



BHEL/CQX/  
007/0006

**BHARAT HEAVY ELECTRICALS LIMITED, JHANSI**

**STANDARD MANUFACTURING  
QUALITY PLAN FOR  
SUBMISSION TO CUSTOMER**

**QUALITY PLAN FOR  
POWER TRANSFORMER**

**MATERIAL INSPECTION / IN-  
PROCESS INSPECTION / FINAL  
INSPECTION**

**SUB VENDORS /  
VENDORS /  
CONTRACTORS WORKS**

**QP.No.QP/PT/013A  
REV.No.00  
DATE: 01.07.12  
PAGE: 01 OF 05**


Sl. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									M	C	N	
1	RAW MATERIAL											
1.1	Steel Plates (For Fabricated items)	a) Surface finish b) Thickness c) Chemical & Mechanical Properties	B B B	V I T	100 % 100 % One sample/lot	IS / PS	IS / PS	Supplier TC	P P P P	V V V V	- - - -	
1.2	CRGO (CRGO Steel)	a) Specific loss b) Bend test c) Ageing test d) Surface Resistivity	B B B B	T T T T	Sample	IS / PS	IS / PS	Supplier TC	P P P P	V V V V	- - - -	
1.3	Paper Insulated Copper Conductor (PICC / CTC)	a) Conductor finish b) Dimensions c) Resistivity / Conductivity	B B B	V I T	One Sample/ Supplier different size	IS / PS & DRG.	IS / PS & DRG.	Supplier TC	P P P	V V V	- - -	
1.4	Insulating Paper (used in PICC & CTC)	a) Dimension b) Physical condition & cleanliness c) Electric Proof Strength	B B B	I V T	One Sample/ Supplier different size	IS / PS	IS / PS	Supplier TC	P P P	V V V	- - -	
1.5	Press Board	a) Dimensions b) Compressibility c) Shrinkage d) Oil Absorption e) Electrical strength f) Physical condition & cleanliness	B B B B B B	I T T T T V	One Sample/ Lot	IS / PS	IS / PS	Supplier TC	P P P P P P	V V V V V V	- - - - - -	
1.6	Densified Wood	a) Dimension b) Electric strength c) Physical condition & cleanliness	B B B	I T V	One sample / lot	IS / PS	IS / PS	Supplier TC	P P P	V V V	- - -	

**Prepared by**

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ENGR. (QC)

**Checked & Approved by**

J K JAIN  
Sr. Manager (CQX)


<div> BHEL/CQX/ 007/0006</div>		BHARAT HEAVY ELECTRICALS LIMITED, JHANSI										
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Sl. No.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									M	C	N	
1.7	Gasket	a) Thickness b) Compressibility c) Recovery d) Flexibility	B B B B	I T T T	One sample / lot	IS / PS	IS / PS	Supplier TC	P P P P	V V V V	- - - -	Review of TC on surveillance basis
1.8	Transformer Oil	a) Electric strength b) Tan Delta c) Water Content d) Resistivity	B B B B	T T T T	One sample / tanker	IS	IS	Supplier TC	P P P P	V V V V	- - - -	
2.0	COMPONENTS	<div>MANUFACTURERS TEST CERTIFICATE SHALL BE SUBMITTED FOR REVIEW (THESE ITEMS SHALL BE AS PER CONTRACT / DESIGN)</div>				IS/PS	IS/PS	Supplier TC				
2.1	On Load tap changer								P	V	V	
2.2	Off CKT, Tap switch								P	V	V	
2.3	Oil Pump								P	V	V	
2.4	Radiators								P	V	V	
2.5	Buchholz Relay								P	V	V	
2.6	Bushings (OIP)								P	V	V	
2.7	OTI								P	V	V	
2.8	WTI								P	V	V	
2.9	Marshalling Box								P	V	V	
2.10	Cooling Fans								P	V	V	
2.11	Pressure Relief Valve								P	V	V	
2.12	Magnetic Oil Gauge								P	V	V	
2.13	Bushing CT								P	V	V	
2.14	Air Cell	P	V	V								
2.15	OFI/WFI	P	V	V								

