

POLARIS CABLES & WIRES PVT. LTD.
(An IS & ISO 9001 :2000 Certified Company)

Plant : Plot 35, Genesis Indl Complex, Kolgaon, PALGHAR, Dist :Thane, Maharashtra.

MANUFACTURER'S QUALITY ASSURANCE PLAN (QAP - Instrumentation cables)

Component / Process	Characteristics Tests	Method of Check / Test equipment	Sampling plan	Requirement / Ref. Doc any) (if	Internal acceptances Norms
I. R A W M A T E R I A L S - P V C W i r e s / C a b l e s					
A. CONDUCTOR	1) Diameter	Vernier / Micrometer	10%	As per BS - 6360	As per BS - 6360
(Cu / Alu)	2) Tensile Test (for Alu)	Tensile Testing M/c	10%	As per BS - 6360	As per BS - 6360
	3) Wrapping Test (for Alu)	Self Device	10%	As per BS - 6360	As per BS - 6360
	4) Surface finish	Visual	10%	The conductor should be smooth.	Confirms to the requirement
	5) Annealing Test (for copper)	Tensile Testing M/c	10%	As per BS - 6360	As per BS - 6360
	6) Conductor Resistance at 20°C	Electrical /Digital micro ohm Meter	10%	As per BS - 6360	As per BS - 6360
	7) Visual check	Visual	10%	Bright Colour, No dents	Confirms to the requirement
	8) Physical & Chemical properties	Review M.T.C	100%	As per BS - 6360	As per BS - 6360
B. PVC COMPOUND	1) Specific Gravity	By Weight on Weighing m/c	One sample Per Lot	As per Manufacturer specification	As per Manufacturer specification
	2) Tensile strength & Elongation	Review M.T.C	100%	As per BS - Standards	As per BS - Standards
	Before and After Ageing				
	3) Loss of mass	Review M.T.C	100%	As per BS - Standards	As per BS - Standards
	4) Thermal Stability	Thermal stability oven	One sample Per Lot	As per BS - Standards	As per BS - Standards
C. POLYSTER & ALUMINIUM					
MYLAR TAPE	1) Physical Dimensions	Vernier / Micrometer	10%	As per Requirement	Confirms to the requirement
II. INPROCESS (SEMI FINISHED CABLES / WIRES) INSPECTION					
A. Bunching / Stranding	1) No of wires/ Strand	Self Device	Measurement at the start of each job	As per BS - 6360	As per BS - 6360
	2) Diameter of Wire/Strand	Vernier calliper / Micrometer	Measurement at the start of each job	As per BS - 6360	As per BS - 6360
	3) Direction of Lay	Visual	Measurement at the start of each job	As per requirement	Confirms to the requirement
	4) Lay length	Meter Scale	Two Samples per Lot	As per requirement	Confirms to the requirement
	5) Overall Dimensions	Vernier calliper / Micrometer	Measurement at the start of each job	As per BS - 6360	As per BS - 6360
	6) Conductor resistance	Electrical /Digital micro ohm Meter	Measurement at the start of each job	As per BS - 6360	As per BS - 6360

