

Table: Technical Data for Distribution Transformer 630 kVA, 20/0.4 kV

Manufacturer's Name		To be specified	
Type / Model		Oil-immersed	
		With oil conservator	
Installation		outdoor	
Dielectric		oil, without PCB	
Oil type		to be specified	
Rated frequency	Hz	50	
Rated power	kVA	630	
Number of phases		3	
Rated voltage:			
- High voltage side	kV	20	
- Low voltage side	kV	0.4	
Taps on HV side	%	$\pm 2 \times 2.5\%$, off load	
Rated currents			
- High voltage side	A	to be specified	
- Low voltage side	A	to be specified	
Impedance voltage	%	6	
Vector group		Dyn5	
Treatment of neutral (LV side)		Solidly earthed	
Losses:			
- No-load	W	To be specified	
- Load	W	To be specified	
Insulation level HV-winding			
Lightning-impulse test voltage	kV	125	
Power-frequency test voltage	kV	50	
Insulation level LV-winding			
Lightning-impulse test voltage	kV	30	
Power-frequency test voltage	kV	10	

مشخصات تخنیکي برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند

Resistance per phase:			
- HV winding	Ω	to be specified	
- LV winding	Ω	to be specified	
Sound pressure level	dB(A)	52	
Max. temperature rise at 45° C ambient temperature and at full load:			
- Winding	°C	to be specified	
- Iron core	°C	to be specified	
- Oil at top level	°C	to be specified	
Max. ambient temperature	°C	45	
Cooling system		ONAN	
Conductor material			
Insulating material of windings		Copper	
Insulation class		to be specified	
Standard bushings		yes	
Accessories:			
- Dial type contactor thermometer transformer	pcs.	1	
- Oil level indicator	pcs.	1	
- Pocket thermometer	pcs.	1	
- Grounding terminals	pcs.	2	
- Filter pipe	pcs.	1	
- Oil drain plug	pcs.	1	
- Rating plate	pcs.	1	
- Towing eye	pcs.	1	
Weights:			
- Total	kg	to be specified	
- Oil	kg	to be specified	
Dimensions:			
- Length	mm	to be specified	
- Width	mm	to be specified	
- Height	mm	to be specified	
- Distance between wheels centers	mm	to be specified	
Standard specifications		IEC 60076-7 IEC 60354	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لاسوالی خاص کجکی ولایت هلمند

Table: Technical Data for Distribution Transformer 400 kVA, 20/0.4kV

Manufacturer's Name		To be specified	
Type / Model		Oil-immersed	
		With oil conservator	
Installation		outdoor	
Dielectric		oil, without PCB	
Oil type		to be specified	
Rated frequency	Hz	50	
Rated power	kVA	400	
Number of phases		3	
Rated voltage:			
- High voltage side	kV	20	
- Low voltage side	kV	0.4	
Taps on HV side	%	±2x2.5%, off load	
Rated currents			
- High voltage side	A	to be specified	
- Low voltage side	A	to be specified	
Impedance voltage	%	4	
Vector group		Dyn5	
Treatment of neutral (LV side)		Solidly earthed	
Losses:			
- No-load	W	To be specified	
- Load	W	To be specified	
Insulation level HV-winding			
Lightning-impulse test voltage	kV	125	
Power-frequency test voltage	kV	50	
Insulation level LV-winding			
Lightning-impulse test voltage	kV	30	
Power-frequency test voltage	kV	10	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لاسوالی خاص کجکی ولایت هلمند

Resistance per phase:			
- HV winding	Ω	to be specified	
- LV winding	Ω	to be specified	
Sound pressure level	dB(A)	52	
Max. temperature rise at 45° C ambient temperature and at full load:			
- Winding	°C	to be specified	
- Iron core	°C	to be specified	
- Oil at top level	°C	to be specified	
Max. ambient temperature	°C	45	
Cooling system		ONAN	
Conductor material			
Insulating material of windings		Copper	
Insulation class		to be specified	
Standard bushings		yes	
Accessories:			
- Dial type contactor thermometer	pcs.	1	
transformer			
- Oil level indicator	pcs.	1	
- Pocket thermometer	pcs.	1	
- Grounding terminals	pcs.	2	
- Filter pipe	pcs.	1	
- Oil drain plug	pcs.	1	
- Rating plate	pcs.	1	
- Towing eye	pcs.	1	
Weights:			
- Total	kg	to be specified	
- Oil	kg	to be specified	
Dimensions:			
- Length	mm	to be specified	
- Width	mm	to be specified	
- Height	mm	to be specified	
- Distance between wheels centers	mm	to be specified	
Standard specifications		IEC 60076-7 IEC 60354	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لیسوالی خاص کجکی ولایت هلمند

