

From: A K THAKUR [<mailto:pmgaktakur@bhel.in>]

Sent: 17 April 2019 14:45

To: 'DHARMENDRA SINGH' <dhhsingh@bhel.in>; naveen.kumar@bhel.in; 'Vimal Kumar' <vimalkumar@bhel.in>; 'JATIN JOSE' <jatinjose@bhel.in>; msasi@bhel.in; singhrahul@bhel.in; paradkar@bhel.in; chpkumar@bhel.in; 'Marina Khuttiya' <marinak@bhel.in>; amjoshi@bhel.in; bhavanishankar@bhel.in; src@bhel.in; 'raviteja b' <raviteja.b@bhel.in>; praful@bhel.in; tkrishna@bhel.in; sksaxena@bhel.in; 'rahulbhatnagar' <rahulbhatnagar@bhel.in>; 'TELANG TUSHAR BABARAO-PSWR' <tushar@bhel.in>; vmganigi@bhel.in; 'ARIF HUSAIN- ISG' <ah@bhel.in>; 'MANOJ KUMAR THAKUR - BAP' <manojkt@bhel.in>; 'SASHI KUMAR O - BAP' <sashi@bhel.in>; ashishsingh@bhel.in; srd@bhel.in; 'JAGADISH' <d.jagadish@bhel.in>; 'Tarun Mishra' <tarun.mishra@bhel.in>; 'JITENDRA KUMAR PAHUJA-HEEP' <jkpahuja@bhel.in>

Cc: 'AMALESH SANYAL-HEEP' <asanyal@bhel.in>; 'GURDEV SINGH' <gurdev@bhel.in>; 'K Chinnasamy, HPBP(TRICHY)' <kchinnasamy@bhel.in>; 'R Vijayakkumar - HPBP(TRICHY)' <vijaykumar.r@bhel.in>; 'ravichandran k' <ravichandran.k@bhel.in>; 'manishdayal' <manishdayal@bhel.in>; bimaljeet@bhel.in; 'rtivari' <rtivari@bhel.in>; 'arjun singh' <arjun.singh@bhel.in>; nnraman@bhel.in; pmishra@bhel.in; ndd@bhel.in; gnjr@bhel.in; rtr@bhel.in; mankar@bhel.in; raghu@bhel.in; 'srinivaspotturi' <srinivaspotturi@bhel.in>; 'gjain' <gjain@bhel.in>; ajaya@bhel.in; 'bk singh' <bk.singh@bhel.in>; 'TELANG TUSHAR BABARAO-PSWR' <tushar@bhel.in>; 'Rajiv Bhatnagar' <rajivb@bhel.in>; 'R P Das-Genl Manager-PSWR' <rpdas@bhel.in>; ajaya@bhel.in; 'M G Koppikar-PSMG' <koppikar@bhel.in>; 'Gaurav Khanna' <gauravk@bhel.in>; 'DEEPAK' <DEEPAK_PMG@bhel.in>; 'C K NIMESH-PMG' <nimesh@bhel.in>; 'Rajib Chakraborty' <rajib@bhel.in>

Subject: 1x660 MW Bhusawal Project : regarding approval of sub-vendors

Importance: High

Dear Sir,

You all might be aware that we deliberated no. of times with MAHAGENCO to a consolidated clarity w.r.t. subject i.e. **approval of sub-vendors**.

Here, in continuation to trailing mail, we would like to update you all on the subject:

1. During the second Kick-off meeting, issue was taken up with Mahagenco. Mahagenco asked us to intimate against each item appearing in Sec-11, Vol-II that whether this is BHEL supply/ fully BOI / part supply i.e. partly by BHEL and partly as BOIs. MOM attached. Point no. 3 may be referred.
2. Accordingly, a letter from PS-Mktg was given to Mahagenco on 18.03.19 enclosing classification of items for have concurrence against our proposal. Letter with enclosure is attached for reference.
3. In view of proposal per PS-Mktg letter dtd 18.03.19, this issue was deliberated at length on 19.03.19 at Mahagenco office. It was participated by PMG and HYD team. (*There was no MOM for the meeting, as Mahagenco informed that in view of discussion they will respond to PS-Mktg letter dt 18.03.19*).
4. Accordingly, Mahagenco's response was received on 03.04.19. Letter attached for reference. From response it is construed that

A. Items of provenness criteria : Each unit/divn. has to refer the bid document (Clause 2, Section-3, Volume-I) for identifying items of provenness criteria in its scope. In line with clause 21.1, Section-2, Volume-I; these items have to be procured from sources meeting the provenness criteria as prescribed in bid document Clause 2, Section-3, Volume-I and subsequent corrigendum VI. **In case, BHEL have to manufacture such item/s in its shop, each unit has to**

apprise MAHAGENCO regd. qualification of BHEL as an approved manufacturer for each item(of provenness criteria) appearing in its respective scope.

