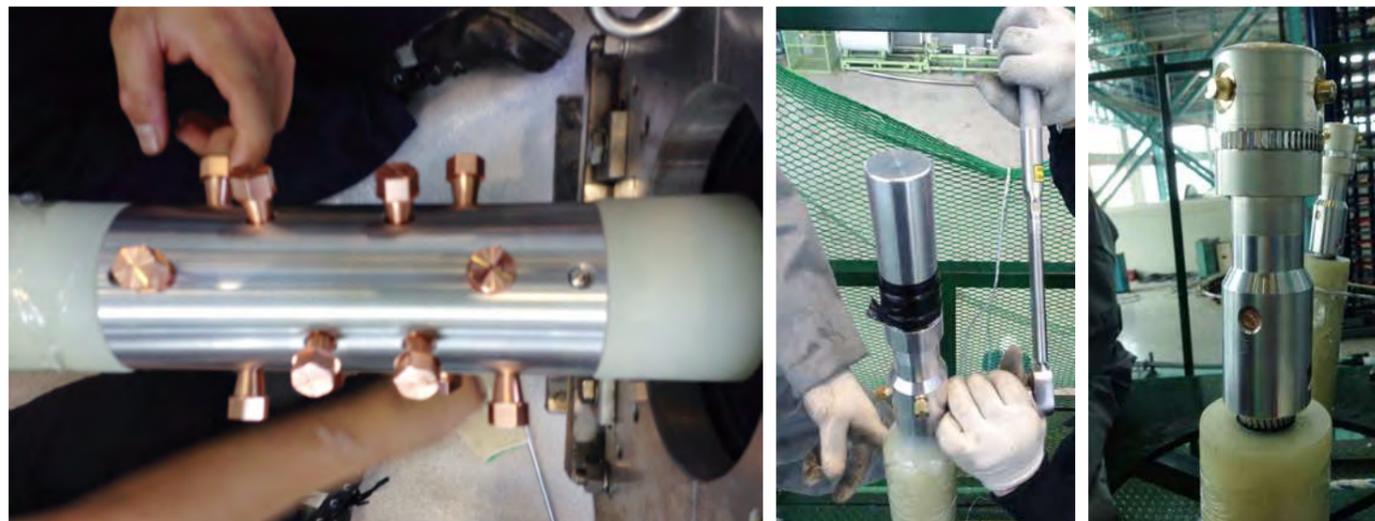
The crimping is the common solution to connect the cable conductor with the conductor sleeve of the cable accessories by compression. In addition to the compression method, the mechanical connector with shear bolts can also be used to connect between cable conductor and conductor sleeve.

Bolted connection gives the practical advantages which the conventional crimping method can not provide. For instance, special tools such as hexagonal dies, pressure pump and pressure holder are necessary to compress the conductor sleeve. However, no special tool is needed to connect the cable conductor and conductor sleeve in the screw type cable accessories. Fastening the shear bolts on the mechanical connector upto the breaking point is only necessary in the cable connection work. In addition, it takes less installation time due to the simple connection work compared with that of crimping procedure. It means the reduction of the installation cost. Moreover, the mechanical connector can be applied to copper and aluminum conductor. On the contrary, crimping method can be only applied to copper cable conductor.

### The Advantage of Screw Type over Crimping Type

1. Easy to proceed the cable connection work.
2. No special tool is needed for the connection procedure.
3. Less installation time and cost required.
4. Can be applied to the copper and aluminum cable conductor.

Saudi Taihan can supply the screw type cable accessories which utilizes the mechanical connector with shear bolts to meet the recent client's requirements.



## PRE-MOLDED JOINT

The main insulation of single piece pre-molded joint is molded silicone insulation with embedded semi-conductive electrode and two semi-conductive stress relief cones.

The **Pre-molded joint** is a kind of cable joint that keeps the insulation property and interface pressure just by self-elasticity of pre-molded rubber unit. Therefore, we adopt the silicone rubber as insulation and electrode materials because silicone rubber has several advantages in mechanical and electrical properties.

**One pre-molded rubber unit** is applicable to various cable sizes where the interface pressure is sufficient to maintain the electrical characteristics.

Several versions of joint designs are available which differ in terms of mechanical protective enclosure as listed below.

Protective Enclosure

Type designation C :  
Glass Fiber-reinforced Protection Box

Type designation X :  
Glass Fiber-reinforced Protection Box & Copper Case

Type designation H :  
Heat Shrinkable Sleeve

Type designation K :  
Heat Shrinkable Sleeve & Copper Case

By using our **special installation tools**, the installation of pre-molded joint can be carried out easily. The installation tools can be provided at the request of customer.

All types of pre-molded joint have high reliability because all main insulation components are carried out routine test in the factory in accordance with IEC standard.

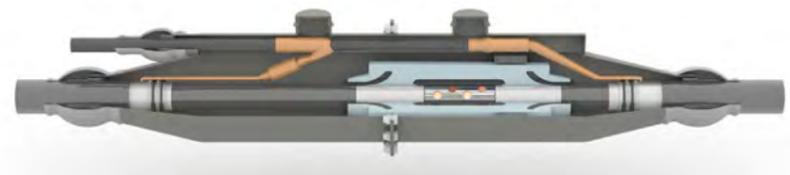


## PRE-MOLDED JOINT

### Type Designation C (Crimping Type)



### Type Designation CS (Screw Type)



Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840	60-69	325	SMI-72-C	200-2000
				SMN-72-C	
				SMI-72-CS	
				SMN-72-CS	
123	IEC 60840	110-115	550	SMI-123-C	200-2500
				SMN-123-C	
				SMI-123-CS	
				SMN-123-CS	
145	IEC 60840	132-138	650	SMI-145-C	200-2500
				SMN-145-C	
				SMI-145-CS	
				SMN-145-CS	
170	IEC 60840	150-161	750	SMI-170-C	200-2500
				SMN-170-C	
				SMI-170-CS	
				SMN-170-CS	
245	IEC 62067	220-230	1050	SMI-245-C	200-2500
				SMN-245-C	
				SMI-245-CS	
				SMN-245-CS	

※ Note : The joints shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## PRE-MOLDED JOINT