Table: Technical Data for Distribution Transformer 250 kVA, 20/0.4 kV

Manufacturer's Name		To be specified	
Type / Model		Oil-immersed	
		With oil conservator	
Installation		outdoor	
Dielectric		oil, without PCB	
Oil type		to be specified	
Rated frequency	Hz	50	
Rated power	kVA	250	
Number of phases		3	
Rated voltage:			
- High voltage side	kV	20	
- Low voltage side	kV	0.4	
Taps on HV side	%	±2x2.5%, off load	
Rated currents			
- High voltage side	A	to be specified	
- Low voltage side	A	to be specified	
Impedance voltage	%	4	
Vector group		Dyn5	
Treatment of neutral (LV side)		Solidly earthed	
Losses:			
- No-load	W	To be specified	
- Load	W	To be specified	
Insulation level HV-winding			
Lightning-impulse test voltage	kV	125	
Power-frequency test voltage	kV	50	
Insulation level LV-winding			
Lightning-impulse test voltage	kV	30	
Power-frequency test voltage	kV	10	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لاسوالی خاص کجکی ولایت هلمند

Resistance per phase:			
- HV winding	Ω	to be specified	
- LV winding	Ω	to be specified	
Sound pressure level	dB(A)	52	
Max. temperature rise at 45° C ambient temperature and at full load:			
- Winding	°C	to be specified	
- Iron core	°C	to be specified	
- Oil at top level	°C	to be specified	
Max. ambient temperature	°C	45	
Cooling system		ONAN	
Conductor material			
Insulating material of windings		Copper	
Insulation class		to be specified	
Standard bushings		yes	
Accessories:			
- Dial type contactor thermometer	pcs.	1	
transformer			
- Oil level indicator	pcs.	1	
- Pocket thermometer	pcs.	1	
- Grounding terminals	pcs.	2	
- Filter pipe	pcs.	1	
- Oil drain plug	pcs.	1	
- Rating plate	pcs.	1	
- Towing eye	pcs.	1	
Weights:			
- Total	kg	to be specified	
- Oil	kg	to be specified	
Dimensions:			
- Length	mm	to be specified	
- Width	mm	to be specified	
- Height	mm	to be specified	
- Distance between wheels centers	mm	to be specified	
Standard specifications		IEC 60076-7 IEC 60354	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لاسوالی خاص کجکی ولایت هلمند

Table: Technical Data for Distribution Transformer 200 kVA, 20/0.4 kV

Designation	Unit	Required	Offered
Manufacturer's Name		To be specified	
Type / Model		Oil-immersed	
Installation		With conservator outdoor	
Dielectric		oil, without PCB	
Oil type		to be specified	
Rated frequency	Hz	50	
Rated power	kVA	200	
Number of phases		3	
Rated voltage:			
- High voltage side	kV	20	
- Low voltage side	kV	0.4	
Taps on HV side	%	$\pm 2 \times 2.5\%$, off load	
Rated currents			
- High voltage side	A	to be specified	
- Low voltage side	A	to be specified	
Impedance voltage	%	4	
Vector group		Dyn5	
Treatment of neutral (LV side)		Solidly earthed	
Losses:			
- No-load	W	To be specified	
- Load	W	To be specified	
Insulation level HV-winding:			
Lightning-impulse test voltage	kV	125	
Power-frequency test voltage	kV	50	
Insulation level LV-winding:			
Lightning-impulse test voltage	kV	30	
Power-frequency test voltage	kV	10	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و سواالی خاص كجى ولايت هلمند