- B.** *MAHAGENCO has accepted our proposal that no approval is required for sub-vendors of **Skid mounted sub-components** and items/sub-components integral to equipment. BHEL shall not take any formal approval of vendor's/sub vendor for skid mounted sub component and items/sub-component integral to equipment. BHEL shall go ahead with procurement on its own and shall ensure that needful records (source selection, quality plan/s, inspection report/s) are being maintained till expiry date of defect liability period.*
- C.** ***Approved vendor list appearing in bid document Sec-11, Volume-II :** Besides provenness criteria items list, there is an approved vendor list from MAHAGENCO as appearing in bid document Sec-11, Volume-II. BHEL has to procure such items from this approved vendor list. In case, BHEL go out of this approved vendor list; then approval of MAHAGENCO is required. However, BHEL has to ensure selection of vendors in line with bid specification clause 21.3, Section-2, Volume-I.*
- There may be some items out of provenness criteria and appearing in Sec-11, Vol-II, which are routine shop supplies by BHEL. For such items also, each unit has to identify each item in its scope and apprise Mahagenco that for such items BHEL is a qualified manufacturer. Reference of 500 MW project done earlier with Mahagenco may be given in this regard.*
- For ACF vendors also, applicable unit may apprise Mahagenco the list of items being manufactured at ACF vendors and take formal concurrence giving reference of 500 MW project done earlier with Mahagenco.*
- D.** *Except for good/equipment/services mentioned under clause no. 2, Section-3, Volume-I and items mentioned in the list Sec-11, Volume-II; No sub vendor approval is required from MAHAGENCO and BHEL shall procure the items from the source at his option and shall ensure that needful records (source selection, quality plan, inspection report/s) are being maintained till expiry date of defect liability period in line with clause no 21.7 Sec- 2 Vol-I.*

Above clarity seems adequate in regard to approval of sub-vendors. Therefore, we rest our efforts for any further clarity. All units are requested to initiate manufacturing/procurement activities accordingly. Requisite concurrence/intimation to MAHAGENCO may please be ensured.

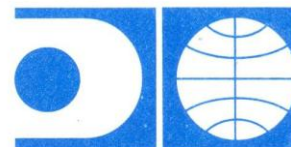
भवदीय/Regards,

ए. के. ठाकुर/ A K Thakur
पा. से. - पीएमजी, बी. एच. ई. एल/ PS-PMG, BHEL,
एडवेंट नवीस बिजनेस पार्क / Advant Navis Business Park ,
सेक्टर/Sec-142, नोएडा/Noida-201305,
दुरभाष/ Contact No. : 09540690700, 0120-674-8346

DEVELOPMENT CONSULTANTS PRIVATE LIMITED

CONSULTING ENGINEERS

Regd. Office : 24 Park Street, Kolkata 700 016, India
Phone : 2226 7601, 2249 7603/7605/7609/7610/7612
Fax : (91) 33 2249 2340/3338/2897
E-mail : dcl@dcigroup.com
Website : www.dcpn.net.in



VENDOR DRAWING / DOCUMENT TRANSMITTAL

Project : BHUSAWAL TPS
1 X 660 MW UNIT-6

Transmittal No : 18V06-E-LOT-BHEL-272

Package : BTG & BOP

Date : 21st Dec 2020

BHEL

Power Sector-PMG,
AdvantNavis Business Park
Noida-201305
Tel: 0120-6748346
Mobile:+919540690700
E-mail: pmgkthakur@bhel.in

Kind Attn : Mr.A K Thakur

Dear Sir,

Following drawings/documents are attached with action/code status as under :

Sl. No.	DWG/DOC. No.	Rev.	TITLE	CATEGORY	CODE
1.	BP-DG-415-301-00020	03	Generator Transformer-OGA Part List	A	1
2.	BP-DG-415-301-0014	01	Generator Transformer-Combined Foundation Plan	A	3
3.	BP-QP-415-300-0001	03	QAP of Generator Transformer	A	1
4.	BP-DG-415-401-0034	01	Layout , Floor Plan & Key Diagram for 11 kV FGD Switchboard	A	3
5.	BP-DG-415-401-0035	01	Layout , Floor Plan & Key Diagram for 3.3 kV FGD Switchboard	A	3

CODE LEGEND	CATEGORY LEGEND	COMMENT :
1. Approved. 2. Approved subject to compliance to comments, proceed with manufacturing/construction. Revised document required to be submitted after incorporating the comments. 3. Not approved. Resubmission required. 4. For information only V. Null & Void (Not applicable)	A : Approval I : Information	Action code marked with * are subject to incorporate minor comments.

