Prostar

PowerOne Series High Frequency Online UPS

1kVA~3kVA 1:1 PF:1.0

Performance Characteristics

- True double conversion
- Microprocessor control optimizes reliability
- DSP technology guarantees high performance
- Sinus shaped power feed (high-frequency pulse width modulation with IGBTs)
- Input power factor correction
- Output power factor 1
- Extremely wide input voltage window of 110 VAC to 300 VAC
- High efficiency up to 95.5%
- 50Hz/60Hz frequency converter mode
- ECO and frequency operating voltage possibilities
- Emergency power off(EPO) function
- Graphic LCD display with interactive multilingual user interface
- Adjustable battery numbers
- Adjustable charging current via LCD panel
- Adjustable charging mode with two stages or three stages
- Charger capacity expansion to 12A for long-run models
- Programmable output voltage
- Cold start by battery without grid Input
- Advanced battery charging technology for maximum durability of the battery
- Generator compatible
- Extension slot for SNMP, potential-free contacts, remote panel

Series Overview

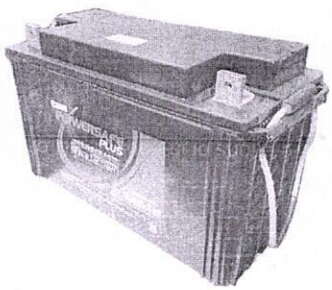
POWER ONE is a double conversion online UPS with output power factor 1. Designed in small footprints, it adopts advanced DSP digital control technology to effectively improve product performance and system reliability. The ECO and frequency inverter operation modes highlight the requirements for a modern versatile UPS. It is widely suitable for safe supply of application-critical loads in the IT environment such as workstations, servers, storage systems and sensitive switching and control systems.

Technical Specifications

Model		PET1101	PET1101B	PET1102	PHT1102B	PET1103	PET1103B
Capacity		1KVA/1KW		2KVA/2KW		3KVA/3KW	
Battery Voltage		36VDC	24VDC	72VDC	48VDC	96VDC	72VDC
Size,D×W×H(mm)		385×143×222			395×143×222		455×190×330
Weight(Kg)		4	8	6	14	6	22
Input	Input Format	L+N+PE					
	Rated Voltage	208/220/230/240VAC					
	Voltage Range	110-300VAC					
	Frequency Range	50/60±6Hz(Default), ±10Hz(Settable)					
	Power Factor	≥0.99					
	Harmonic Distortion(THDi)	≤3 % THD (Linear Load); ≤ 5% THD (Non-linear Load)					
Output	Output Format	L+N+PE					
	Rated Voltage	208/220/230/240VAC					
	AC Voltage Regulation	±1%					
	Frequency Range	AC Mode:same as AC, Battery Mode:50/60Hz±1%					
	Harmonic Distortion(THDi)	≤1% THD (Linear Load); ≤3% THD (Non-linear Load)					
	Power Factor	1					
	Overload Capacity	AC Mode: 30min@102%~110% load 10min@110%~130% load 30s@130%~150% load 200ms@>150% load			Battery Mode: 1min@102%~110% load 10s@110%~130% load 3s@130%~150% load 200ms@>150% load		
	Wave Form	Pure Sine Wave					
Transfer Time	AC Mode to Battery Mode	0ms					
	Inverter to Bypass	4ms					
Efficiency	AC Mode	94.5%@220VAC			95.5%@220VAC		
	Battery Mode	88.5%	87.5%	91.5%	89.5%	91.5%	91.5%
Battery	Battery Type	Depending on applications					
	Battery Numbers	3	12V7Ah×2	6	12V7Ah×4	8	12V7Ah×6
	Charging Current	5A(Default), 1-12A(Adjustable)	1A(Default), 1-4A(Adjustable)	5A(Default), 1-12A(Adjustable)	1A(Default), 1-4A(Adjustable)	5A(Default), 1-12A(Adjustable)	1A(Default), 1-4A(Adjustable)
	Charging Mode	Two-stage / Three-stage charging					
Display	LCD Display	Working mode/load/input/output					
Environment	OperationTemperature	0~40°C					
	Storage Temperature	-15~60°C (Battery:0~40°C)					
	Relative Humidity	20%~95%(No condensation)					
	Altitude	≤1000m					
	Noise	<45dB@1 Meter					
Management	RS232/USB	Windwos 2000/2003/XP/Vista/2008/7/8/10, Linux and MAC					
	Optional SNMP	Power management from SNMP manager and web browser					

52 32

Exide 100Ah EP100-12 SMF UPS Battery



Manufacturer : Exide
Model : Powersafe PLUS EP100-12
Warranty : 24 Months
Capacity : 12V, 100Ah
Store Location : Chennai

- Price Inclusive of GST.
- Get GST invoice save additional **28%** on business purchases.

Rating: Not Rated Yet
Price

Ask a question about this product

ManufacturerEXIDE

Description

Description:

Exide SMF batteries are flat plate batteries that do not require periodic topping-up with water and normally do not emit any fumes or gases on a continuous basis. They are best suitable for applications where backup requirement is usually short, normally not exceeding 30 mins to 1 hour. These batteries are automatic choice where the ambient temperature is not very high and space is a constraint. Exide's Powersafe VRLA batteries provide ideal backup power for UPS systems.

Exide Presenting NEW Improved Exide Powersafe Plus, Sealed, Maintenance-free VRLA batteries with enhanced design features which give a

higher performance and reliability, better suited to Indian conditions. Exide Powersafe is a product of collaborative efforts of in-house R&D of Exide Industries Ltd., the largest lead-acid battery manufacturer of India.

FEATURES OF VRLA EXIDE POWERSAFE+ RANGE 12V 100Ah (EP100-12) UPS Battery

- New Improved Sealed Maintenance-free
- Free from Orientation Constraints
- Eco-Friendly
- Easy Handling and No Installation Constraints
- Ready to Use
- Long Service Life
- Low Self-Discharge
- Excellent Charge Retention and Recovering Ability
- Superior High Rate Discharge

APPLICATION:

UPS System

PCO Monitors (Electronic)

Telecommunication System

Office Automation System

Fire Alarm & Security System

Electronic PABX System

Cable Television Equipment

Electronic Attendance & cash Register

Process Instrumentation & Control

Railway Signalling

Power Plants

Substations Etc...

SPECIFICATIONS - Exide 12V 100Ah SMF UPS Battery :

Brand	Exide
Model	Powersafe PLUS EP100-12
Voltage	12V DC
Capacity	100Ah
Type of Battery	SMF
Factory Charged	Yes
Maintenance	Not Required
Warranty	24 Months Warranty
Dimensions (L*W*H) in mm	407mm * 173mm * 235mm
Weight in Kgs (approx.)	32.0 Kg
Sales Support	Best Price Available from Authorised Distributor, Kongu Energies, Chennai
After-sales service Support.	Warranty Service support by Exide Industries Ltd

Reviews

SL 4 & 5

7.5-20 kVA TECHNICAL SPECIFICATIONS

Prime Rating at rated rpm (as per ISO8528)		kVA	7.5	10 ✓	15 ✓	20
		kW	6	8	12	16
Genset Model			KG4-7.5WS1	KG4-10WS1	KG4-15WS1	KG4-20WS1
Frequency		Hz	50			
Power Factor		lagging	0.8			
Voltage		V	230 (1Ø) & 415 (3Ø) ✓			
Governing class (As per ISO 8528 Part-V)			G2			
DG set Noise level at 1 meter		dBA	<75 (Genset with canopy)			
Fuel tank capacity (Standard DG set)		Ltrs	28	32	32	40
✪Weight of genset with canopy (approx..)^	Dry	Kg	545	585	605	680
	Wet (w/o fuel)	Kg	550	590	610	690
Overall dimensions of genset ^	Length	mm	1600	1800	1850	2180
	Width	mm	760	760	760	905
	Height	mm	1050	1050	1050	1150
Electrical Battery Starting Voltage		Volts-DC	12			

ENGINE

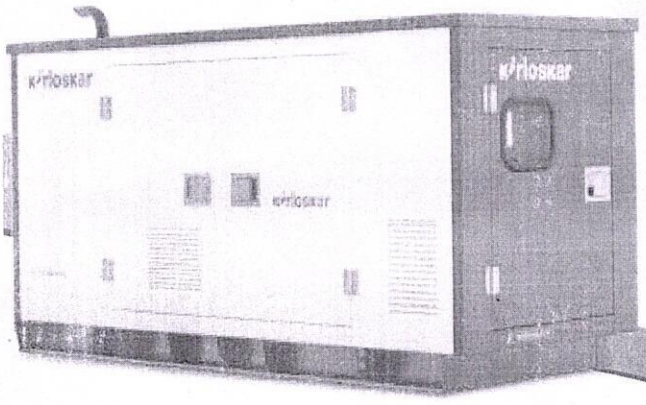
		2R550NA 4G1	3R550NA 4G1	3R550TC 4G1	3R550TA 4G1
Engine Model					
Rated output (Prime Continuous rating as per ISO 8528-1)	kW	7.9	11	15.4	18.8
	HP	10.74	15	20.9	25.5
Cooling system		~~Liquid~~ Air Cooled.			
No. of cylinder	Number	2	3	3	3
Cubic capacity	Ltrs	1.09	1.65	1.65	1.65
Bore x Stroke	mm	86 x 94	86 x 94	86 x 94	86 x 94
Rated Speed	RPM	1500			
Aspiration	NA/TC/TA	NA	NA	TC	TA
Lube Oil change period	hrs.	500			
Lube oil Sump Capacity (max)	Ltrs	3.8	5.95	5.95	5.95
Coolant Capacity (Engine + Radiator)	Ltrs	3.4	3.78	4.2	5

ALTERNATOR

Insulation Class		Class H			
Alternator Efficiency (at 100% load) 0.8 pf**	%	82.4	80.3	85.2	88.6
Max Voltage Dip at Full Load 0.8 pf lag		< 20 %			
Max Time to build up rated voltage at Rated RPM		< 2 sec, provided engine reach the rated speed			

^ Tolerances Apply
✪ These Weight are for handling & transportation only
** Efficiency of Alternator as per standards IEC60034-1

Notes
Above specifications are subject to change without prior notice due to continuous technical development.
For intermediate ratings, kindly contact nearest Kirloskar office.
For Site Conditions other than standard operating conditions consult Kirloskar Oil Engines for available prime power.