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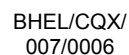
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									M	C	N	
3	<b>In Process Inspection</b>											
3.1	Fabrication of tank, tank cover, & cons.											
3.1.1	Welding Requirement	Welder Qualification	B	T	100%	ASME Sec. IX	ASME Sec. IX	BHEL Record	P	V	-	Review of Records on surveillance basis
3.1.2	Assembly	a) DP test on load bearing Items weld as per drg.	B	I	100%	DRG.	DRG.	Check List	P	V	V	
		b) Dimensional check after final welding	B	I	100%	DRG.	DRG.		P	V	V	
		c) Tank Rim flatness	B	V	100%	DRG.	DRG.		P	V	V	
		d) Visual check on welds	B	V	100%	DRG.	DRG.		P	V	V	
3.1.3	Testing	a) Leakage test	B	T	100 % Routine Test	DRG.	DRG.	Record	P	W	V	Record Review on surveillance basis
		b) Vacuum withstand and permanent deflection Measurement.	A	T	One job / WO Type test	DRG.	DRG.	OS	P	W	V	
		c) Pressure withstand and permanent deflection Measurement.										
3.1.4	Shot/Sand blasting	a) Surface cleaning by Shot/sand blasting.	B	V	Random	AA0674101	AA0674101	Record	P	V	-	
		b) Painting Process, Paint film thickness (inside and outside)	B	I	Random	JS 0674198/ JS 0674199	JS 0674198/ JS 0674199		P	V	-	
		c) Paint film adhesion test	B	I	Random	„	„		P	V	-	
3.2	Core	a) Dimension, Straightness & Roundness of Core	B	I	100%	DRG.	DRG.	Check List	P	V	-	
		b) 2 KV Insulation Test between Core and clamping structure	B	T	100%	DRG.	DRG.		P	V	-	

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Sl. No.	Component & Operations	Characteristics	Class	Type of Check	Quantum of Check	Reference Document	Acceptance Norms	Format of Record	Agency			Remarks
									M	C	N	
3.3	WINDING	a) Dimensions b) Brazed joints c) Megger test	B B B	I T T	100 % 100% 100 %	DRG. DRG. DRG.	DRG. DRG. DRG.	Ch. list	P P P	V V V	V V V	Review of record on surveillance basis
3.4	Core and coil assembly	a) Ratio test on all taps b) Check for healthiness of insulation of conductor joints and leads c) Check for Proper cleanliness for absence of dirt & dust d) Dimensional Check for various clearances (after tanking)	B B  B B	T V  V	100 % 100 %  100 % 100 %	AS PER AGREED TEST SCHEDULE DRG  DRG	AS PER AGREED TEST SCHEDULE DRG  DRG	TC Ch. list	P P  P P	V V  V V	V V  V V	
3.5	Treatment process	a) Drying, oil impregnation, Soaking, servicing & oil filling	B	I / V	100 %	AS PER BHEL PROCESS SPEC.	AS PER BHEL PROCESS SPEC.	Shop record	P	V	V	Review of records on surveillance basis
3.6	Final Inspection	a) Electric Test (i) Routine Test  (ii) Type test	A  A	T  T	100 %  One Job / WO	AS PER AGREED TEST SCHEDULE	AS PER AGREED TEST SCHEDULE	Test Report	P  P	-  -	W  W	

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3.7	PRE-SHIPMENT CHECKS	a) Oil Pressure Test b) N <sub>2</sub> gas tightness (If Reqd.) c) Completeness of transformer & Packing of accessories	B B B	T T V	100 % 100 % 100 %	DRG  SHIPPING LIST	DRG  SHIPPING LIST	Check List	P P P	V V V	- - -	

**LEGEND:**

CLASS	TYPE OF CHECK	AGENCY	SCOPE OF AGENCY	FORMAT OF RECORD
A : CRITICAL	V : VISUAL	M : MANUFACTURER / SUB CONTRACTOR	P : PERFORMER	TC : TEST CERTIFICATE
B : MAJOR	I : MEASUREMENT	C : CONT/ NOMINATED INSPECTION AGENCY	V : VERIFICATION	OS : OBSERVATION SHEET
C : MINOR	T : TEST	N : CUSTOMER	W : WITNESS	DRG : DRAWING
			CHP : CUSTOMER HOLD OINT	CHECK LIST : CHECK LIST
				AA/JS/PS/BP : BHEL PURCHASE SPECIFICATION

**Note:**

- \* CHP for type testing will be randomly selected job. The TC for Type Test Testing for the job of same rating can also be furnished, in lieu of Testing for verification.
- The items appearing in the QA plan but not applicable to the specific design / contract shall stand cancelled.

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