	Distribution & Customer Services Department Distribution Services Bhutan Power Corporation Limited Thimphu: Bhutan
Document No.	DCSD/SoP/CBL - 01
Document Name	Standard Operating Procedures (SoP) for Underground cable Jointing & Terminations works
Version	1.0

Preparation, Review & Approval of the Document

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1. PURPOSE

To outline the proper cable termination and jointing procedures.

2. SCOPE

This procedures applies to the following voltage level and to be followed by all ESD/ESSD offices:

1. 33 kV cables
2. 11 kV cables
3. 6.6 kV cables
4. 415 Volts cables

3. RESPONSIBILITIES

ESD Managers/Engineers shall be responsible to ensure full compliance with this method statement and the requirements are strictly followed.

Electrician/jointer shall be responsible to carry out tasks assigned to him/her as per the instruction of site supervisors and to follow this method statement.

Supervisor shall be responsible to verify and inspect, confirms as per this SoP and review the work done.

4. PRE-REQUISITE

Availability of qualified manpower/technician/cable jointer. Ensure that the specified termination/jointing kits are available. Ensure that there is sufficient compatibility with the equipment adaptor or terminal box & sufficient clearances/space within to accommodate the termination assembly.

5. PROCEDURES

5.1 General

5.1.1 On-site risk assessment shall be carried, follow all safety standards and maintain work area safe and comfortable before carrying out jointing and termination works;

5.1.2 The repair/jointing works should not be carried during bad weather. Ingress moisture in the joints may slowly deteriorate the insulation properties of the cables. Under unavoidable/emergency situations, at least pull a tarpaulin shed over the work area;

5.1.3 Cable shall be checked to confirm the healthiness. IR value shall be recorded;

- 5.1.4 Cable ends shall be prepared as having an adequate loop to allow re-splicing if required;
- 5.1.5 Cable core markers shall be checked, phase conductors shall be identified and checked using standard phase color identification as given in figure 1 before performing termination & jointing;
- 5.1.6 The lugs and cores shall be crimped by using appropriate crimping tools;
- 5.1.7 All joints and termination shall be carried out by experienced technician/cable jointer;
- 5.1.8 Records shall be maintained for all joints and termination works carried out as per the check list given in Section 6

5.2 Cable End Termination

- 5.2.1 Before commencement of termination, both the ends of the cable shall be identified by performing continuity check;
- 5.2.2 Cable core makers shall be checked before performing the termination works;
 - i. Cable cores and phases shall be marked with appropriate marker/use phase identification markers as shown in Figure 1. Phase identification should be visible at all times.
 - ii. When terminating the cable to or from a Substation panel busbar, Distribution pillar (DP) busbar, Substation Gantry, and Power/ Distribution Transformer, phases on the cable shall be clearly marked using the Phase identification tapes/tubes and maintain at all times.
 - iii. The phases of cable should match with the phases of Substation busbar/ DP busbar/ Gantry/ Transformer in correct phase configuration while carrying out the termination.
- 5.2.3 Procedures for preparation and termination process shall be as per manufacturers manual;
- 5.2.4 Once the termination is completed, phase sequence shall be checked with the phase sequence meter;
- 5.2.5 Permanent cable identification tag/tube/tape shall be installed as shown in figure 1 below;

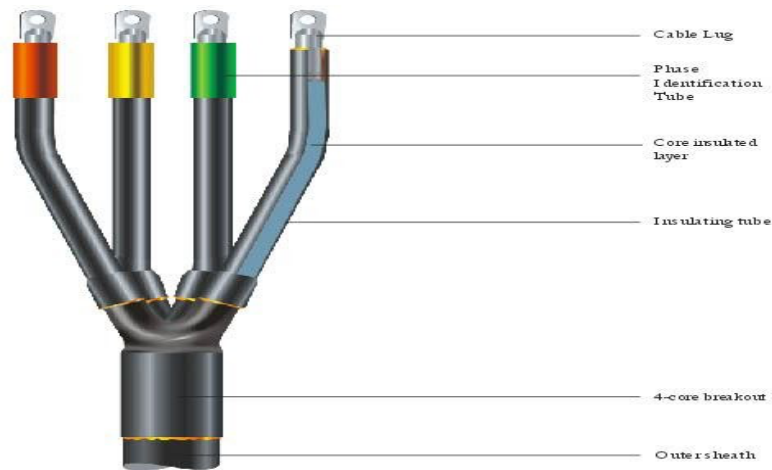


Figure 1: Phase identification tubes/tapes (Use the actual standard phase identification colors: Red, Yellow and Blue)

5.3 Cable Jointing

- 5.3.1 The joint kits shall be suitable for specified size, voltage rating and type of cable;
- 5.3.2 Check and ensure that cable jointing kit is complete with all the materials as per packing list;
- 5.3.3 Check the size of the cable and ensure that the joint kit is suitable for the cable;
- 5.3.4 Ensure enough length of cable is available for jointing ends with adequate loop for future jointing of the cable;
- 5.3.5 Check the insulation resistance of the cable with appropriate insulation tester;
- 5.3.6 Identify the cores as coded in the cable and mark them with appropriate marker/tapes with color code Red/Yellow/Blue for each phase at both ends.
- 5.3.7 Jointing shall be carried as per manufacturer's manual ensuring that phases marker are followed till the end of jointing. **No crossing of cores/phase conductors shall be permitted;**
- 5.3.8 Cable makers and joint markers shall be installed to enable to locate joint area in future.

6. CHECKLIST

Checklist provides opportunity to confirm that quality is not compromised while taking up the works. It is therefore mandatory for all supervisors or team leaders to check and complete the checklist given below prior to start of work till the completion. This completed checklist shall be preserved for future reference.

CHECKLIST FOR CABLE TERMINATION AND JOINTING

Name of ESD:		Location of joints/termination:				
Type of Work:		GPS Coordinates				
		Latitude	Longitude	Altitude		
Date:						
Sl. No	Items	Checks/Measurement				Remarks
1	Cable size					
2	Voltage level	33 kV	11 kV	6.6 kV	415 V	
3	IR Test value of the cable	RY	YB	RB	Ph to Earth	
4	Phase Sequence					
5	Cable termination /joint marker installed	Yes		No		
Comments:						
Jointing/Termination carried out by:				Supervised by:		
Name/Designation		Signature		Name/Designation		Signature