7 Easy steps for a happy Genset Ownership

- Insist on a load-study
- Select the Genset rating as per the load-study and with sufficient margin for future load expansion
- Apply site-selection guidelines carfully
- Insist on installation in line with Kirloskar guidelines
- Ensure adeqate size and proper connection of cables
- Understand the Genset operation & maintenance procedures during commissioning
- Follow routine maintenance protocols through authorised Kirloskar service dealers

Reference:

Technical Specification for 10 kVA Kirloskar Single Phase DEG

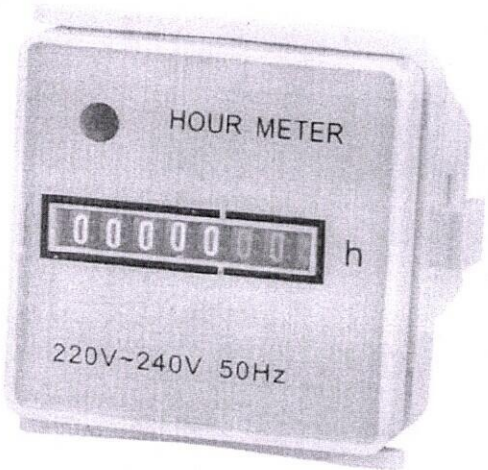
Brand	Kirloskar
Genset Rating KVA	10 kVA
Type	Semi-Automatic
Cooling System	Air Cooling
Voltage	215-240 V
Fuel Type	Diesel
Rated Speed	1500 RPM
Fuel Tank Capacity	50 L
Insulation Class	Class H
Fuel Consumption	3 L/H (At 100 % Load),2.4 L/H (At 75 % Load),1.8 L/H (At 50 % Load)
No. Of Cylinder	2 Cylinder

Technical Specification for 25 kVA Kirloskar Single Phase DEG

Prime Rating at rated rpm		kVA	25
		kW	20
Frequency		Hz	50
Power Factor		lagging	0.8
Voltage		V	230 (1Ø)
Governing class (As per ISO 8528 Part-V)			G2
DG Set Noise level at 1 meter		dBA	<75 (Genset with canopy)
Fuel tank capacity (Standard DG set)		Ltrs	50
Weight of genset with canopy (approx.)	Dry	Kg	770
	Wet (w/o fuel)	Kg	
Overall dimensions of genset ^	Length	mm	2330
Electrical Battery Starting Voltage		Volts-DC	12
Rated output (Prime Continuous rating as per ISO 8528-1)		kW	26.5
No. of cylinder		Number	3
Rated Speed		RPM	1500
Insulation Class			Class H

SL 6 DEG RUN HOUR METER, ANOLOGE.

Packaging Type	Box
Voltage	220 V
Usage/Application	Laboratory
Phase	Single Phase
Color	White
Material	Plastic
Frequency	50 Hz
Mounting Type	Wall Mount
Ip Rating	IP54
Available Power Supply	24 V DC
Display	LCD
Country of Origin	Made in India
Availability	In Stock



SL. 19

LG 1.5 Ton 5 Star Inverter Split AC (US-Q19YNZE) Full Specifications

General

Brand	LG
Model	1.5 Ton 5 Star Inverter Split AC (US-Q19YNZE)
Price in India	₹42,490
Model Name	US-Q19YNZE
Type	Inverter Split
Capacity	1.5 Ton
Star Rating	5 Star
BEE Rating Year	2025
Colours	White
Cooling Capacity	5000 W
Compressor	Dual Rotary Compressor
Dehumidification	Yes
Condenser Coil	Copper
Remote Control	Yes

Dimensions

Indoor W x H x D	99.8 cm x 34.5 cm x 21 cm
Indoor Unit Weight	11 kg
Outdoor W x H x D	77 cm x 54.5 cm x 28.8 cm
Outdoor Unit Weight	30 kg

Performance features

ISEER	5.2 W/W

Power features

Power Requirement	AC 230V, 50Hz

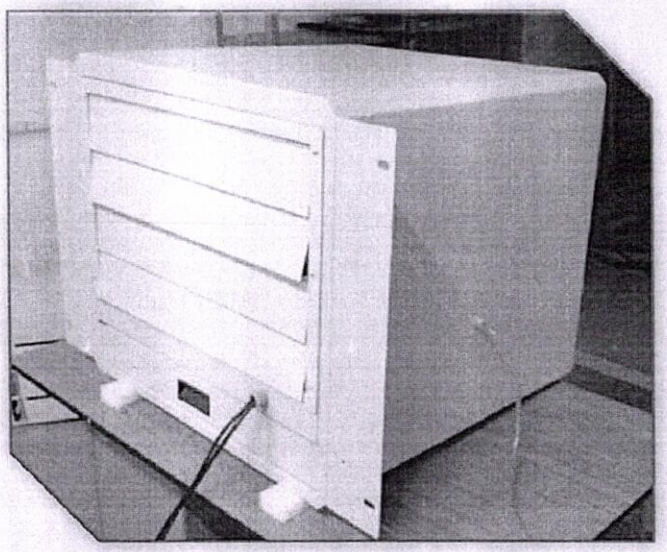
Air flow and filter features

Anti-bacteria Filter	Yes

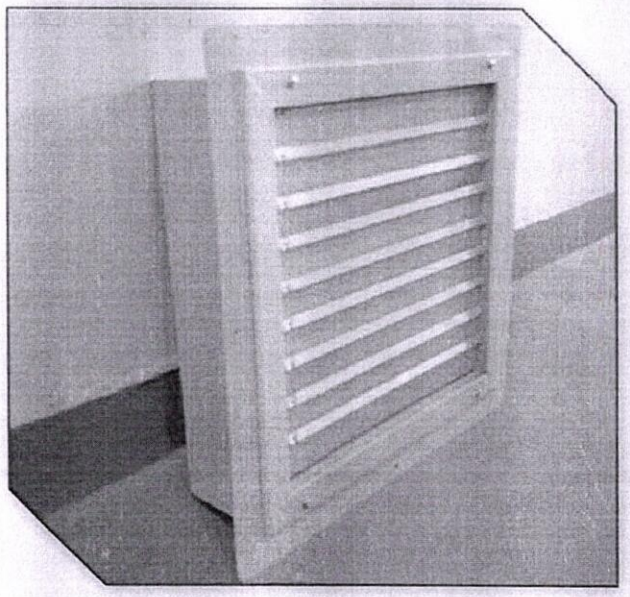
Free Cooling Unit

Components of FCU

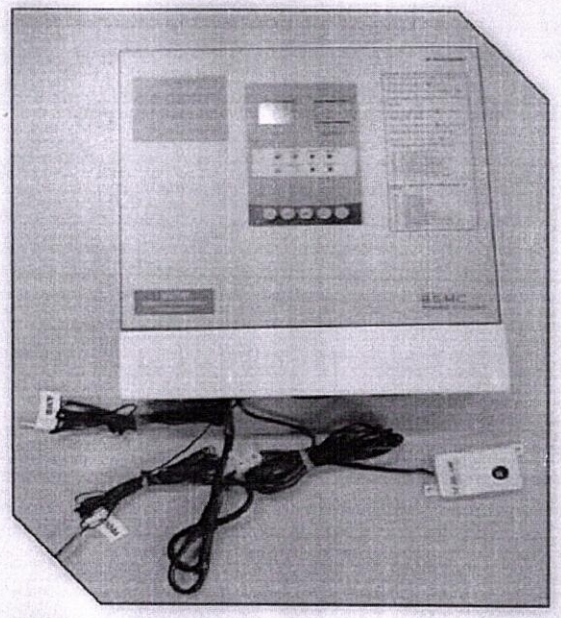
1. Air Inlet Unit
2. Exhaust Unit
3. Control Unit