### Type Designation X (Crimping Type)



### Type Designation XS (Screw Type)



Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840	60-69	325	SMI-72-X	200-2000
				SMN-72-X	
				SMI-72-XS	
				SMN-72-XS	
123	IEC 60840	110-115	550	SMI-123-X	200-2500
				SMN-123-X	
				SMI-123-XS	
				SMN-123-XS	
145	IEC 60840	132-138	650	SMI-145-X	200-2500
				SMN-145-X	
				SMI-145-XS	
				SMN-145-XS	
170	IEC 60840	150-161	750	SMI-170-X	200-2500
				SMN-170-X	
				SMI-170-XS	
				SMN-170-XS	
245	IEC 62067	220-230	1050	SMI-245-X	200-2500
				SMN-245-X	
				SMI-245-XS	
				SMN-245-XS	

※ Note : The joints shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## PRE-MOLDED JOINT

### Type Designation H (Crimping Type)



### Type Designation HS (Screw Type)



Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840	60-69	325	SMI-72-H	200-2000
				SMN-72-H	
				SMI-72-HS	
				SMN-72-HS	
123	IEC 60840	110-115	550	SMI-123-H	200-2500
				SMN-123-H	
				SMI-123-HS	
				SMN-123-HS	
145	IEC 60840	132-138	650	SMI-145-H	200-2500
				SMN-145-H	
				SMI-145-HS	
				SMN-145-HS	
170	IEC 60840	150-161	750	SMI-170-H	200-2500
				SMN-170-H	
				SMI-170-HS	
				SMN-170-HS	
245	IEC 62067	220-230	1050	SMI-245-H	200-2500
				SMN-245-H	
				SMI-245-HS	
				SMN-245-HS	

※ Note : The joints shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## PRE-MOLDED JOINT

### Type Designation K (Crimping Type)



### Type Designation KS (Screw Type)



Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840	60-69	325	SMI-72-K	200-2000
				SMN-72-K	
				SMI-72-KS	
				SMN-72-KS	
123	IEC 60840	110-115	550	SMI-123-K	200-2500
				SMN-123-K	
				SMI-123-KS	
				SMN-123-KS	
145	IEC 60840	132-138	650	SMI-145-K	200-2500
				SMN-145-K	
				SMI-145-KS	
				SMN-145-KS	
170	IEC 60840	150-161	750	SMI-170-K	200-2500
				SMN-170-K	
				SMI-170-KS	
				SMN-170-KS	
245	IEC 62067	220-230	1050	SMI-245-K	200-2500
				SMN-245-K	
				SMI-245-KS	
				SMN-245-KS	

※ Note : The joints shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## OUTDOOR TERMINATION

The **Outdoor Termination** is available for the connection of underground cable and overhead line. Saudi Taihan can supply the conventional termination with the synthetic oil and the plug-in type termination without the synthetic oil.

**Prefabricated Type Termination** consists of an epoxy insulator, EPR stress relief cone and a set of compression device to maintain the interfacial pressure between the stress relief cone and cable core.

**Slip on Type Termination** is equipped with silicone rubber stress cone. The interface pressure stability is achieved by self-elasticity of the stress cone. The stress cone guarantees a sufficient positive pressure to control the electric field concentration under any service condition. Electrical separation between cable metallic sheath and supporting structure is ensured by station post insulators.

The conventional terminations are filled with an insulation oil up to a level where the electric field is substantially reduced.

The outdoor termination is available both porcelain and composite (polymeric) hollow insulator with several different creepage distance.

All types of outdoor termination have high reliability because all main insulation components are carried out routine test in the factory in accordance with IEC standard.

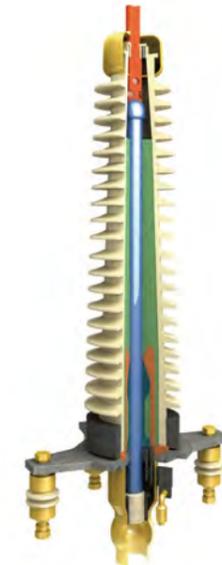


## OUTDOOR TERMINATION

### Prefabricated Type (Porcelain, APP Type) Prefabricated Type (Porcelain, APPS Type)



[Crimping Type]



[Screw Type]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Min. Creepage Distance [mm]	Conductor Size [mm <sup>2</sup> ]
123	IEC 60840	110-115	550	APP-123-60	6000	200-2500
				APP-123-70	7000	
				APPS-123-60	6000	
				APPS-123-70	7000	
145	IEC 60840	132-138	650	APP-145-60	6000	200-2500
				APP-145-70	7000	
				APPS-145-60	6000	
				APPS-145-70	7000	
170	IEC 60840	150-161	750	APP-170-60	6000	200-2500
				APP-170-70	7000	
				APPS-170-60	6000	
				APPS-170-70	7000	
245	IEC 62067	220-230	1050	APP-245-87	8700	200-2500
				APP-245-92	9200	
				APPS-245-87	8700	
				APPS-245-92	9200	

※ Note : The outdoor termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## OUTDOOR TERMINATION

Prefabricated Type (Polymer, APC Type) Prefabricated Type (Polymer, APCS Type)



[Crimping Type]



[Screw Type]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Min. Creepage Distance [mm]	Conductor Size [mm <sup>2</sup> ]
123	IEC 60840	110-115	550	APC-123-60	6000	200-2500
				APC-123-70	7000	
				APCS-123-60	6000	
				APCS-123-70	7000	
				APC-145-60	6000	
145	IEC 60840	132-138	650	APC-145-70	7000	200-2500
				APCS-145-60	6000	
				APCS-145-70	7000	
				APC-170-60	6000	
170	IEC 60840	150-161	750	APC-170-70	7000	200-2500
				APCS-170-60	6000	
				APCS-170-70	7000	
				APC-245-91	9100	
APCS-245-91	9100					

※ Note : The outdoor termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## OUTDOOR TERMINATION

Slip on Type (Porcelain, AMP Type)

Slip on Type (Porcelain, AMPS Type)



[Crimping Type]