Resistance per phase:			
- HV winding	Ω	to be specified	
- LV winding	Ω	to be specified	
Sound pressure level	dB(A)	52	
Max. temperature rise at 45° C ambient temperature and at full load:			
- Winding	°C	to be specified	
- Iron core	°C	to be specified	
- Oil at top level	°C	to be specified	
Max. ambient temperature	°C	45	
Cooling system		ONAN	
Conductor material			
Insulating material of windings		Copper	
Insulation class		to be specified	
Standard bushings		yes	
Accessories:			
- Dial type contactor thermometer	pcs.	1	
- Oil level indicator	pcs.	1	
- Pocket thermometer	pcs.	1	
- Grounding terminals	pcs.	2	
- Filter pipe	pcs.	1	
- Oil drain plug	pcs.	1	
- Rating plate	pcs.	1	
- Towing eye	pcs.	1	
Weights:			
- Total	kg	to be specified	
- Oil	kg	to be specified	
Dimensions:			
- Length	mm	to be specified	
- Width	mm	to be specified	
- Height	mm	to be specified	
- Distance between wheels centers	mm	to be specified	
Standard		IEC 60076-7 IEC 60354	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و سواالی خاص کجکی ولایت هلمند

Table: Technical Data for Distribution Transformer 160 kVA, 20/0.4 kV

Designation	Unit	Required	Offered
Manufacturer's Name		To be specified	
Type / Model		Oil-immersed	
		With oil conservator	
Installation		outdoor	
Dielectric		oil, without PCB	
Oil type		to be specified	
Rated frequency	Hz	50	
Rated power	kVA	160	
Number of phases		3	
Rated voltage:			
- High voltage side	kV	20	
- Low voltage side	kV	0.4	
Taps on HV side	%	±2x2.5%, off load	
Rated currents			
- High voltage side	A	to be specified	
- Low voltage side	A	to be specified	
Impedance voltage	%	4	
Vector group		Dyn5	
Treatment of neutral (LV side)		Solidly earthed	
Losses:			
- No-load	W	To be specified	
- Load	W	To be specified	
Insulation level HV-winding			
Lightning-impulse test voltage	kV	125	
Power-frequency test voltage	kV	50	
Insulation level LV-winding			
Lightning-impulse test voltage	kV	30	
Power-frequency test voltage	kV	10	

مشخصات تخته‌بندی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند

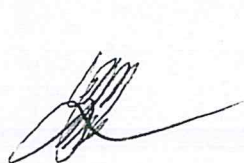
Resistance per phase:			
- HV winding	Ω	to be specified	
- LV winding	Ω	to be specified	
Sound pressure level	dB(A)	52	
Max. temperature rise at 45° C ambient temperature and at full load:			
- Winding	°C	to be specified	
- Iron core	°C	to be specified	
- Oil at top level	°C	to be specified	
Max. ambient temperature	°C	45	
Cooling system		ONAN	
Conductor material			
Insulating material of windings		Copper	
Insulation class		to be specified	
Standard bushings		yes	
Accessories:			
- Dial type contactor thermometer transformer	pcs.	1	
- Oil level indicator	pcs.	1	
- Pocket thermometer	pcs.	1	
- Grounding terminals	pcs.	2	
- Filter pipe	pcs.	1	
- Oil drain plug	pcs.	1	
- Rating plate	pcs.	1	
- Towing eye	pcs.	1	
Weights:			
- Total	kg	to be specified	
- Oil	kg	to be specified	
Dimensions:			
- Length	mm	to be specified	
- Width	mm	to be specified	
- Height	mm	to be specified	
- Distance between wheels centers	mm	to be specified	
Standard specifications		IEC 60076-7 IEC 60354	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لیسوالی خاص کجکی ولایت هلمند

Table: Technical Data Disconnecting Switch Combination fuse 20kV, 630 A

Description	Unit	Required	Offered
Manufacturer's Name		to be specified	
Type / Model		to be specified	
Installation		pole mounted	
Nominal Voltage	kV	20	
Rated Voltage	kV	24	
Rated Frequency	Hz	50	
Rated Normal Current	A	630	
Rated Breaking current			
Rated lightning-impulse withstand voltage	kV	125	
Power frequency test voltage	kV	50	
Rated short-time current	kA	25	
Rated short-circuit making current	kA	63	
Creepage distance for insulators	mm/kV	25	
Distance between phase centers (min)	mm	350	
Link Fuse	A	To be specified according to BOQ	
Operation mechanism		Manual	
All necessary accessories		to be confirmed	
Standard specifications		IEC 60129 VDE 0670	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لاسوالی خاص کجکی ولایت هلمند