Air Inlet Unit



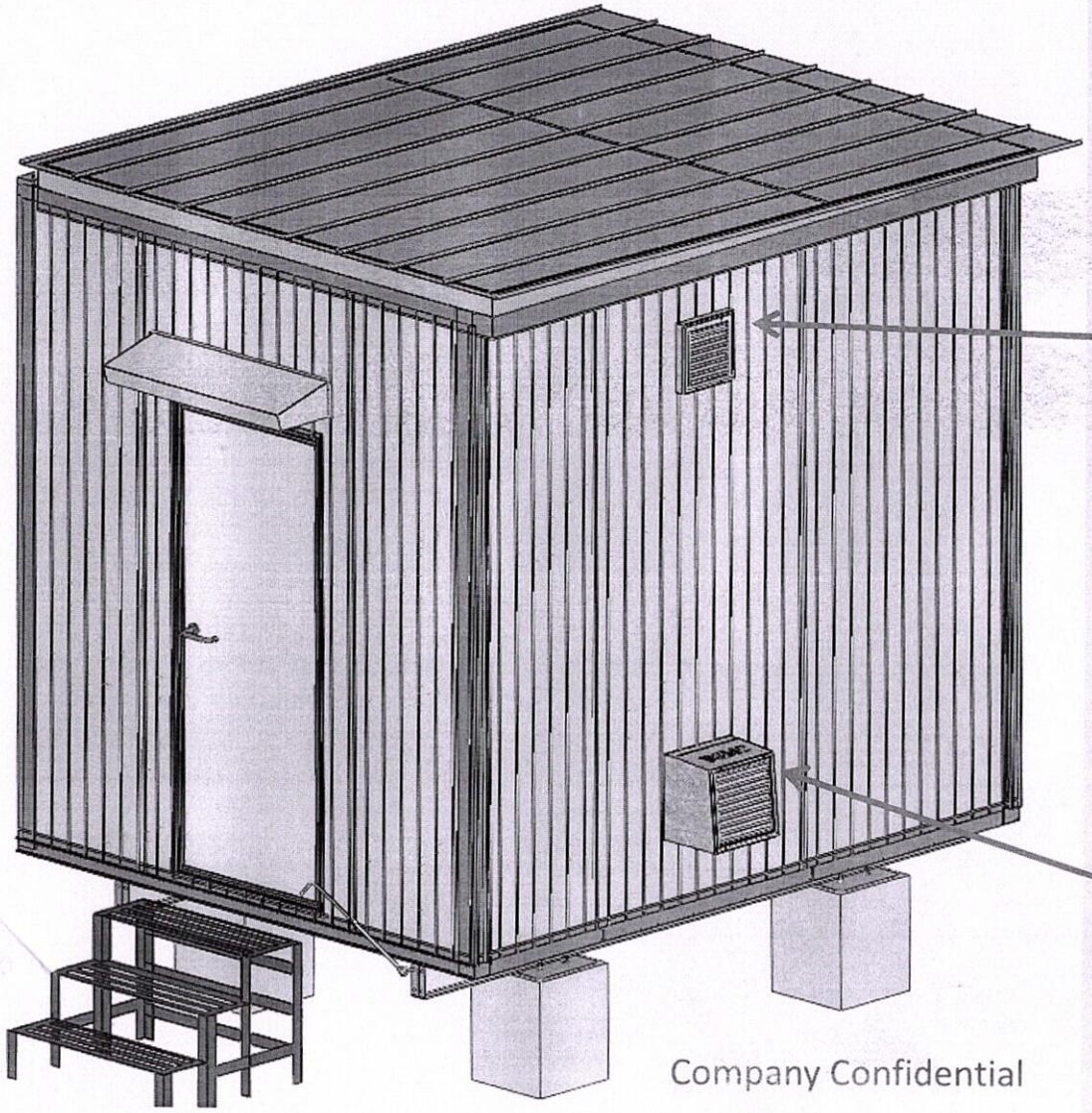
Exhaust Unit



Control Unit

Free Cooling Unit

Outside View of BTS site (Shelter)

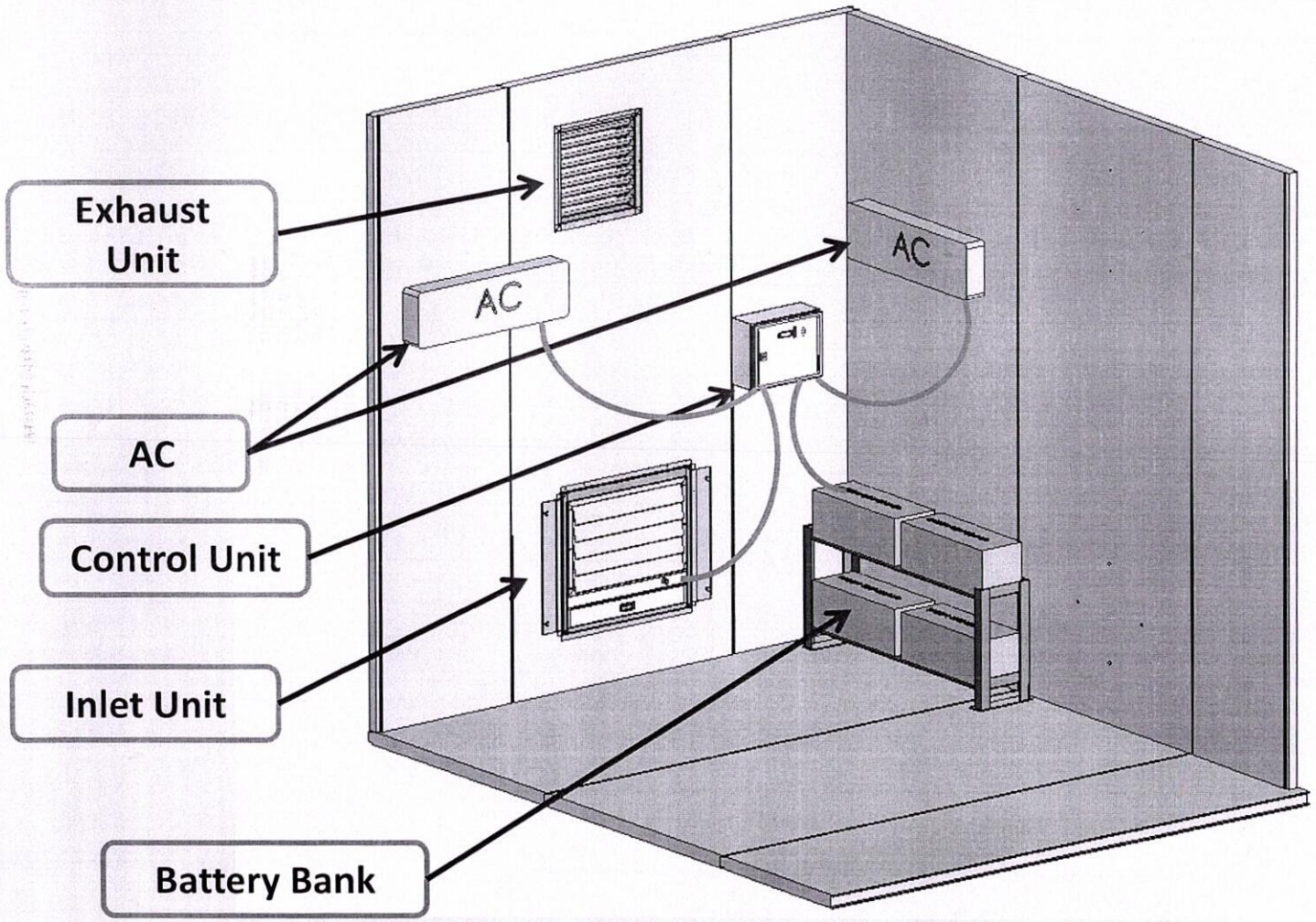


Exhaust Unit
View from outside

Air –Inlet Unit
View from outside

Free Cooling Unit

Inside View of BTS site (Shelter)



Free Cooling Unit

Technical Specification sheet

FCU Technical Parameters	Value
Power Consumption	168 Watts (Max at full speed)
Fan nominal voltage	48V DC (Make: EBM)
Working ambient temperature	-25˚C ~ +60 ˚C
Air flow Volume (CFM)	3030 m^3/h (1800 CFM)
Noise level	<55 db
Protection from Dust and Water	IP 54
Weight	40 Kg (Approx)
Cooling Output at $\Delta t = 5^0$ C	5.0 KW
Filter	F5 or G4 ; 80 % down to 20 Micron
Mounting Method	Wall mounted
Controller operational mode	Auto/Manual/Off Mode
Air Inlet Outer Dimension (mm)	690(W) x 625(H) x 700(D) in mm
Air Inlet Outer Dimension (mm)	470(W) x 470(H) x 100(D) (mm)
Powder paint Color	RAL 7035