[Screw Type]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Min. Creepage Distance [mm]	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840	60-69	325	AMP-72-22	2250	200-2000
				AMPS-72-22		
123	IEC 60840	110-115	550	AMP-123-60	6000	200-2500
				AMP-123-70	7000	
				AMPS-123-60	6000	
				AMPS-123-70	7000	
				AMP-145-60	6000	
145	IEC 60840	132-138	650	AMP-145-70	7000	200-2500
				AMPS-145-60	6000	
				AMPS-145-70	7000	
				AMP-170-60	6000	
170	IEC 60840	150-161	750	AMP-170-70	7000	200-2500
				AMPS-170-60	6000	
				AMPS-170-70	7000	
				AMP-245-87	8700	
AMP-245-92	9200					
AMPS-245-87	8700					
245	IEC 62067	220-230	1050	AMPS-245-92	9200	

※ Note : The outdoor termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## OUTDOOR TERMINATION

### Slip on Type (Polymer, AMC Type)



[Crimping Type]

### Slip on Type (Polymer, AMCS Type)



[Screw Type]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Min. Creepage Distance [mm]	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840	60-69	325	AMC-72-22	2250	200-2000
				AMCS-72-22		
123	IEC 60840	110-115	550	AMC-123-60	6000	200-2500
				AMC-123-70	7000	
				AMCS-123-60	6000	
				AMCS-123-70	7000	
145	IEC 60840	132-138	650	AMC-145-60	6000	200-2500
				AMC-145-70	7000	
				AMCS-145-60	6000	
170	IEC 60840	150-161	750	AMC-170-60	6000	200-2500
				AMC-170-70	7000	
				AMCS-170-60	6000	
				AMCS-170-70	7000	
245	IEC 62067	220-230	1050	AMC-245-91	9100	200-2500
				AMCS-245-91	9100	

※ Note : The outdoor termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## GIS TERMINATION

The **GIS Termination** is available for the connection of underground cable and GIS.

**Prefabricated Type Termination** consists of an epoxy bushing, an EPR stress relief cone and a set of compression device to maintain the interfacial pressure between the stress relief cone and cable core.

**Slip on Type Termination** is equipped with silicone rubber stress cone. The interface pressure stability is achieved by self-elasticity of the stress cone. The stress cone guarantees a sufficient positive pressure to control the electric field concentration under any service condition.

The interface dimensions conform to IEC62271-209 or are agreed upon between the GIS and cable accessory supplier for the particular application concerned.

**Plug-in Type Termination** conforms to the IEC 62271-209, dry type cable connection. The advantage of plug-in dry termination is that the insulator socket (female part) can be installed in advance at the GIS switchgear manufacturing plant, thus avoiding additional work with SF6 gas during cable installation on site.

For protecting the epoxy insulator from switching impulse, the SVL (Sheath Voltage Limiter) can be installed between cable sheath and GIS metal clad.

All types of GIS termination have high reliability because all main insulation components are carried out routine test in the factory in accordance with IEC standard.



# GIS TERMINATION

Prefabricated Type (GPF Type)



[Crimping Type]

Prefabricated Type (GPFS Type)



[Screw Type]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Cable Connection (IEC 62271-209)	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840 IEC 62271-209	60-69	325	GPF-72-L	Fluid Filled	200-2000
				GPFS-72-L		
123	IEC 60840 IEC 62271-209	110-115	550	GPF-123-L	Fluid Filled	200-2500
				GPFS-123-L		
145	IEC 60840 IEC 62271-209	132-138	650	GPF-145-L	Fluid Filled	200-2500
				GPFS-145-L		
170	IEC 60840 IEC 62271-209	150-161	750	GPF-170-L	Fluid Filled	200-2500
				GPFS-170-L		
245	IEC 62067 IEC 62271-209	220-230	1050	GPF-245-L	Fluid Filled	200-2500
				GPFS-245-L		

※ Note

1. The GIS termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.
2. Interface coordination with GIS maker may be required before manufacturing relevant products.

# GIS TERMINATION

Prefabricated Type (GPD Type)



[Crimping Type]

Prefabricated Type (GPDS Type)



[Screw Type]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Cable Connection (IEC 62271-209)	Conductor Size [mm <sup>2</sup> ]
123	IEC 60840 IEC 62271-209	110-115	550	GPD-123-L	Dry Type	200-2500
				GPDS-123-L		
145	IEC 60840 IEC 62271-209	132-138	650	GPD-145-L	Dry Type	200-2500
				GPDS-145-L		
170	IEC 60840 IEC 62271-209	150-161	750	GPD-170-L	Dry Type	200-2500
				GPDS-170-L		
245	IEC 62067 IEC 62271-209	220-230	1050	GPD-245-L	Dry Type	200-2500
				GPDS-245-L		

※ Note

1. The GIS termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.
2. Interface coordination with GIS maker may be required before manufacturing relevant products.

# GIS TERMINATION

Slip on Type (GMF Type)



[Crimping Type]

Slip on Type (GMFS Type)



[Screw Type]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Cable Connection (IEC 62271-209)	Conductor Size [mm <sup>2</sup> ]
123	IEC 60840 IEC 62271-209	110-115	550	GMF-123-0	Fluid Filled	200-2500
				GMFS-123-0		
145	IEC 60840 IEC 62271-209	132-138	650	GMF-145-0	Fluid Filled	200-2500
				GMFS-145-0		
170	IEC 60840 IEC 62271-209	150-161	750	GMF-170-0	Fluid Filled	200-2500
				GMFS-170-0		

※ Note

1. The GIS termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.
2. Interface coordination with GIS maker may be required before manufacturing relevant products.

# GIS TERMINATION

Plug-in Type (GPP Type)



[Crimping Type]

Plug-in Type (GPPS Type)



[Screw Type]



[Female Part]



[Male Part]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Cable Connection (IEC 62271-209)	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840 IEC 62271-209	60-69	325	GPP-72-L	Dry Type	200-2000
				GPPS-72-L		
123	IEC 60840 IEC 62271-209	110-115	550	GPP-123-L	Dry Type	200-2500
				GPPS-123-L		
145	IEC 60840 IEC 62271-209	132-138	650	GPP-145-L	Dry Type	200-2500
				GPPS-145-L		
170	IEC 60840 IEC 62271-209	150-161	750	GPP-170-L	Dry Type	200-2500
				GPPS-170-L		
245	IEC 62067 IEC 62271-209	220-230	1050	GPP-245-L	Dry Type	200-2500
				GPP-245-L		

※ Note

1. The GIS termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.
2. Interface coordination with GIS maker may be required before manufacturing relevant products.
3. The bushing cover to proceed the GIS electrical test without cable is an option item.

