

## Quality Assurance

### Objective

This document was established to demonstrate the compliance of BCC to the local and international standards that requires the monitoring and measurement of characteristics of product at appropriate stages of product realization. Furthermore, this document aimed to satisfy customer on the quality assurance requirements for wire & cable.

### Scope

This Test Plan is applicable to all manufactured Wires & Cables of Bahra Cables Company at several production stages from incoming to in-process up to finished product.

### Test Plans:

#### A. Incoming Material Test Plan

All incoming raw materials are tested and the quality is controlled based on our established Material Specification. Our Material Engineers ensures that all the required material tests are conducted by the qualified Material Inspectors based on established Quality Procedures and only those materials which have passed in the incoming inspection are released to production.

Below is the list of our raw materials with the corresponding required no. of samples.

Raw Material	Test Frequency
High Conductivity Continuously Cast And Rolled Copper Rod For Wire Drawing	2 /10 Coils
Continuously Cast And Rolled Aluminum Rod For Wire Drawing	2 /10 Coils
Annealed Copper Tape For Cable Shielding	3 Samples / Delivery
Galvanized Mild Steel Wire For Electric Cables Armouring	3 Sample / Delivery
Galvanised Mild Steel Slitted Tape For Armouring Of Electric	3 Sample / Delivery
Pvc Compound For Insulation Of Building Wires To Thw, Thw-2, Thhn And Thwn	1 Sample / Delivery
Pvc Compounds For Cables Insulation	1 Sample / Delivery
Pvc Compounds For Sheathing Of Cables	1 Sample / Delivery
Cross-Linkable Silane Copolymer With Catalyst Masterbatch For Xlpe Insulating	3 Sample / Core
Polyester Tapes For Electric Cables Wrapping	3 Sample / Delivery
Polypropylene Rope For Electric Cable Filling	3 Sample / Delivery
Polypropylene Tapes For Cable Binding	3 Sample / Delivery
Colour Masterbatch For Polymeric Compounds	1 Sample / Delivery

# LIST OF TESTING EQUIPMENTS

## B. In-process Inspection Test Plan

Below is the list of in-process inspection and test which are carried out during the whole manufacturing process to ensure conformance of the product.

Process & Inspection/Tests	Test Frequency	Inspection/Tests Aid
Copper Wire Drawing: Rod Breakdown Diameter Surface finish E.A.B Lubricant state - Fat content - pH value	Start and 1 in 10  Start and 1 in 10 Every Week Every Week	Micrometer Visual Elongation M/C Refractometer pH meter
Copper Wire Drawing: Intermediate Multi wire Diameter Surface finish E.A.B Lubricant state - Fat content - pH value	Each Bobbin  Start and 1 in 10 Every Week Every Week	Micrometer Visual Elongation M/C Refractometer pH meter
Aluminium Wire Drawing:  Diameter Wrapping test Surface finish	Sample Every 10 Bobbins	Micrometer Testers Visual
Stranding Of Conductor:  No. Of wires ; wire lays & P.S lays Direction of wire lay & P.S lays Conductor dimensions Conductor Resistance Conductor weight/m Surface finish	Each Bobbin	Visual/ change gears Measuring tape/meter scale Micrometer Weighting scale Visual
PVC or XLPE INSULATING:  Machine settings Insulation thickness: Actual Avg. & Min. point Diameter/eccentricity Color/Finish/markings Spark testing	Every Drum (Start and one sample from every drum)	Visual Profile Projector  Profile Projector Visual Spark Tester
XLPE CURING Curing time  Hot set Test (in the lab.) Shrinkage Test (in the lab.)	Every Drum	Digital Timer  Oven / Vernier Oven / Vernier

# LIST OF TESTING EQUIPMENTS

Process & Inspection/Tests	Test Frequency	Inspection/Tests Aid
Laying Up Of Cores :		
Core Colour / number sequence Filler size & Nos. Coring lay Tape registration Laid-up diameter Cable shape	Every Drum (Start and one sample from every drum)	Visual Visual Gear setting Visual Diameter tape Visual
Extruded Bedding :		
Machine settings Bedding thickness: Actual Avg. & Min. point Diameter/ over bedding Colour/Finish	Every Drum (Start and one sample from every drum)	Visual Profile Projector  Profile Projector Visual
Wire Armouring :		
Wire material/No. of wires. Diameter over armour Armour wire lay Direction of lay Cable shape and finish	One sample from every drum	Visual Dia. tape/Vernier caliper Gear position Visual Visual
Tape Armouring :		
Tape width & Thickness / gap Diameter over armour	Every Drum	Diameter tape /Vernier caliper
Outer Sheathing :		
Machine settings Sheath thickness: Actual Avg. & Min. Point. Eccentricity Overall diameter Colour/Finish/ marking Spark Test	Every Drum (Start and one sample from every drum)	Visual Profile Projector  Profile Projector Dia. tape/ vernier caliper Visual Spark Tester
Rewinding Of Cables :		
Cable finish Cable marking Spark Test	Every Drum	Visual Visual/metre scale Spark Tester
Insulation / Sheath Repair :		
Repair finish Spark Test	Every Drum	Visual Spark Tester

## C. Finished Wire & Cable Test Plan

Our Test Field Engineer ensure that final inspection is carried out based on local and international standards and no finished product will be delivered to customer without quality clearance.

The following parameters and product information are taken as records during the final inspection.

No#.	For Finished Wire (Every Produced Drum)	For Finished Cable (Every Produced Drum)
1.	Date	Date
2.	Metal No.	Metal No.
3.	Lot No.	Lot No.
4.	Product Code	Product Code
5.	Length	Length
6.	Embossing or Marking	Embossing or Marking
7.	Thickness ( PVC & Nylon)	Construction
8.	Color	Surface Finish
9.		Insulation Resistance per Length (Meg-ohm/ km)
10.	AC Dielectric Voltage Test	AC Dielectric Voltage Test
11.	Patial Discharge	Test for M.V
12.	Conductor Resistance at 20 °C (Ohm/km)	Conductor Resistance at 20 °C (Ohm/km)
13.		Armour( Resistance, No./dia, W/Thick)
14.		Filler Used
15.	Wire Size	Diameter (Core Diameter, Over Bedd, Over Armour, Over all)
16.		Wooden Drum No.
17.	Specification	Specification
18.	Status	