Table: Technical Data Disconnecting Switch 20kV, 630 A

Description	Unit	Required	Offered
Manufacturer's Name		to be specified	
Type / Model		to be specified	
Installation		pole mounted	
Nominal Voltage	kV	20	
Rated Voltage	kV	24	
Rated Frequency	Hz	50	
Rated Normal Current	A	630	
Rated Breaking current			
Rated lightning impulse withstand voltage	kV	125	
Power frequency test voltage	kV	50	
Rated short-time current	kA	25	
Rated short-circuit making current	kA	63	
Creepage distance for insulators	mm/kV	25	
Distance between phase centers (min)	mm	350	
Operation mechanism		Manual	
All necessary accessories		to be confirmed	
Standard specifications		IEC 60129 VDE 0670	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لاسوالی خاص کجکی ولایت هلمند

Table: Surge Arrester

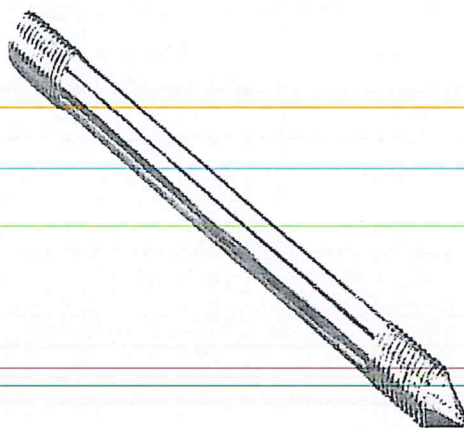
Designation	Unit	Required	Offered
Manufacturer	-	-	
Country of origin	-		
Type	-	station metal oxide gapless	
Housing	-	silicon rubber	
Color	-	grey	
Nominal characteristics	-		
Rated max. network operating voltage	kV	24	
Rated operating voltage (Ur)	kV	24	
Rated continuous operating voltage (Uc)	kV	20	
Rated discharge current (peak)	kA	10	
Switching impulse current (peak)	kA	2	
Line discharge class (IEC 99-4)	-		
Rated frequency	Hz	50	
Protection characteristics			
Max. residual voltages			
- For a steep impulse current, 1/2 μs front, 10 kA.	kV	71	
- For lightning impulse current, 8/20 μs, 10 kA.	kV	67	
- For a switching impulse current 30/60 μs, 0.5 kA	kV	52	
Energy absorbing capacity	kJ/kV	4.3	
Operating performances			
High current impulse withstand (4/10 μs)	kA	100	
Temporary over voltage withstand (for 10s)	kV	24	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و سواهی خاص کجکی ولایت هلمند

Table: Surge Arrester

Designation	Unit	Required	Offered
Insulation levels			
- Lightning impulse withstand voltage	kV	125	
- Power frequency withstand voltage (1 m wet)	kV	50	
- Creepage distance	mm/kV	25	
- Cantilever strength	kN	--	
- Torsion strength	N-m	-	
Pressure relief capacity			
- Current amplitude (rms)	KA	17.5	
- X/R, asymmetry factor	-	17	
- Current duration	s	0.2	
Weights and dimensions:			
- Arrester height	mm	-	
- Arrester diameter	mm	-	
- Weight	kg	-	
Accessories			
Mounting hardware	-	Yes	
Ground Connector	-	Yes	
Insulating bases	-	Yes	
Discharge counter	-	-	
HV terminals connectors	-	Yes	
Standards	-	IEC 60099-4	
Quality control	-	ISO 9001	
Installation	-	Outdoor	

مشخصات تخنیکي برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند

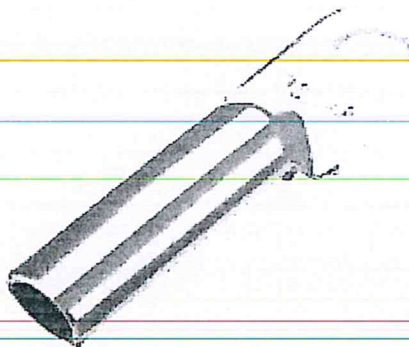


Copper Ground Ear thing Rod

Diameter	20mm
Usage/Application	Power Distribution Earthing
Material	Copper
Color	Copper
Length Of Rod	1000mm

مشخصات تخنیکي برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند

Compression Cable



Lugs

Color	Golden
Material	Copper
Size:	(300-150-120) mm ²
Application	Power Distribution