## TRANSFORMER TERMINATION

The **Transformer Termination** is available for the connection of underground cable and transformer.

**Prefabricated type Termination** consists of an epoxy bushing, an EPR stress relief cone and a set of compression device to maintain the interfacial pressure between the stress relief cone and cable core.

**Slip on type Termination** is equipped with silicone rubber stress cone. The interface pressure stability is achieved by self-elasticity of the stress cone. The stress cone guarantees a sufficient positive pressure to control the electric field concentration under any service condition.

All types of transformer termination have high reliability because all main insulation components are carried out routine test in the factory in accordance with IEC standard.



## TRANSFORMER TERMINATION

### Prefabricated Type (OPF Type)



[Crimping Type]

### Prefabricated Type (OPFS Type)



[Screw Type]

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60840	60-69	325	OPF-72-L	200-2000
				OPFS-72-L	
123	IEC 60840	110-115	550	OPF-123-L	200-2500
				OPFS-123-L	
145	IEC 60840	132-138	650	OPF-145-L	200-2500
				OPFS-145-L	
170	IEC 60840	150-161	750	OPF-170-L	200-2500
				OPFS-170-L	
245	IEC 62067	220-230	1050	OPF-245-L	200-2500
				OPFS-245-L	

※ Note

1. The TR termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.
2. Interface coordination with TR maker shall be required before manufacturing relevant products.

## TRANSFORMER TERMINATION

**Slip on type (OMF TYPE)**



**[Crimping Type]**

**Slip on type (OMFS TYPE)**



**[Screw Type]**

Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Conductor Size [mm <sup>2</sup> ]
123	IEC 60840	110-115	550	OMF-123-0 OMFS-123-0	200-2500
145	IEC 60840	132-138	650	OMF-145-0 OMFS-145-0	200-2500
170	IEC 60840	150-161	750	OMF-170-0 OMFS-170-0	200-2500

※ Note

1. The TR termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.
2. Interface coordination with TR maker shall be required before manufacturing relevant products.

## PREFABRICATED JOINT

The main insulations of three-piece prefabricated joint are an epoxy unit embedded with metallic electrode and two EPR stress relief cones. Other main components are conductor sleeve, compression device and metallic outer case. The outer protection box can be supplied by client's request.

There are several pins on the conductor sleeve to fix on the grooves of metallic electrode in the middle of epoxy unit. Especially, the **Click-Fit type** prefabricated joint can be implemented by using two conductor sleeves, which are attached on the metallic electrode in the epoxy unit at each side separately. Each conductor sleeves are connected by means of the silver-plated multi-contact. This feature enables the installation of joints simply by plugging-in the prepared cable end, that lead to a reduction in project realization time and cost.

Compression devices are used for maintaining the interfacial pressure between the stress relief cone and cable core. The metallic outer case connects the each side of metallic cable sheath electrically and provides protection of the joint against moisture ingress and external damage.

Straight joints as well as joints with sheath interruption (insulation joint) for cross bonding connection are available. In case of insulation joint, the metallic case is provided with PE or epoxy insulator.

All types of prefabricated joint have high reliability because all main insulation components are carried out routine test in the factory in accordance with IEC standard.



## PREFABRICATED JOINT

### Click Fit Type (Outer Case)



### Click Fit Type (Outer Case & Coffin Box)



Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Type Designation	Conductor Size [mm <sup>2</sup> ]
123	IEC 60840	110-115	550	SPIC-123-0	200-2500
				SPIC-123-X	
145	IEC 60840	132-138	650	SPIC-145-0	200-2500
				SPIC-145-X	
170	IEC 60840	150-161	750	SPIC-170-0	200-2500
				SPIC-170-X	

※ Note : The joints shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## PLUG-IN & INSULATED TYPE AC VOLTAGE TEST DEVICE

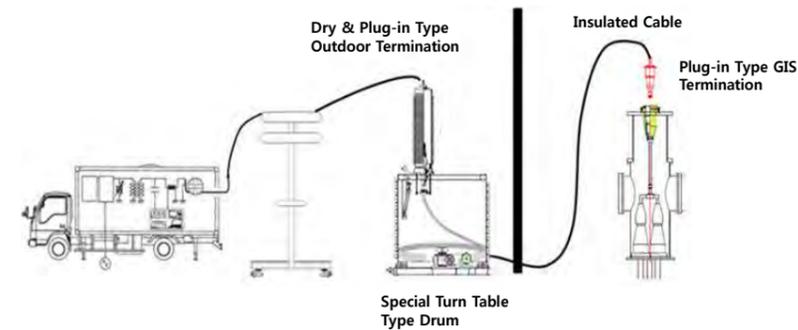
Generally, the AC voltage test shall be proceeded before energizing the EHV underground cable system. Traditional AC voltage test devices utilize a kind of bare wire to connect with the equipments under test so that the sufficient insulation clearance shall be secured.

Saudi Taihan develops the AC voltage test device which adopts the insulated cable instead of bare wire for connection purpose to carry out the AC voltage test even in the narrow place.

### Main Features of Saudi Taihan's AC Voltage Device

1. The insulated cable to solve the insulation clearance problem.
2. The dry & plug-in type outdoor & GIS termination for easy installation.
3. The Special turn-table type drum for easy transportation and AC voltage test.
4. The universal GIS test chamber, connection flange and conductor connection with GIS switchgear under test.

Due to these advantages over the traditional AC voltage test equipments, Saudi Taihan can provide an efficient solution to proceed the AC voltage test to EHV underground cable system at any place.



[Schematic Diagram]



[Special Turn Table Drum]



[Structure of Dry Plug-in Type Outdoor Termination]



[Plug-in GIS Termination]

## OF CABLE ACCESSORIES

Saudi Taihan has been supplied all types of oil filled cable accessories and auxiliary equipments to make up the whole oil filled cable system.

The **Straight Through Joint** is used for connecting both sides of OF cables electrically and hydraulically. Normal (without insulator) or insulation type joint which provides the insulator to separate the cable metallic sheath can be provided.