Free Cooling Unit

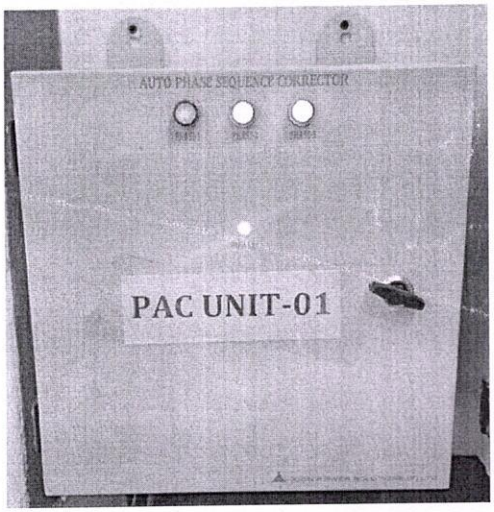
Controller Specification and Features

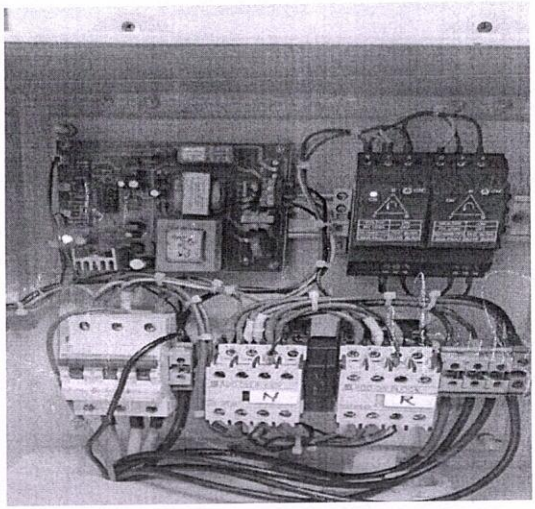
Supply Voltage	48V DC
Wide input voltage range	42 - 56 V
Working Ambient temperature range	-25˚C to + 60˚C
Max no of AC to connect	Up to 3 Nos AC
Port compatible for	RS 485/RS 232 port for Connectivity with laptop/computer
Display	LED Type
Temperature sensor	For room and ambient Temperature measurement
Humidity Sensor	For measuring room humidity
Remote Monitoring	Monitored from central location
Emergency cooling	On failure of AC or high room temperature
Potential free contacts for Alarms	For remote monitoring of alarms
Speed control for Fan (1-10V)	According to the external temperature variation
Sound buzzer	For different alarms

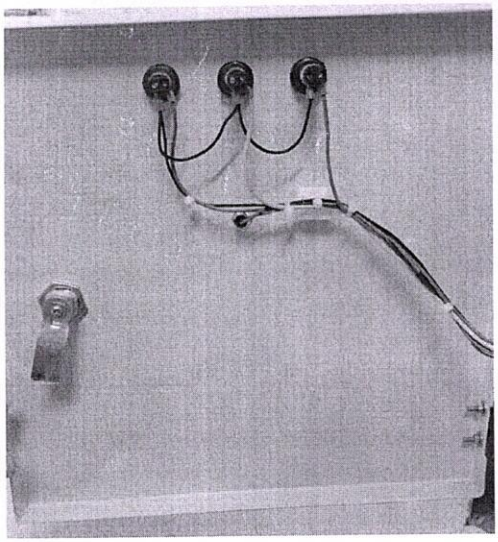
SL 20 Specification Datasheet is not available in internet, so please proceed with the Specification provided below.

Technical Specification:
Input rating & Voltage: 3-Phase, 415 V
Input MCB: 32 A
Output Voltage: 3-Phase, 415 V
Frequency: 50 Hz
Indication: R-phase, Y-phase & B-phase, LEDs or Digital display
Operation: Fully Automatic

Automatic Phase Sequence Corrector (APSC) is used to keep all the three Phases in the correct sequence (RYB), irrespective of any sequence coming from input supply







Details for ESE Lightning Protection System

Note: During the Open box investigation, the supplier should produce the necessary testing kit to test the ESE lightening conductor and strike counter.

Technical Specifications

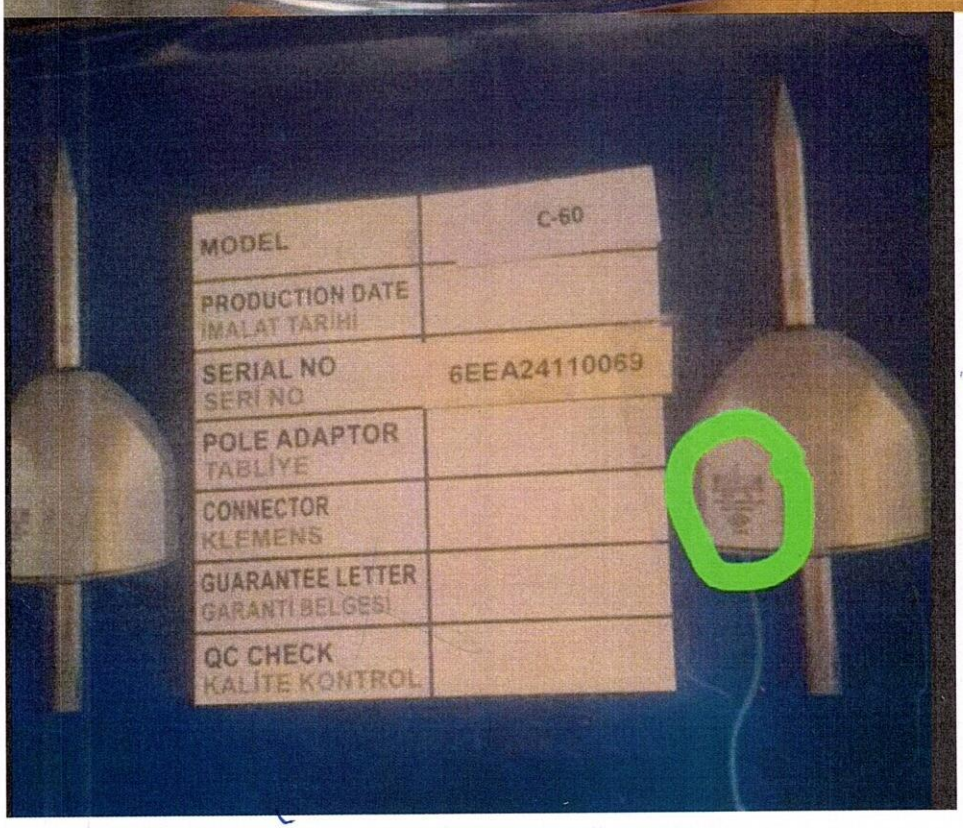
1. ESE Lightening Conductor- (Model: Level 3, COSMOS C60, protection radius: 107 meter)
2. Mast to erect the conductor: Should be FRP pole of length 2.5 metres.
3. Lightening Protection System - Down Conductor
   Total Cable = 700 meter

4. Lightening Protection System - Lightning Strike Counter with IP-65 enclosure

5. Copper Bonded Chemical Base Earthing System with one Pit cover.
   - Chemical should be 80Kg
   - Chemical should be packed in plastic bucket of two

6. Should have four copper rods of length 5 ft. The rods will be installed with a gap of 2 meter each.
7. 2 meter copper strip should be provided to connect each rod. In one set, there should be three copper strip to connect each rod. All necessary connectors, lugs, clamps should be included.
8. It should also include U-Clamps and necessary plates with nuts to fix the mast with tower.