B. Core Extrusion	1) Type of Compound	Visual check of grade used	Once when the new bag is opened for use	As per requirement	Confirms to the requirement
	2) Thickness of Insulation	Vernier Calliper	Each setting & twice in a shift	As per BS - Standards	As per BS - Standards
	3) Core Identification	Visual	Each setting & twice in a shift	As per BS - Standards	As per BS - Standards
	4) Void Test	Visual	5%	As per Plants Std	No Voids
	5) Spark test (On Line)	On line sparke tester	100%	As per BS - Standards	As per BS - Standards
	6) Diameter Check	Vernier Calliper	Each setting & twice in a shift	As per BS - Standards	As per BS - Standards
	7) Surface finish	Visual	Start and end of each setting & twice during the processing for that setting	Should be smooth & free from porosity	Should be smooth & free from porosity
	8) Continuity of Conductor	Continuity tester	100%	Conductor should show continuity	Conductor should show continuity
C. Tests on cores in Laboratory	1) Thickness of Insulation	Vernier Calliper	Random check for each size & colour	As per BS - Standards	As per BS - Standards
	2) Concentricity of PVC	Vernier Calliper	One for each size & colour(if changes)	As per BS - Standards	As per BS - Standards
	3) Tensile strength & Elongation	Tensile testing m/c	- Do -	As per BS - Standards	As per BS - Standards
	4) Insulation resistance & Volume resistivity	Insulation tester	One for each size & colour(if changes)	As per BS - Standards	As per BS - Standards
D. Printing / Embossing	Visual Check	Visual	100%	As per BS - Standards	As per BS - Standards
E. Pair Twisting	1) Lay Length	Meter Scale	Each setting	As per requirement	Confirms to the requirement
	2) Continuity of conductors	Continuity tester	100%	Conductor should show continuity	Conductor should show continuity
F. Laying up	1) Number / Sequence of cores	Visual	Each setting	As per BS - Standards	As per BS - Standards
	2) Identification Of Cores	Visual	Each setting	As per BS - Standards	As per BS - Standards
	3) Lay Direction	Visual	Each setting	As per BS - Standards	As per BS - Standards
	4) Lay Length	Meter Scale	Each setting	As per requirement	Confirms to the requirement
	5) Continuity of conductors	Continuity tester	100%	Conductor should show continuity	Conductor should show continuity
G. Shielding	1) Tape dimension	Vernier calliper/micrometer	10%	As per requirement	Confirms to the requirement
	2) Coverage & over lapping	Meter scale	10%	As per requirement	Confirms to the requirement
	3) Drain wire dimension	Micrometer	10%	As per requirement	Confirms to the requirement
	4) High voltage Test	High voltage tester	100%	As per BS - Standards	As per BS - Standards
	5) Continuity test	Multimeter	100%	Conductor should show continuity	Conductor should show continuity
H. Inner Sheath	1) Type of PVC	Visual check of grade used	Random	As per requirement	Confirms to the requirement
	2) Thickness of Inner Sheath	vernier calliper / microscope	Each setting	As per BS - Standards	As per BS - Standards
	3) Colour of Sheath	visual	Check on each size	As per BS - Standards	As per BS - Standards

	4) Continuity test	Continuity tester	100%	Conductor should show continuity	Conductor should show continuity
	5) Surface finish	Visual	100%	Smooth surface	Smooth surface
I. Armouring	1) Material	Visual check of Material	Random Check	As per BS - Standards	As per BS - Standards
	2) No. of Wires / Flat Strip	Visual	At the start of each drum	As per BS - Standards	As per BS - Standards
	3) Lay Direction	Visual	Each setting	As per BS - Standards	As per BS - Standards
	4) Dimensions of wire / strip	Vernier calliper	At the start of each drum	As per BS - Standards	As per BS - Standards
	5) Lay Length	Meter scale	Each setting	As per requirement	Confirms to the requirement
	6) High voltage test	High voltage tester	100%	As per BS - Standards	As per BS - Standards
	7) Continuity test	Continuity tester	100%	Armour should show continuity	Armour should show continuity
J. Outer Sheath Extrusion	1) Type of PVC	Visual check of grade	Random	As per requirement	Confirms to the requirement
	2) Thickness of Outer sheath	Vernier calliper / microscope	Each setting	As per BS - Standards	As per BS - Standards
	3) Overall Diameter	Vernier calliper	Each setting	As per BS - Standards	As per BS - Standards
	4) Colour of sheath	Visual	Check on each Drum	As per BS - Standards	As per BS - Standards
	5) Embossing / Sequential Marking	Visual	Check on each Drum	As per BS - Standards	As per BS - Standards
	6) Cable Length	Visual	Check on each Drum	As per requirement	Confirms to the requirement
	7) Surface Quality	Visual	Check on each Drum	Smooth surface	Smooth surface
	8) Continuity test	Continuity tester	100%	Conductor should show continuity	Conductor should show continuity
	9) High Voltage Test	High voltage tester	100%	As per BS - Standards	As per BS - Standards
J. DRUMS	1) Marking on Drum	Visual	100%	As per BS - Standards	As per BS - Standards
	2) Checking of length	Visual	100%	As per requirement	Confirms to the requirement
III. FINISHED CABLE INSPECTION					
A. Routine Tests	1) Conductor Resistance	Electrical /Digital micro ohm Meter	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	2) High Voltage Test	High voltage tester	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
B. Acceptance Tests	1) Annealing test on Copper	Tensile testing m/c	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	2) Conductor resistance	Electrical /Digital micro ohm Meter	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	3) Tensile test for Aluminium	Tensile testing m/c	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	4) Wrapping test for Aluminium	Self Device measurement	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	5) Thickness of Insulation / Sheath		As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	6) Tensile strength of PVC insulation / sheath	Tensile testing m/c	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards

	7) Elongation of PVC insulation / sheath	Tensile testing m/c	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	8) Insulation Resistance Test	I.R. Tester	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	9) High Voltage Test at room temp	High voltage tester	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
	10) Flammability Test	Flammability Chamber	As per IS -1554 (PT-1)	As per BS - Standards	As per BS - Standards
C. Type Tests	1) Annealing test on Copper	Tensile testing m/c	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	2) Tensile test for Aluminium	Tensile testing m/c	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	3) Wrapping test for Aluminium	Self Device	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	4) Conductor resistance	Electrical /Digital micro ohm Meter	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	5) Thickness of Insul /.sheath	measurement	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	6) Tensile strength of PVC insulation / sheath	Tensile testing m/c	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	7) Elongation of PVC insulation / sheath	Tensile testing m/c	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	8) Ageing in air oven	Oven, tensile testing m/c	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	9) Shrinkage test on PVC insulation / sheath	Oven Scales	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	10) Hot deformation test for insulation / sheath	Oven Scales	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	11) Loss of mass test for insulation / sheath	oven, weighing	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	12) Heat shock test for insulation / sheath	Oven Scales	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	13) Thermal Stability Test for insulation / sheath	Stability oven	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	14) Insul.resistance Test	I.R. Tester	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	15) High Voltage Test at room Temperature & water Immersion test	Water tank, HV tester	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	16) Test for armour				
	- wire dia / strip size	Vernier/ micrometer	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	- Tensile test	tensile tester meter	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	- Elongation test	tensile tester meter	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	- Resistivity test of armour	resistance meter	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	- Torsion test of armour	Torsion Apparatus	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	- Winding test of armour	Self Service	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	- Galvanisation Test (Mass of zinc coating	Chemical	One Sample Per Lot	As per BS - Standards	As per BS - Standards
	17) Flammability Test	Flammability Chamber	One Sample Per Lot	As per BS - Standards	As per BS - Standards

	18) Test for shielding material				
	-- Tape dimension	Vernier calliper/micrometer	10%	As per requirement	Confirms to the requirement
	-- Coverage & over lapping	Meter scale	10%	As per requirement	Confirms to the requirement
	-- Drain wire dimension	Micrometer	10%	As per requirement	Confirms to the requirement
	19) Capacitance -- Mutual	Capacitance Meter	10%	As per BS - Standards	As per BS - Standards
	--- Core to Screen	Capacitance Meter	10%	As per BS - Standards	As per BS - Standards
	20) L / R Ratio	Electrical /Digital micro ohm Meter	10%	As per BS - Standards	As per BS - Standards
D. Special Test	1) Oxygen Index Test	Oxygen Index test set	One Sample Per Lot	ASTM-D-2863	ASTM-D-2863
(For FRLS cable	2) Temperature Index Test	Temperature Index test set	One Sample Per Lot	ASTM-D-2863	ASTM-D-2863
only)	3) Halogen acid gas evolution Test	Halogen acid gas evolution Test set	One Sample Per Lot	IEC-754-1	IEC-754-1
	4) Smoke Density Test	Smoke density test set	One Sample Per Lot	ASTM-D-2843	ASTM-D-2843