The **Stop Joint** is used to divide the oil feeding section in case that the route length is too long or oil pressure change is too excessive at static or transient operation. Stop joint connects both sides of OF cable electrically but to separate the oil feeding section. Normal and insulation type joint can be supplied.

The **Outdoor Termination** is used to connect between overhead line and underground cable. The porcelain bushing is adopted and epoxy bell-mouth or condensor cone, which is comprised of insulation paper and metallic foil, is the component to control the electric field of outdoor termination.

The **GIS & TR Termination** is used to terminate the underground cable inside the GIS & TR cable box. Epoxy bushing is adopted and epoxy bell-mouth or condensor cone can be applied inside GIS & TR Termination for electric stress control purpose.

The interface dimensions of GIS termination conform to IEC62271-209 or are agreed upon between the GIS and cable accessory supplier for the particular application concerned.



## OF CABLE ACCESSORIES

### Straight Through Joint



Highest Voltage [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60141-1	60-69	325	200-2000
123	IEC 60141-1	110-115	550	200-2500
145	IEC 60141-1	132-138	650	200-2500
170	IEC 60141-1	150-161	750	200-2500
245	IEC 60141-1	220-230	1050	200-2500

### Stop Joint

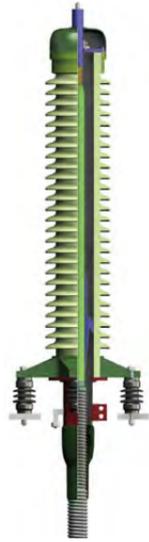


Highest Voltage [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60141-1	60-69	325	200-2000
123	IEC 60141-1	110-115	550	200-2500
145	IEC 60141-1	132-138	650	200-2500
170	IEC 60141-1	150-161	750	200-2500
245	IEC 60141-1	220-230	1050	200-2500

※ Note : The joints shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## OF CABLE ACCESSORIES

### Outdoor Termination (Porcelain)



Highest Voltage [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60141-1	60-69	325	200-2000
123	IEC 60141-1	110-115	550	200-2500
145	IEC 60141-1	132-138	650	200-2500
170	IEC 60141-1	150-161	750	200-2500
245	IEC 60141-1	220-230	1050	200-2500

※ Note : The outdoor termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

### GIS & TR Termination



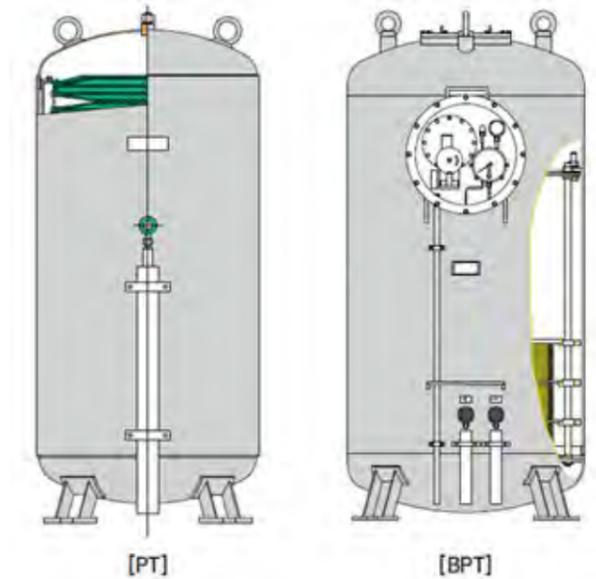
Highest Voltage [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60141-1	60-69	325	200-2000
123	IEC 60141-1	110-115	550	200-2500
145	IEC 60141-1	132-138	650	200-2500
170	IEC 60141-1	150-161	750	200-2500
245	IEC 60141-1	220-230	1050	200-2500

1. The GIS & TR termination shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.
2. Interface coordination with GIS & TR maker shall be required before manufacturing relevant products.

### Pressure Tank (PT)



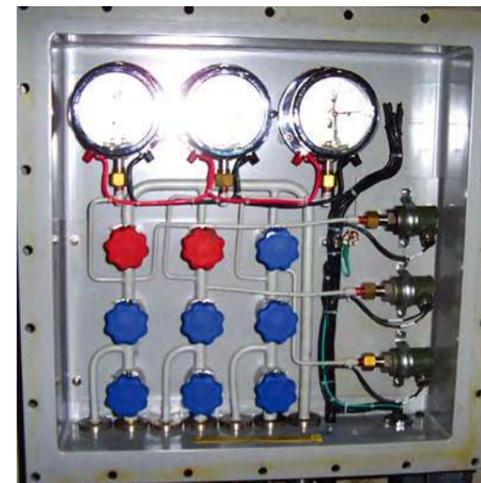
The pressure tank is a device to compensate the hydraulic shrink and expansion of insulation oil during the operation of OF cable system.



### Guage Panel & Alarm Receiver

Guage panel has a function as to sense and indicate the oil pressure of pressure tank. Pressure gauges shall be provided with electrical contacts for sending the emergency signal to alarm panel.

### Guage Panel (GP)



### Alarm Receiver (AR)



※ Note : The above items shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## TRANSITION JOINT

The **transition joint** is applicable for jointing single core oil-filled cable to single core XLPE cable. The 3-core oil-filled cable can be connected by using a splitter box.

The prefabricated and dry (oil-less) configuration is used on the XLPE cable side while on the oil-filled cable side conventional oil impregnated paper roll and newly adopted epoxy bell mouth is applied to realize the compact design.

The **main insulation** consists of ERP stress relief cone, epoxy bell mouth and epoxy unit with embedded metallic electrodes.

Hydraulic separation between the different cables is ensured by a set of dual O-ring gasket and epoxy unit. To ensure the thermo-mechanical characteristics of XLPE cable side, EPR stress relief cone has been adopted with a compression ring which consists of several coil springs.