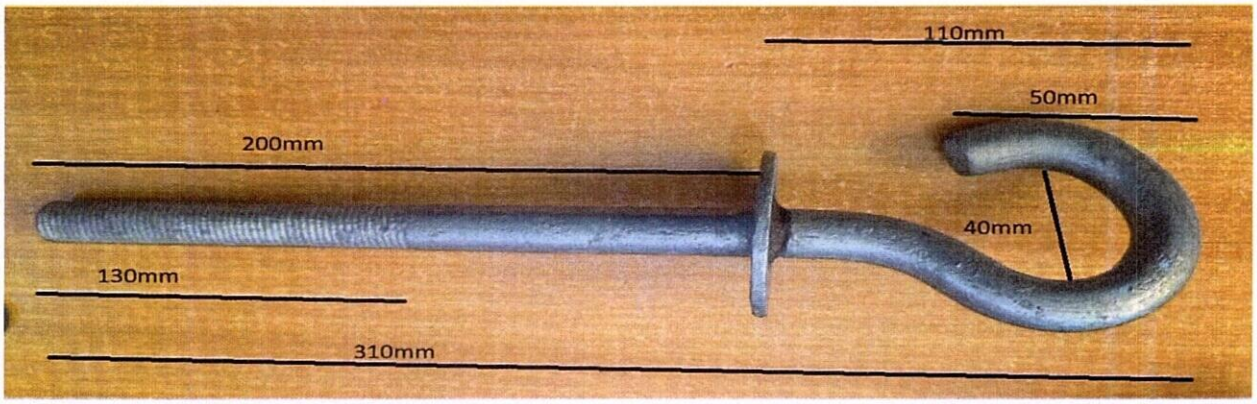

COSMOS
ESE LIGHTNING CONDUCTOR
MODEL
SERIAL NO :
Made in TURKEY
TSE

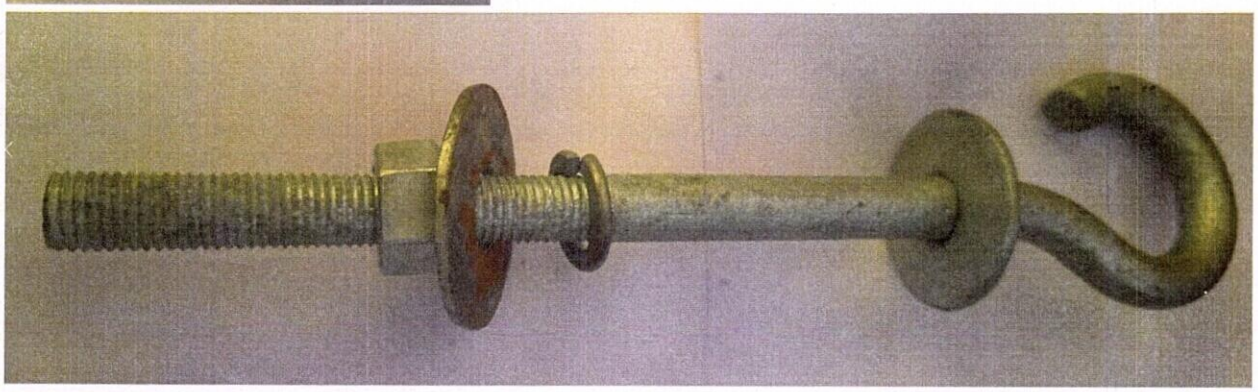

MODEL
C-60
PRODUCTION DATE
IMALAT TARIHI
SERIAL NO
SERİ NO
6EEA24110069
POLE ADAPTOR
TABLİYE
CONNECTOR
KLEMENS
GUARANTEE LETTER
GARANTİ BELGESİ
QC CHECK
KALİTE KONTROL

Submitted: 23/01/2026

Eye-hook Specification

- ✓ Galvanized
- ✓ Material: Drop-Forged Steel





• Stay wire

3. Stay wire

Utilities grade galvanized steel stranded shall be used for guy wire as shown in below table.

Designation	No. of strands	Strand SWG	Stranded Diameter (mm)	Overall diameter (mm)	Approx. Weight per meter (kg)	Min. Breaking load (kN)
7/8	7	8	4.04	12	0.72	60

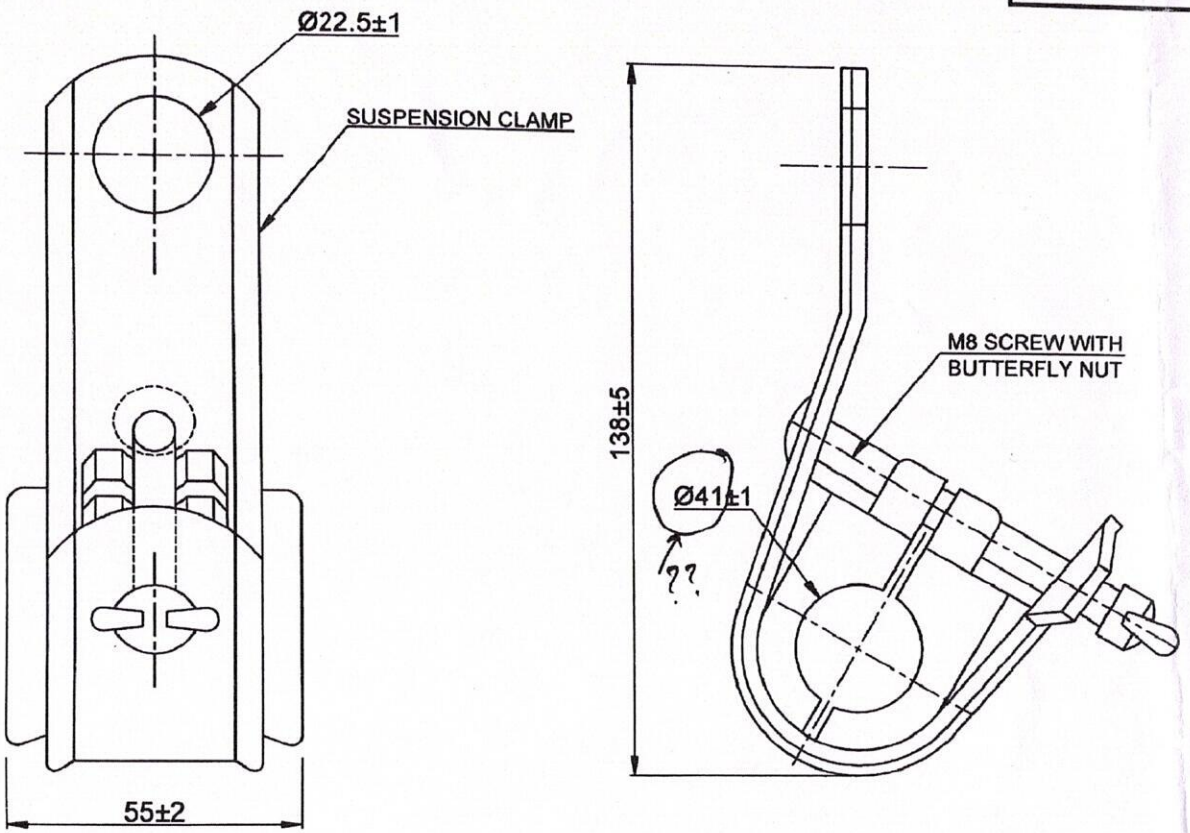
Dead End

1. Name: Tension clamp for 2x50mm² cable, shear head
2. Conductor size: 2x50mm²
3. Conductor Diameter: 10mm
4. Specific Minimum Failure Load (SMFL): 9.6 KN
5. Tightening Torque: 44 Nm

Suspension Clamp.

TECHNICAL DATA:-

1. ALL FERROUS PARTS ARE HOT DIP GALVANISED AS PER IS:2629/2633



ALL DIMENSIONS ARE IN MM.

DO NOT SCALE

Raychem RPG Pvt. Ltd.

(A Tyco Electronics - RPG Enterprises JV)

Rev	Revision Record	Date	Dwn	Apd

Customer Drawing

Tolerance: ± 2% Unless otherwise specified

Weight (Min.): Gms.

Material -

DRAWN BY:	SONAL RANA
CHKD BY:	SARAVANAN T.
APPR. BY:	SARAVANAN T.
DRAWING NO.:	C-AJA4040106

TITLE: SUSPENSION CLAMP ASSY FOR ~~2X120 Sq.mm SC 4120~~ 2490 mm²

SCALE:	NTS
SHEET SIZE:	A4
ISSUE DATE:	26.10.2016
REFERENCE:	4-1446346-9

RESTRICTED TO:	REV DATE	REV
-	-	0

འབྲུག་གློག་མེ་ལས་འཛིན།།
Bhutan Power Corporation Limited
(An ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Company)
Registered Office, Thimphu
Office of the Chief Executive Officer
Thimphu: Bhutan

18/BPC/MISC/CEO/2025/ 29

April 24, 2025

The Managing Director
Tashi InfoComm Private Limited
Thimphu

Subject: **Submission of Technical Specifications for LV line Materials**

Sir,

Please find attached herewith the technical specifications for the LV line materials, as requested vide your letter no. TIPL/SPPD-5/559 dated 11th April 2025.

Thank you.

Yours Sincerely,

(Sonam Tobjey)
Chief Executive Officer

Technical Specification:

A) LV Aerial Bundled Conductor (ABC)

General

The design of aerial bundled conductors shall comprise compacted, stranded, hard drawn aluminium phase conductors with dry cured cross linked polyethylene insulation. All of the Aerial Bundled Conductors required shall be fully supported cable, where all the equal-sized phase and neutral cores share the mechanical load. The cable shall be XLPE insulated and rated for 0.6/1kV. The bundle shall have a right-hand lay.

Two core cable shall be used for single phase distribution and 4 core cable for three phases. Typical design parameters for the ABC cable used are given in table below:

The Minimum Technical Requirement of the LV ABC

Sl#	Cable Size (mm2)	50		95	
	Parameter	2- core	4- core	2-core	4-core
1	Applicable Standard	IEC60502-1 & IEC 60228 OR Equivalent Standards			
2	Rated Voltage (kV)	0.6/1(1.2)			
3	Nominal conductor diameter (mm)	8.05		11.40	
4	Minimum insulation thickness (mm)	1.5		1.7	
5	Nominal overall diameter (mm)	23.8	28.7	31.8	38.4
6	Approximate mass (kg/km)	350	700	680	1,350
7	DC resistance at 20°C (ohms/km)	0.641		0.320	
8	AC resistance at 50 Hz 80°C (ohms/km)	0.796		0.398	
9	Inductive reactance at 50 Hz (ohms/km)	0.086	0.093	0.080	0.087
10	Voltage drop at 50 Hz, 80°C (mV/A/m)	1.60	1.39	0.81	0.71
11	Continuous current rating (A)	150	140	230	215
12	Fault current rating (kA for 1 sec)	4.1		8.3	
13	Minimum bending radius core (mm)	65		90	
14	Minimum bending radius cable (mm)	130	160	270	320
15	Minimum breaking load (kN)	14.0	28.0	26.6	53.2
16	Recommended highest everyday tension (kN)	2.52	5.04	4.79	9.58
17	Recommended maximum working tension (kN)	3.92	7.84	7.45	14.90

The cable shall be restricted to **(PT KMI Wires and cables, Tbk, PT Sucaco Tbk, PT Voksel Electric Tbk, PT Jembo cables company Tbk and Zhongli Science & Technology, China)** brands only.