مشخصات تخنیکي برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند

Table: Technical data for 12/20kv Cable Termination- Outdoor

Designation	Unit	Required	Offered
Cable			
Nominal voltage of cable	kV	12/20	
Cable type		N2XS2Y .	
Insulation material of conductor		XLPE	
Outer sheath material		PE	
Nominal cross-section	mm ²	35	
Nominal cross-section	mm ²	50	
Nominal cross-section	mm ²	70	
Nominal cross-section	mm ²	95	
Nominal cross-section	mm ²	120	
Nominal cross-section	mm ²	150	
Nominal cross-section	mm ²	185	
Nominal cross-section	mm ²	240	
Termination			
Manufacturer		to be specified	
Type		to be specified	
Design		track resistant, silicon rubber insulator with	
		an detector for controlling the electrical field	
Installation	kV		
Rated lightning – impulse test voltage	kV	>55	
Rated power – frequency withstand voltage		>145	
Direct current withstand	kA	>U ₀	
Short-time current withstand	mm	>75	
Dimension	kg	to be specified	
Weitht		to be specified	
Standard specifcations		IEC 60, 230, 437, 502 VDE 0278	

مشخصات تخیلی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لیسوالی خاص کجکی ولایت هلمند

Table: Technical data for 12/20kv Cable Termination- indoor

Designation	Unit	Required	Offered
Cable			
Nominal voltage of cable	kV	12/20	
Cable type		N2XS2Y	
Insulation material of conductor		XLPE	
Outer sheath material		PE	
Nominal cross-section	mm ²	35	
Nominal cross-section	mm ²	50	
Nominal cross-section	mm ²	70	
Nominal cross-section	mm ²	95	
Nominal cross-section	mm ²	120	
Nominal cross-section	mm ²	150	
Nominal cross-section	mm ²	185	
Nominal cross-section	mm ²	240	
Termination			
Manufacturer		to be specified	
Type		to be specified	
Design		track resistant, silicon rubber insulator with an detector for controlling the electrical field	
Installation	kV		
Rated lightning – impulse test voltage	kV	>55	
Rated power – frequency withstand voltage		>145	
Direct current withstand	kA	>U ₀	
Short-time current withstand	mm	>75	
Dimension	kg	to be specified	
Weight		to be specified	
Standard specifications		IEC 60, 230, 437, 502 VDE 0278	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لاسوالی خاص کجکی ولایت هلمند

A L- ACSR**- Tension Clamp**

Standard	GB
Usage	Line Fittings
Type	Tension Clamp
Conductor Range	1x(50-120)mm ²
Application	Voltage 20-24 kv M-
Materials	Cast iron

مشخصات تخنیکي برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند



Table: Technical Data for 20 kV Fiber pin Insulator

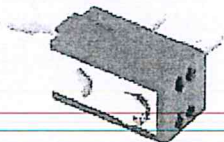
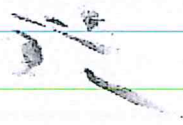
Description	Unit	Required	Offered
Manufacturer's Name		to be specified	
Type		pin insulator	
Material		silicon rubber	
Rated voltage	kV	24	
Power frequency withstand voltage:	KV	65	
Dry Lightning impulse withstand voltage:	KV	145	
Leakage distance	mm	610	
Min Arc distance	mm	215	
Section length	mm	305	
Specified mechanical load	KN	11	
Nominal diameter "D"	mm	to be specified	
Maximum height "H"	mm	to be specified	
Min. nominal creepage distance	mm	to be specified	
Number of the fiber	number	to be specified	
Unit weight	kg	to be specified	
With all necessary accessories for Installation incl. metal thimbles threaded for screwing on to steel spindles			
Reference standard		IEC 61109	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لیسوالی خاص کجکی ولایت هلمند

Table: Technical Data for 20 kV Fiber Tension Insulator

Designation	Unit	Required	Offered
Manufacturer's Name		to be specified	
Type		tension insulator	
Material		silicon rubber	
Rated voltage	kV	24	
Minimum mechanical failing load	kN	70	
Height	MM	450	
Insulating distance Li.	MM	235	
Min.nominal creepage distance	MM	635	
Diameter of shed	MM	148/118	
1 min power frequency wet withstand voltage not less than	KV	42	
Full wave lightning impulse voltage (peak value)	KV	150	
Dry impulse withstand voltage:	KV	to be specified	
Minimum puncture voltage in oil	kV	to be specified	
Number of elements	number	to be specified	
Weight	kg	to be specified	
With all necessary accessories for installation standard		IEC 61109	

مشخصات فنی برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق و لیسوالی خاص کجکی ولایت هلمند