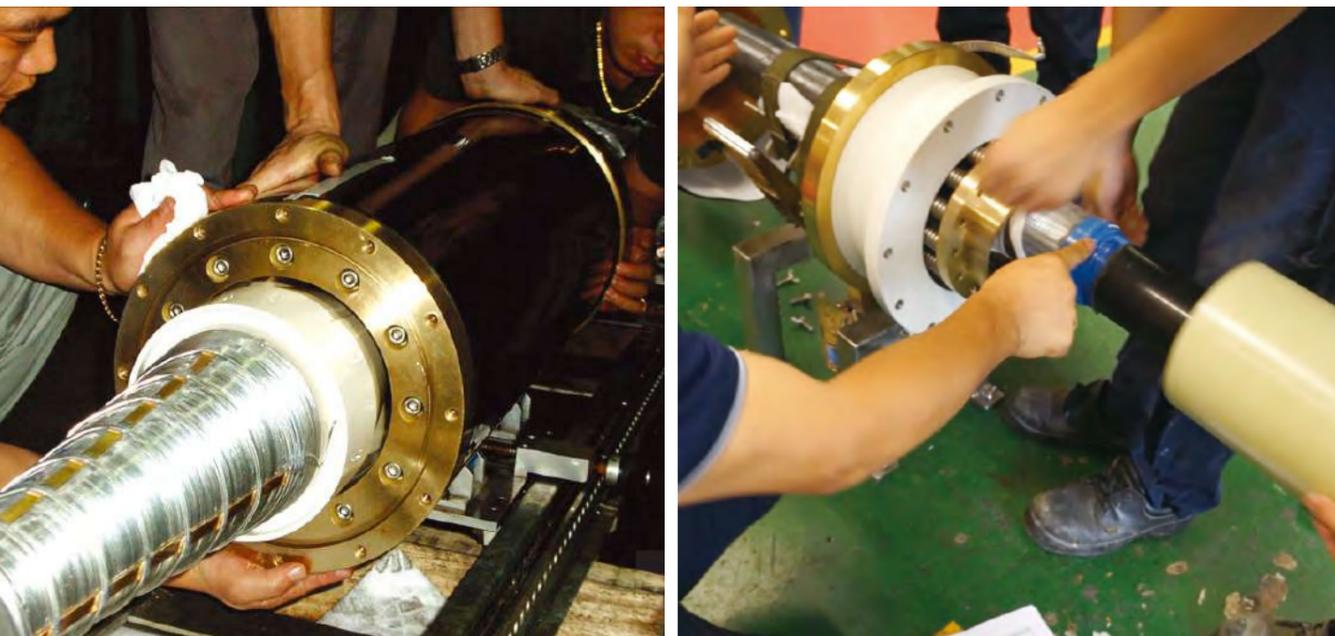
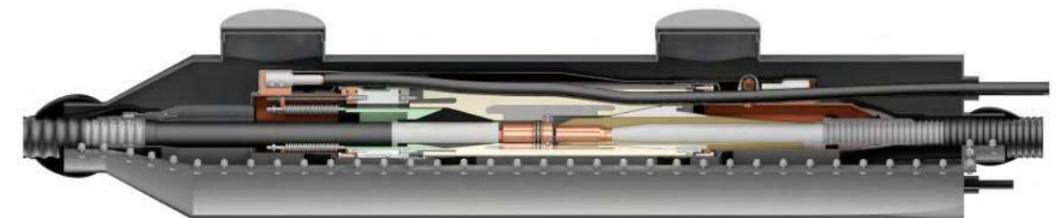
Prefabricated type joint has high quality reliability because all of the main insulators are conducted routine test in the factory in accordance with IEC standard.

## TRANSITION JOINT

### Transition Joint (Without Coffin Box)



### Transition Joint (With Coffin Box)



Highest Voltage $U_m$ [kV]	Standard	Rated Voltage [kV]	Lightning Impulse Withstand Voltage [kV]	Conductor Size [mm <sup>2</sup> ]
72.5	IEC 60141-1 IEC 60840	60-69	325	200-2000
123	IEC 60141-1 IEC 60840	110-115	550	200-2500
145	IEC 60141-1 IEC 60840	132-138	650	200-2500
170	IEC 60141-1 IEC 60840	150-161	750	200-2500
245	IEC 60141-1 IEC 62067	220-230	1050	200-2500

※ Note : The joints shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

# LINK BOX

Link boxes are used with cable joints and terminations to connect the cable metallic sheath to earth or each other to limit the overvoltage induced by lightning, fault current and switching operations.

Saudi Taihan can supply the link boxes which the material of outer protection case is stainless steel, brass and fiber-reinforced plastic. The terminal blocks and link bars in the link box are made of tinned copper. Although Saudi Taihan can provide various types of link boxes to meet the client's requirements, Saudi Taihan's link box can be divided by four types basically.

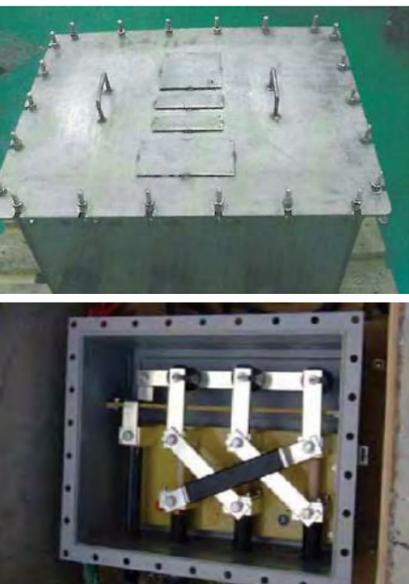
The **Compact Type** link box has the characteristics which the clearance between links and between link and earth are designed compactly so that the size of link box pits can be optimized accordingly.

The **Reinforcing Type** link box can withstand the internal power arc fault. It shall be designed to contain the effect of a failure or flashover and subsequent power arc within the box.

The **Swing Bolt Type** link box is provided with drop (swing) bolts for fastening the link box lid. The bolts are designed to enable the tightening by spanner.

The **TMSS Type** link box is designed to meet the technical requirements of 12-TMSS-11, which is the link box specification of SEC (Saudi Electricity Company). Saudi Taihan can supply the link box which the impulse withstand voltage is upto 125kV for the application of 380kV EHV underground cable system.

Sheath Voltage Limiters (SVLs) in the link box are the gapless ZnO arresters encapsulated by EPR housing or polymer housing, which have the insulation resistance above 100MΩ at test voltage so that the sheath insulation can be checked without disconnecting SVLs.