Technical Specification:

5.2	Minimum Insulation thickness	mm	1.5	1.5
6	**Test Voltage**			
6.1	5 minute power frequency withstand voltage	kV/5min	3.5 for 5 minutes	
6.2	continuous current rating	A	150	140
6.3	Type of cable end sealing			
7	**Cable drums**			
7.1	Dimensions	Mtr.	As per manufacturing standard	
7.2	Weight	Kg		
7.3	Nominal Length per drum	Mtr.		

B) Galvanised Tubular Steel Swaged Poles

Technical Specification for the Galvanised Tubular Steel Swaged Poles

1. **Scope**

This specification covers the design, manufacture, testing, supply and delivery and performance requirements of the galvanised tubular steel swaged poles.

2. Standards

The equipment shall comply with the latest editions of and amendments to Indian Standards listed below. Where any provision of this specification differs from those of the standards listed hereafter, the provision of this specification shall govern:

IS – Indian Standards

- IS 2713: Specification for tubular steel poles for overhead power lines
- IS 2062: Steel for general structural purposes

Note:
In case of conflict, the order of precedence shall be:

- This Specification

diameter. The length of the overlap shall be at least three times the diameter of the smaller tube, in each case. The Supplier shall state the length of overlap. The upper edge of the tube at each joint shall be chamfered at an angle of 45°.

The poles shall be supplied in two sections for assembly at site by bolting. Galvanised bolts of adequate strength, required for joining the poles at site, shall also be supplied, with manufacturer's instructions for the pole assembly.

Transportation of full-length poles is avoided in Bhutan, due to hand cartage in the mountainous terrain.

Cost of bolts, nuts and washers for joining pole sections shall be deemed included in the schedule rates for pole supply.

4.2 Bolts, nuts and washers

All bolts, nuts and washers, supplied under this Specification shall comply with the following:

The bolts and nuts shall comply with ISO 4016. Mechanical properties shall be in accordance with ISO 898.

The dimensions and characteristics in this Specification are intended to describe typical ISO metric bolts, nuts, and washers, such as are commonly used in the construction of electrical distribution lines, plant and equipment.

The safe working shear stress of bolts is taken as 120 MPa, with the area of the bolt measured at the root of the thread. The table below shows the ultimate tensile strength, the tensile stress areas, the safe working tensile loads and the safe working shear loads for the bolts covered by this Specification. The ultimate shear strength has been assumed to be 75% of the ultimate tensile load and a factor of safety of 2.5 has been applied:

Bolt Size	Ultimate Tensile Stress (N/mm^2)	Tensile Stress Area (mm^2)	Ultimate Tensile Strength (kN)	Working Tensile Load (kN)	Safe Working Shear Load (kN)
M16	400	157.0	62	25	18
M18	400	204.0	81	32	24
M20	400	245.0	98	39	29

Screw threads shall be parallel throughout their length. They shall be so formed that, after galvanising, the nut can be easily screwed by hand over the whole length of thread, without excessive play. Before despatch from the works, one washer shall be fitted to each bolt and a nut shall be screwed on the whole threaded length and left in that position. Washers shall be round, flat, of mild steel, unless where otherwise specified.

4.3 Base plate, pole cap and pole earthing

of the inspected items show damage or serious deviations from the design criteria, the entire batch shall be unconditionally rejected without further sorting.

Dimensions, such as length and top diameter, shall be measured with a standard steel tape.

7. List of tests

The following tests shall be carried out on samples drawn from each consignment of the poles:

i) Deflection Test

ii) Permanent Set Test

iii) Drop Test.

8. Number of samples to be tested

- No. of poles selected for conducting tensile and chemical analysis shall be as per Clause 10.1.1 of IS 2713.
- No. of poles selected for conducting deflection, permanent set and drop test shall be as per Clause 10.1.2 of IS 2713.

9. Rejection

All the samples subjected to above tests shall pass the tests. Should one or more number of poles fail in any of the test, a second set of samples, double in number shall be drawn and subjected to above tests. Should one or more number of poles from second set of poles fail in any of the tests, the entire consignment shall be rejected.

10. **Tolerances:** The poles shall meet the requirements of relevant standards IS 2713 in all respects. In case of weight of the pole, though the standard allows negative tolerance on the weight of the pole (for individual pole as well as for the LOT), while the acceptance of the poles will be based on their conformity to the standards (in case of weight within the specified tolerance limits), the payment will, however, be prorated for any reduction in weight from the standard weight based on to the actual weight of the LOT (within the specified limits) compared to the calculated weight for the LOT based on standard weight indicated in the standard.

For example

IS 2713 allows 10% below the standard weight for individual poles, subject to 7.5% below the calculated standard weight for the LOT. If the pole and LOT weights are within the specified limits, the LOT will be considered as having met the requirement for acceptance, as far as weight is concerned, and will be accepted subject to its having met all other tests / requirements. However, the actual payment will be based on the following:

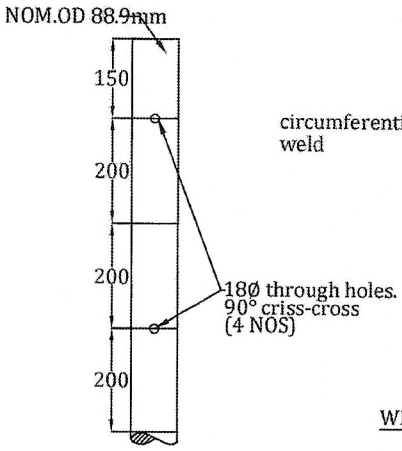
Payment as per contract rates = $R \times N$

Less reduction for lower weight = $R \times N \times \{(W_s - W_a) / W_s \}$

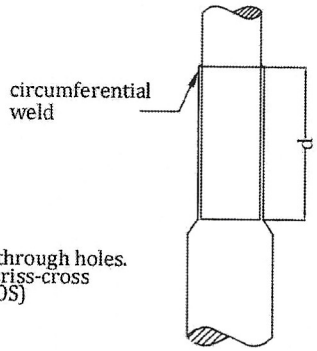
i.e Actual Eligible Payment = $R \times N \times (W_a / W_s)$

where,

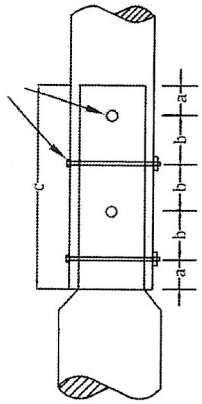
Technical Specification:



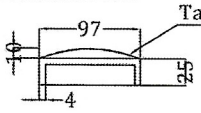
POLE TOP DETAILS



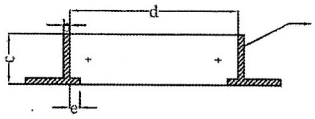
WELDED JOINT J1 DETAILS

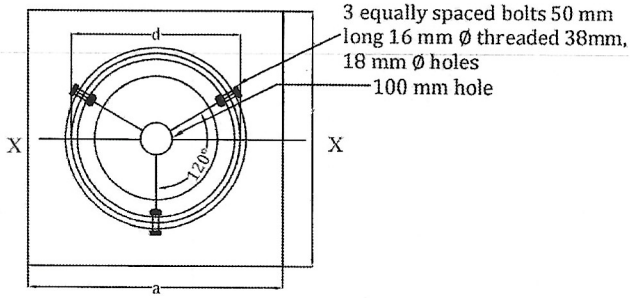


BOLTED JOINT J2 DETAILS



POLE CAP DETAILS (WELDED TO THE POLE)





SECTION X X

DETAILS OF MS BASE PLATE (Seperately packed)

Pole Type			7.5 M (410 SP 9)
	Length	mm	7500
Top Segment	OD	mm	88.9
	Thickness	mm	3.25
	Length	mm	1500
Middle Segment	OD	mm	114.3
	Thickness	mm	3.65
	Length	mm	1500
Bottom Segment	OD	mm	139.7
	Thickness	mm	5.4
	Length	mm	4500
Joint J1	Welded Joint		
	d	mm	230
Joint J2	a	mm	45
	b	mm	70
	c	mm	300
	BL	mm	160
Planting Depth		mm	1250
Base plate details	a	mm	220
	b	mm	4.5
	c	mm	70
	d	mm	139.7
	e	mm	10

NOTES

1. DIMENSIONS AS SHOWN ARE IN MM.
2. SPECIFICATIONS AS PER IS:2713 (PART 1 TO III : 1980)
3. POLE TOP CAP -M.S. PLATE WOULD BE TAG WELDED TO THE POLE

BHUTAN POWER CORPORATION LIMITED			ENGINEERING AND RESEARCH DIVISION	
			TITLE: DISTRIBUTION DESIGN & CONSTRUCTION STANDARD 7.5 METERS SWAGED POLE DETAILS	
	NAME	DATE		
DESIGNED BY				
CHECKED BY			DRAWING NO. BPC - DDCS - 2023 - 15/2-7	REVISION 2023
APPROVED BY				

C) Low Voltage PVC insulated Cables

1.0 Scope

This specification covers the design, manufacture and testing of cables at manufacture's work before dispatch, packing and transportation to BPC stores.