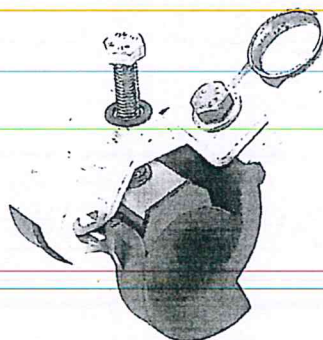
AL-ABC –

Tension Clamp

Usage	Line Fittings
Type	Tension Clamp
Conductor Range	4X(50-120)mm2
Application	Low Voltage 1kv
Materials	AL- Robber

مشخصات تخنیکي برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند

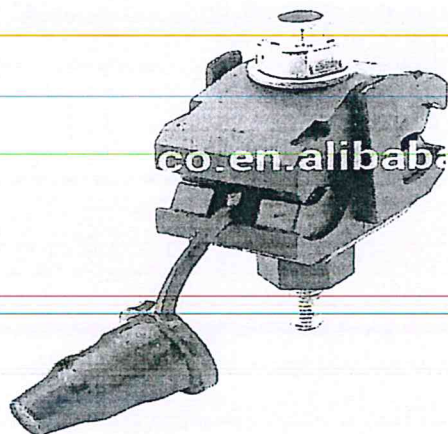




LV ABC Cable Suspension Clamp

MODEL	CROSS-SECTION(mm2)
SM140	4 X (35-120)

مشخصات تخنیکي برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند



TYPE:	insulation piercing connector
Material:	PA66
Color:	Black
Size:	25-95 mm2

مشخصات تخنیکي برای تجهیزات برقی پروژه اصلاح و ترمیم شبکه برق ولسوالی خاص کجکی ولایت هلمند

Piercing connectors for LV ABC

Application

As piercing connectors of EP and PX type (see table 1) can be used as a connection between LV and service or main cables

Type EP and PX types are designed for connection of cables with large cross section (LV-ABC lines) when tight fitting the bolts, the teeth of the contact plates pierce the insulation and establish a contact with it. The bolts (wrench size 17 mm) are tightened until the heads shear off. Stripping of insulation is avoided and the cable end is sealed with a cap

Features

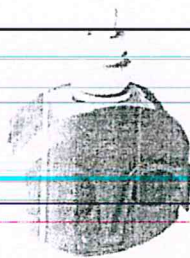
- Suitable for aluminium and copper conductors
- Potential free (lightning proof) with safe installations on poles
- Connectors for 4/25, 4/35, 4/50 mm² according to IEC 88 (see table 1) including 4/45 and 4/60 mm² cables
- Connector depth are 25, 35, 50, 60 mm covered with a rubber cap to prevent water entry and corrosion
- Components not loaded and not attached to body

- The bolt is made of stainless weather resistant material (plastic reinforcement possible)
- The teeth are made of hardened copper bolt material (4/45, 4/60) or Steel (4/25, 4/35, 4/50)

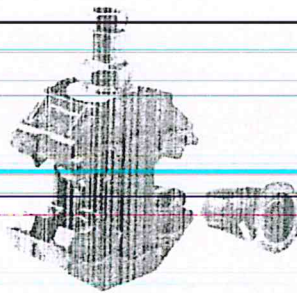
Applied dimensions only VRC to cables (see table 1) on cable connection kits" on 25

For cable terminals and core protection (see table 1) on 25 and 26

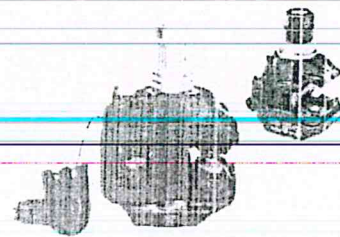
EP and PX connectors



Type EP 95



Type PX 95



Type EP 95 MK2 EP95-13

Simultaneous piercing of main (insulated LV-ABC) and branch (cable core) conductor

Ordering code	Application range (mm ²)		Bolt	Torque	Weight
	LV-ABC	Cable conductor		(Nm)	(kg/100 pcs)
EP95-10	16 - 95	1.5 - 10	1 x M6	7	5.0
PX 10A75	16 - 95	4 - 35	1 x M6	11	10.3
PX 10	25 - 95	25 - 95	1 x M8	19	16.0
DZS 10A75-150V	25 - 120 (150V)	120 - 240	1 x M10	40	20.0

For cable terminals and core protection (see table 1) on 25 and 26