# LINK BOX

## Compact Type



Classification	Product Type	Type of Bonding Cable	Size of Bonding Cable	Link Box Size		
				Width [mm]	Lenght [mm]	Depth [mm]
Cross Bonding Link Box with SVL	6XAB(CC)	Concentric	185-400	Nom. 449	Nom. 381	Nom. 300
Solid Bonding Link Box with SVL	3AB(1C)	Single	185-400	Nom. 446	Nom. 330	Nom. 288
Solid Bonding Link Box without SVL	3B(1C), 3B(CC)	Single, Concentric	185-400	Nom. 446	Nom. 330	Nom. 288
Solid Bonding & Earthing Link Box with SVL	3AB3B(CC)	Concentric	185-400	Nom. 449	Nom. 381	Nom. 300

## Reinforcing Type



Classification	Product Type	Type of Bonding Cable	Size of Bonding Cable	Link Box Size		
				Width [mm]	Lenght [mm]	Depth [mm]
Cross Bonding Link Box with SVL	6XAB(CC)	Concentric	185-630	Nom. 800	Nom. 650	Nom. 338
Solid Bonding Link Box with SVL	3AB(1C)	Single	185-630	Nom. 800	Nom. 650	Nom. 338
Solid Bonding Link Box without SVL	3B(1C), 3B(CC)	Single, Concentric	185-630	Nom. 800	Nom. 650	Nom. 338
Solid Bonding & Earthing Link Box with SVL	3AB3B(CC)	Concentric	185-630	Nom. 800	Nom. 650	Nom. 338

## Swing Bolt Type



Classification	Product Type	Type of Bonding Cable	Size of Bonding Cable	Link Box Size		
				Width [mm]	Lenght [mm]	Depth [mm]
Cross Bonding Link Box with SVL	6XAB(CC)	Concentric	185-500	Nom. 795	Nom. 640	Nom. 485
Solid Bonding Link Box with SVL	3AB(1C)	Single	185-500	Nom. 795	Nom. 640	Nom. 485
Solid Bonding Link Box without SVL	3B(1C), 3B(CC)	Single, Concentric	185-500	Nom. 795	Nom. 640	Nom. 485
Solid Bonding & Earthing Link Box with SVL	3AB3B(CC)	Concentric	185-500	Nom. 795	Nom. 640	Nom. 485

## TMSS Type



Classification	Product Type	Type of Bonding Cable	Size of Bonding Cable	Link Box Size		
				Width [mm]	Lenght [mm]	Depth [mm]
Cross Bonding Link Box with SVL	6XAB(CC)	Concentric	185-500	Nom. 1242	Nom. 822	Nom. 560
Solid Bonding Link Box with SVL	3AB(1C)	Single	185-500	Nom. 1242	Nom. 822	Nom. 560
Solid Bonding Link Box without SVL	3B(1C), 3B(CC)	Single, Concentric	185-500	Nom. 1001	Nom. 588	Nom. 510
Solid Bonding & Earthing Link Box with SVL	3AB3B(CC)	Concentric	185-500	Nom. 1242	Nom. 822	Nom. 560

※ Note : The link boxes shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## COMPOSITE HOLLOW INSULATOR

Saudi Taihan has been developing and producing composite hollow insulator which consists of FRP tube and silicone rubber sheds to withstand various environmental conditions. The advantage of composite hollow insulator over traditional porcelain hollow insulator has been proven is well known and accepted.

### ADVANTAGE

- Reduced risk for transport and assembly (no broken sheds)
- Explosion safety for personnel and installation
- Excellent seismic performance
- High insulating performance in highly polluted environment

### APPLICATION

- Cable Termination
- GIS Switchgear
- Instrument Transformer
- Lightening Arrester



Rated Voltage [kV]	Height H [mm]	Inner Diameter [mm]	Creepage Distance [mm]	Arcing Distance [mm]
110-161	1676	260	5280	1495
	2060	260	6720	1879
	2444	260	8150	2263
220-230	2536	370	9100	2308

※ Note : The composite bushing shall be designed according to the customer's specification. Therefore, detailed technical data and dimensioned drawings shall be provided on request.

## GIS EPOXY SPACER



Saudi Taihan has been manufacturing several kinds of cast epoxy insulators which are using in GIS systems. With our extensive knowledge regarding material technology with advanced process engineering skills, we have developed and produced epoxy insulators upto 550kV grade.

### VACUUM CASTING TECHNOLOGY

- Void-free Insulation
- Excellent Adhesion to Metallic Parts
- Net Shape Casting

### PRODUCT

- Insulation Spacer
- Tri-post Insulator
- Earthing Terminal
- Insulation Supporter

Product	Type	Voltage Grade
Epoxy Insulators for GIS Switchgear	1P Spacer	72.5 ~ 550kV
	3P Spacer	
	Tri-post Insulator	
	Insulation Support	
	Double-Post Insulator	
	Contact Rod	
	Support Spacer	
	Operating Rod	

## TECHNOLOGY TRAINING CENTER (TTC)

To ensure that its HV cable accessories are installed safely and efficiently, Taihan has established its own in-house technology education center at its cable accessory factory in Dangjin, Korea, and runs optimized educational courses. Saudi Taihan has also established a similar technology education center and operates it accordingly.

The center's education courses are focused on providing technicians who carry out installation work on site with the necessary technical expertise and qualifications. Besides practical classes related to cable connection works, the course also consists of theory lessons conducted by experienced engineers with the aim of providing the technical education required for engineering and surveillance works.