2.0 Design Criteria

2.1 Standards

The cables under this specification shall comply with the requirements of latest edition of the following standards including amendments:
IEC: 60183, 60227,60502, 60885, 50480 IS (Indian standards): 1554 (Part-I) IS: 1753 IS: 3961 Part-II IS: 3975IS: 4905, IS:5831, IS: 7098 (Part- III), IS: 7098 (Part-II), IS: 7098 (Part-I), IS: 8130, IS: 10418, IS: 10810, ASTMD 2863, IEEE-383, IEC-332 (Part-I), IEC-754 (Part-I), ASTMD – 2843, SS-4241475, (Swedish standard)

2.2 Cable Design

i) The cables shall be suitable for installation in a monsoon area having 100% relative humidity and low temperature which is likely to accelerate rusting in steel. However, for the reference ambient temperature may be taken as 40^0 C with the relative of 100%. The galvanizing of steel armour has to be of the highest quantity for such an ambient condition.

ii) The cable shall operate with the following requirements.

a) Maximum continuous conductor temperature and allowable conductor temperature during short circuit shall be taken as 70°C and 160°C respectively.

b) Frequency variation ± 5%, voltage variation ± 10% and combined frequency and voltage variation of ± 10%.

iii) Amongst the various standards given above, for design, stringent conditions specified in the above standards shall be applicable.

2.3 General Technical Requirement

i) The cables shall be suitable for laying in racks, ducts, covered trenches, conduits and underground buried installation with chances of flooding by water.

ii) Cables shall be designed to withstand mechanical, electrical and thermal stresses developed under steady state and transient operating conditions.

iii) The copper wires used for manufacturing the cables shall be true circular in shape before stranding and shall be of uniformly good quality free from defects.

iv) The conductor of control cables shall be manufactured from plain annealed copper. All the conductors shall be multi-stranded.

numeral, a dash shall be placed underneath it. If the number consists of two numerals, these shall be disposed one below the other and a dash placed below the lower numeral. The spacing between consecutive numbers shall not exceed 50 mm.

xiii) In addition to manufacturer's identification on cables as per IS/IEC, following marking shall also be embossed over outer sheath.

a) Cable size and voltage grade.

b) Sequential marking of length of the cable in meters at every one meter.
The embossing shall be progressive, automatic, on line and marking shall be legible and indelible.

xiv) Allowable tolerance on the overall diameter of the cables shall be ± 2 mm maximum, over the declared value in the technical data sheets.

xv) In plant repairs to the cables shall not be accepted.

3.0 General Constructional Requirements

3.1 General

The control cables, are required for control and protection of various equipment.

3.2 Type Of Cable

The cable shall be multi core, PVC insulated as specified in the Price Schedule.

3.3 Conductor

The cable conductor shall be made from stranded copper to form compact conductor having a resistance within the limits specified in IS: 8130.
The control cables shall be stranded copper (electrolytic) conductor with a minimum size of 2.5 mm^2.

3.4 Conductor (Shield)

The conductor having a semi-conducting screen shall ensure perfectly smooth profile and avoid stress concentration. The conductor screen shall be extruded in the same operation as the insulation.

3.5 Insulation

The insulation of the cable shall be extruded type and shall be designed and manufactured for the specified system voltage. The manufacturing process shall ensure that insulation shall be free from voids. The insulation shall withstand mechanical and thermal stresses under steady state and transient operating

Extruded PVC serving as per IS: 5831 or as specified otherwise shall be applied over the armouring with suitable additives to prevent attack by rodent and termites. All serving must be given anti-termite treatment.

3.10 Construction

Cable shall have suitable fillers laid up with the conductors to provide a substantially circular cross section before the sheath is applied. Fillers shall be suitable for the operating temperature of the cable and compatible with the insulating material. All materials shall be now, unused and of finest quality. Workmanship shall be neat, clean and of highest grade.

(a) **Control Cables**

The cable shall be 1.1 kV grade, heavy duty, multi core stranded (7 wires) tinned copper (annealed) conductor, PVC Type-A insulated, galvanized steel wire/strip armoured, flame retardant low smoke (FPLS) extruded PVC of type-ST1 outer sheathed. The following sizes shall be used.

4.0 Cable Drums

4.1 LV and control cables shall be supplied in non-returnable wooden drums. The wood used for construction for the drum shall made from hard wood, be properly seasoned, sound and free from defects. Wood preservative shall be applied to the entire drum.

4.2 Bidder shall indicate in the offer the standard length for each size of power and control cable which can be furnished on one drum. The cable length per drum shall be subject to tolerance of ± 0.5% of the standard drums length. The bidders shall take into consideration the wastages in the pricing and quote accordingly. IS tolerance shall not be applicable.

However the cable drums shall be selected so those through joints are eliminated. Typical drum lengths shall be as follow:

1.1 kV grade cables:

Below 35 mm^2 sizes 2000 m

4.3 A layer of PVC sheet shall be applied to the surfaces of the drums and over the outer most cables layer. A clear space of at least 40 mm shall be left between the cables and the logging.

4.4 Each drum shall have the following information stencilled on it in indelible ink:

i. Contract/specification No.
ii. Name and address of the consignee
iii. Makers name and address
iv. Drum No.

Technical Specification:

			strip	strip
	Thickness	mm	0.8(nom)	0.8(nom)
12	Details of screen, if any		N.A	N.A
13.0	Total overall diameter	mm	22+/-2mm	26+/-2mm
14	**Test Voltage**			
	Five minute power frequency withstand voltage	kV/5 min	3kV	3kV
15	Type of cable end sealing		both end of cable sealed with tight Cap	
16	**Cable drums**			
	Dimensions	mm	1500	1750
	Weight	kg	1520	2320
	Nominal length per drum	mtr	2000	2000

Data on Standard 400 V Underground Cable – Three Phase

Cable Size (mm^2)	No of Cores	Current Rating (A) (In Ground)[1]	AC Resistance (ohms/km)	Reactance (ohms/km)	P-P Voltage Drop (mV/A/m)
630[2]	1	390	0.0563	0.0800	0.1694
400	1	325	0.0934	0.0829	0.2163
400	4	335	0.0988	0.0732	0.2130
300	4	305	0.1250	0.0732	0.2509
150	4	210	0.2530	0.0745	0.4568
70	4	135	0.5420	0.0770	0.9482
35	4	92	1.0600	0.0826	1.8415

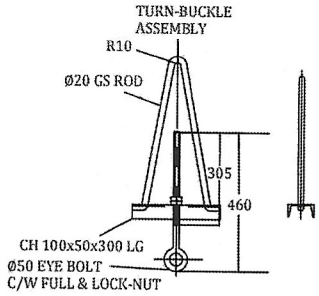
Note 1: These ratings are for BPC use. They incorporate a safety factor and may be used for design purposes.

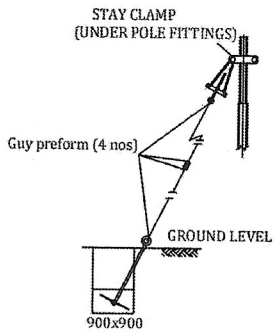
Note 2: Cable with XLPE insulation

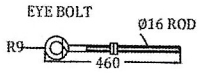
Data on Standard 230 V Underground Distribution Cable – Single Phase

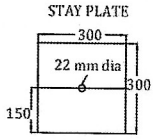
Cable Size (mm^2)	No of Cores	Current Rating (A) (In Ground)[1]	AC Resistance (ohms/km)	Reactance (ohms/km)	P-P Voltage Drop (mV/A/m)
16	2	60	2.3300	0.0861	4.6632
10	2	47	3.700	0.0906	7.4022
6	2	35	6.2411	0.0967	12.4836

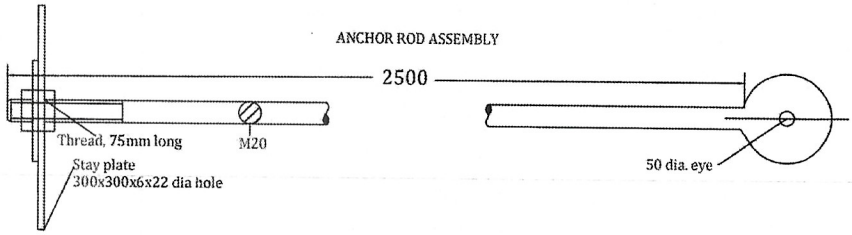
Technical Specification:









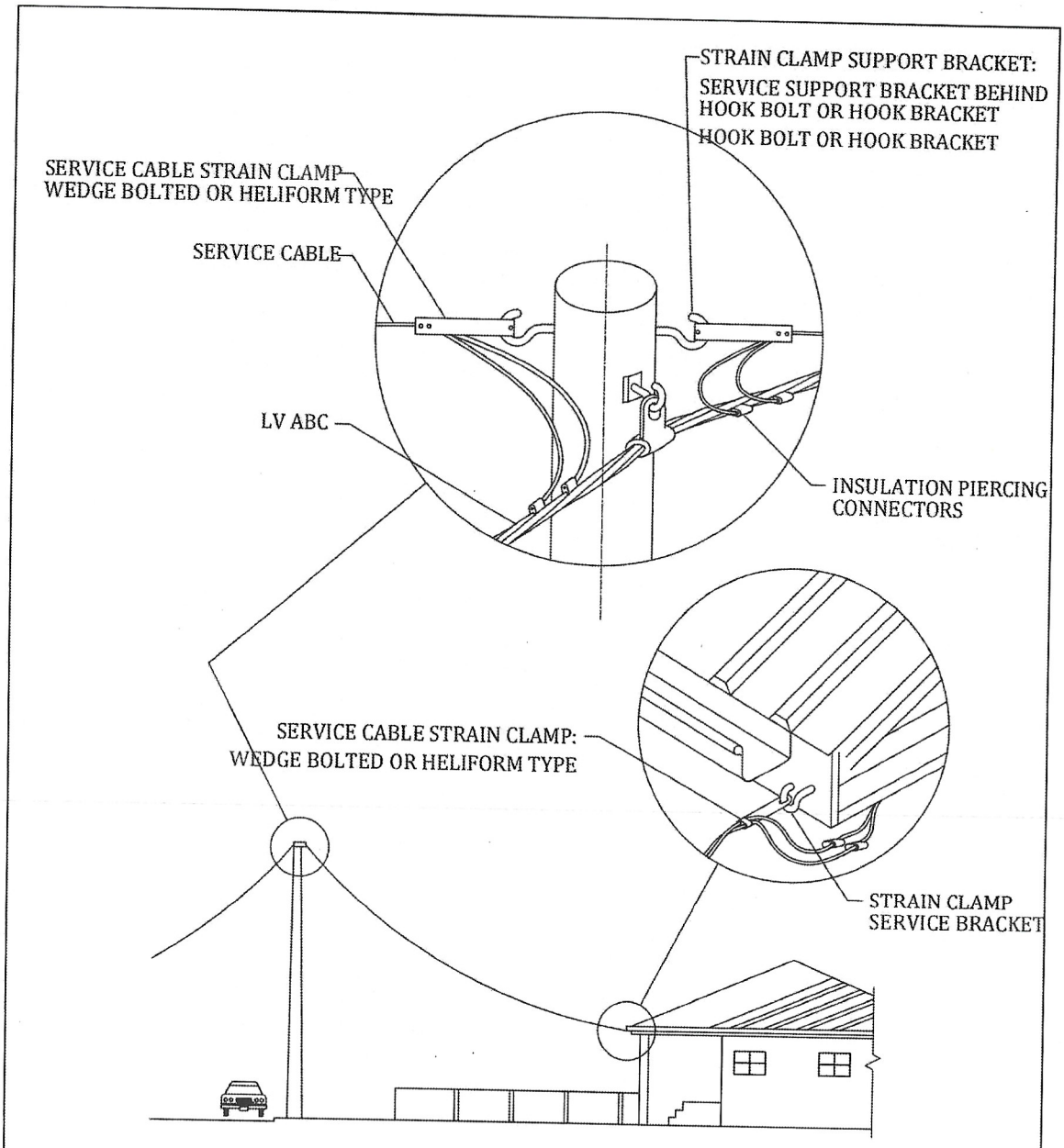


NOTES
Stay rod and nuts assembled and packed together
Anchor plates packed separately
Material :- BS 4360 Grade 43A
Galvanizing :- BS 729
Threads :- ISO Metric
Nut :- BS 4190 Grade 4.0

STAY WIRE (7/8 SWG) (IN METERS)	1M-POLE HEIGHT	H.D.G STEEL
STAY ROD (2.5 M) WITH THIMBLE	1	H.D.G STEEL
ANCHOR PLATE (300 X 300 X 6MM)	1	H.D.G STEEL
TURN BUCKLE ASSEMBLEY WITH THIMBLE	1	H.D.G STEEL
GUY PREFORMED SUITABLE FOR 7/8 SWG	4	GALVANISED STEEL WIRE
STAY INSULATOR	1	PORCELAIN
NAME OF THE ITEM	QTY	MATERIAL

	BHUTAN POWER CORPORATION LIMITED	ENGINEERING AND RESEARCH DIVISION	
		TITLE: DISTRIBUTION DESIGN & CONSTRUCTION STANDARD STAY SET ASSEMBLY FOR STEEL TUBULAR	
	NAME	DATE	
DESIGNED BY			
CHECKED BY		DRAWING NO. BPC - DDCS - 2023 - 22/1-2	REVISION 2023
APPROVED BY			

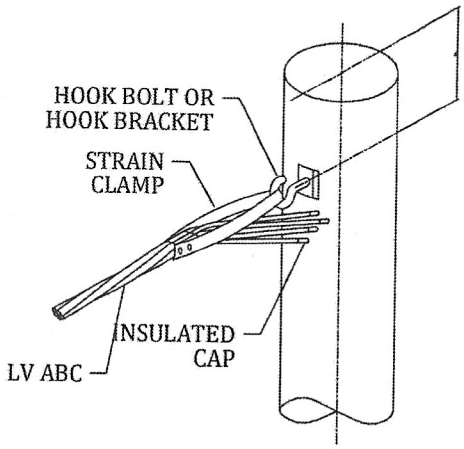
Technical Specification:



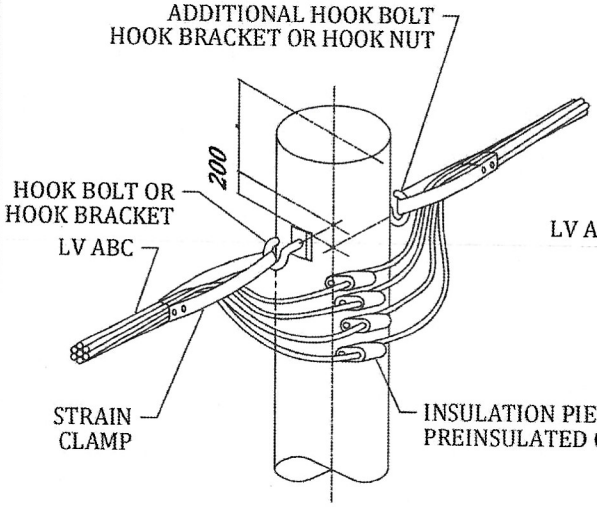
NOTES

1. DIMENSIONS AS SHOWN ARE IN mm.
2. DRAWING IS NOT TO SCALE.

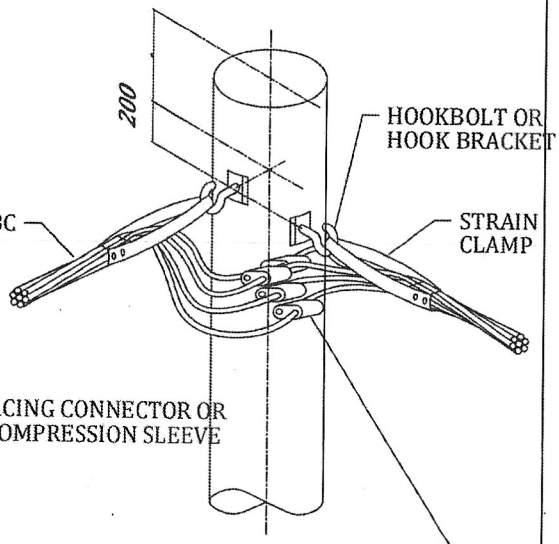
BPC	BHUTAN POWER CORPORATION LIMITED	ENGINEERING AND RESEARCH DIVISION	
		DISTRIBUTION DESIGN AND CONSTRUCTION STANDARDS	
		LV ABC TYPICAL SERVICE LAYOUT ARRANGEMENT	
TITLE	NAME	DATE	
DESIGNED BY			
CHECKED BY			
APPROVED BY			
		DRAWING NO. BPC - DDCS -2023-14/1-4	REVISION 2023



ALLOW SUFFICIENT CABLE TAIL
TO ALLOW FOR FUTURE EXTENSION



FIELD CONDITIONS MAY ALLOW
CABLE TO BE CONTINUOUS AT POLE



NOTES

1. DIMENSIONS AS SHOWN ARE IN mm.
2. DRAWING IS NOT TO SCALE.

BPC	BHUTAN POWER CORPORATION LIMITED		ENGINEERING AND RESEARCH DIVISION
			DISTRIBUTION DESIGN AND CONSTRUCTION STANDARDS
TITLE	NAME	DATE	LV ABC TERMINATION & ANCHOR POLES DETAILS
DESIGNED BY			
CHECKED BY			
APPROVED BY			DRAWING NO. BPC - DDCS - 2023-14/3-4 — REVISION 2023