Classification	Qualification	Type	Duration	Contents	Remark
Senior Course	More than 7 years experience	Basic	6 days	-Make the test circuit -AC withstand test	- Exemption of cable insulation smoothing test
		Option	Depending on the training item (2 ~ 6 days)		
Advance Course	2 ~ 5 years experiences	Basic	7 days	-Pre-test of the cable insulation smoothing -Make the test circuit -AC withstand test	-Begin the training course after passing the pre-test -Exemption of final cable insulation smoothing test
		Option	Depending on the training item (4 ~ 7 days)		
Primary Course	Less than 2 years experiences	Basic	20 days	-Practice of cable insulation smoothing -Final cable insulation smoothing test -Make the test circuit -AC withstand test -Assemble components	- Issue the certificate in case of passing the final cable insulation smoothing test and AC withstand test
		Option	Depending on the training item (13 ~ 20 days)		



## INSTALLATION TOOL LIST

Item No.	Description	Range of usage	Shape
GT-0001	Temperature controller For annealing the cable	- Conductor Size : 200~2500sqmm	
GT-0002	Aluminum pipe For annealing the cable - (No.) : According to Outer sheath diameter & Acc'y type	- Shall be made considering the cable specification	
GT-0003	Band heater For annealing the cable - 5M - 10M	- Conductor Size : 200~2500sqmm	
GT-0010	Pressure pump For compressing the conductor sleeve	- Conductor Size : 200~2500sqmm	
GT-0020	Hose set for Pressure pump For compressing the conductor sleeve - 10M	- Conductor Size : 200~2500sqmm	
GT-0030	Pressure holder For compressing the conductor sleeve - Pressure force : 150ton or 200ton	- Conductor Size : 200~2500sqmm	
GT-0040	Hexagonal die For compressing the conductor sleeve - (No.) : According to Conductor diameter	- Shall be made considering the cable specification	

## INSTALLATION TOOL LIST

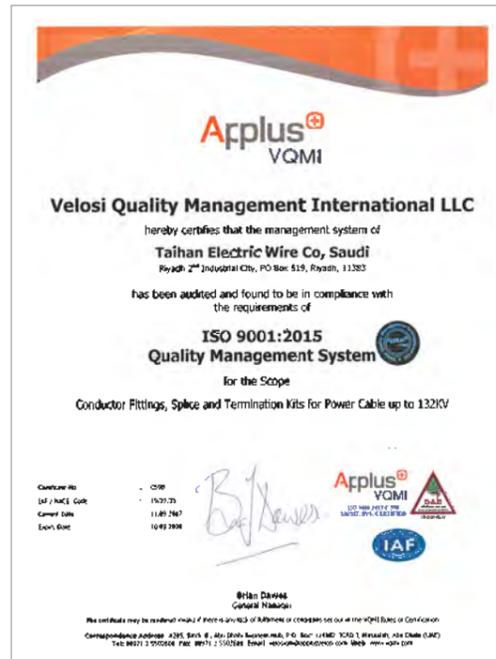
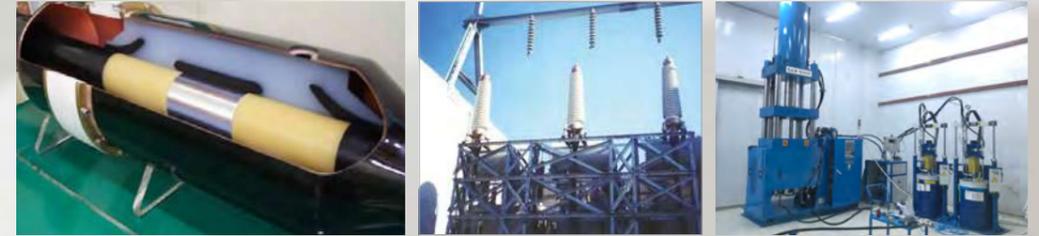
Item No.	Description	Range of usage	Shape
GT-0100	Belt sander For smoothing the surface of cable insulation	- Conductor Size : 200~2500sqmm	
GTJ-0010	Compound mixer For mixing the waterproof compound	(for Premolded joint only) - Conductor Size : 200~2500sqmm	
GTA-0010	Oil pump For filling the insulation oil in the bushing	(for Outdoor termination only) - Conductor Size : 200~2500sqmm	
GTA-0020	Drum heater For heating the drum with insulation oil	(for Outdoor termination only) - Conductor Size : 200~2500sqmm	
ST-0001	Conductor exposing tool For exposing the cable conductor	- Conductor Size : 200~2500sqmm	
ST-0002	Puller For pulling the insulation to expose the conductor	- Conductor Size : 200~2500sqmm	
ST-0003	Removing tool For removing the outer semi-cond. Layer - S : Outer semi-cond. Layer diameter 50~80mm - M : Outer semi-cond. Layer diameter 80~100mm - L : Outer semi-cond. Layer diameter 100~130mm	- Shall be made considering the cable specification	

## INSTALLATION TOOL LIST

Item No.	Description	Range of usage	Shape
ST-0004	Conductor cutting die For cutting the conductor vertically - (No.) : According to Conductor diameter	- Shall be made considering the cable specification	
STJ-0010	Groove tool : Body For making a position of the corona shield	(for Premolded joint only) - Conductor Size : 200~2500sqmm	
STJ-0020	Groove tool : Core For making a position of the corona shield - (No.) : According to Conductor diameter	(for Premolded joint only) - Shall be made considering the cable specification	
STJ-0030	Teflon cone For expanding the premolded unit - (No.) : According to Outer semi-cond. Layer diameter	(for Premolded joint only) - Shall be made considering the cable specification	
STJ-0040	Mobile frame For inserting the premolded unit on the cable insulation	(for Premolded joint only) - Conductor Size : 200~2500sqmm	
STJ-0040-A	Mobile frame (Auto) For inserting the premolded unit on the cable insulation	(for Premolded joint only) - Conductor Size : 200~2500sqmm	

\*(No.) : The item is designed or selected according to the cable specification.

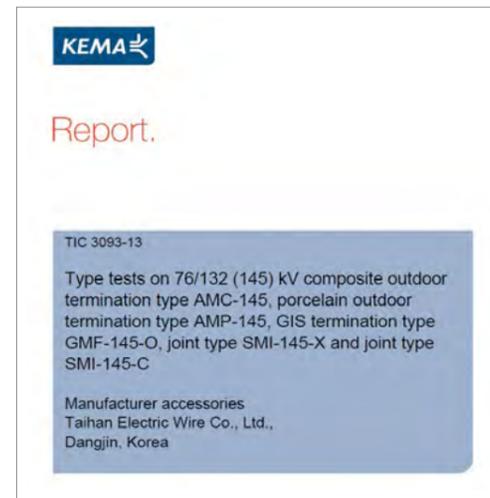
# CERTIFICATES



ISO 9001 2015 Saudi Taihan



CR Saudi Taihan\_ Revised GM



KEMA Report



KEMA Report

# GLOBAL NETWORKS

● Affiliated Company ● Taihan's Branch Office



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### Dangjin Cable Accessory Plant

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