Note: The recipient is responsible for segregation and destruction of superseded issues.

DEVELOPMENT CONSULTANTS PRIVATE LIMITED

CONSULTING ENGINEERS

Regd. Office : 24 Park Street, Kolkata 700 016, India
Phone : 2226 7601, 2249 7603/7605/7609/7610/7612
Fax : (91) 33 2249 2340/3338/2897
E-mail : dcl@dcigroup.com
Website : www.dcpl.net.in

ISO 9001

BUREAU VERITAS
Certification



Action Status as above does not absolve the Vendor/Contractor of his responsibilities of complying with the Technical Specifications and Contractual requirements.

Very truly yours,
S.N PATWARDHAN

Project Manager
DEVELOPMENT CONSULTANTS PRIVATE LIMITED



BHARAT HEAVY ELECTRICALS LIMITED
QUALITY ASSURANCE – TCB
BHEL, BHOPAL-462022

QAP NO: QA/TCB/31/1345

Rev No: 03

Date: 26/11/2020

Page No. 1 Of 8

QUALITY ASSURANCE PLAN FOR GENERATOR TRANSFORMER

CUSTOMER



M/S MAHAGENCO-BHUSAWAL

CONSULTANT



M/S DEVELOPMENT CONSULTANTS
PRIVATE LIMITED-KOLKATA

DEVELOPMENT CONSULTANT PVT. LTD.

Reviewed only for general conformance with contract drawings and specifications;
Contractor to be responsible for any error and for fulfilment of details requirements of contract documents.

CODE:- 1 (ONE) DATE:- 21.12.2020

DISTRIBUTED BY:- SALONI BELNEKAR

1 Approved 4 For information only

2 Approved Subject to compliance to comments, Proceed with manufacturing/construction. Revised document required to be submitted after incorporating the comments. V Null and Void (Not applicable)

3 Not Approved. Resubmission required

SEE COVERING LETTER

LETTER REF.NO.:- 18V06-E-LOT-BHEL-0272

10MW BHUSAWAL TPS UNIT-6

P-415-300-0001


IO DG/BSL U-6/2011/T-1/BTG+BOP EPC


TRACT/SUPPLY/0054 PO DATE: 17/01/2018


5 MVA, 21/420 KV, 1- PHASE GENERATOR
SFORMER


	Name	Signature	Date
Prepared By	Satyendra Kumar Singh		26/11/2020
Reviewed By	Abhishek Kumar Sharma		26/11/2020


Total No. of Sheets: 8


		MANUFACTURER'S NAME & ADDRESS : BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		STANDARD MANUFACTURING QUALITY PLAN																	
				ITEM : POWER TRANSFORMER UP TO 420 KV CLASS						CUSTOMER:		M/s MAHAGENCO- BHUSAWAL									
				4 X 275 MVA, 21/420 KV, 1- PHASE GENERATOR TRANSFORMER						PROJECT:		1 X 660MW BHUSAWAL TPS UNIT-6									
				PO NO.: LOA NO DG/BSL U-6/2011/T-1/BTG+BOP EPC CONTRACT/SUPPLY/0054 PO DATE: 17/01/2018						BHEL WO NO.:		68001A51201									
SL NO	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS								
					M	C/N				M	C	N									
1	2	3	4	5	6		7	8	9	D*	10**		11								
RAW MATERIAL & BOUGHT OUT ITEMS: 1.00 a) Corelated supplier's TC for items with unique identification no. / lot no. shall be maintained by BHEL for Customer verification at any time. In absense of the TC, test / check will be done by BHEL. b) Materials and BOIs to be procured from Customer approved sources as per vendor list of project.																					
1.01	Steel Plates a) (Stock Item)	a) Thickness b) Surafce defects c) Chemical composition d) Mechanical Properties	Major	Measure	1sample / thick / lot	1sample / thick / lot	BHEL Drawing & IS2062/ASTM A 240 M	BHEL Drawing & IS2062/ASTM A 240 M	TC or TR	✓	P	V	V								
			-do-	Visual	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	Test	-do-	1 sample/ lot	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
1.01	Pipes b) (Stock Item)	a) Thickness b) Surafce defects c) Chemical composition d) Mechanical Properties e) Hydraulic Pressure Test	Major	Measure	1sample / thick / lot	1sample / thick / lot	BHEL Drawing & IS3589	BHEL Drawing & IS3589	TC or TR	✓	P	V	V								
			-do-	Visual	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	Test	-do-	1 sample/ lot	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
1.02	CRGO Steel (Stock Item)	a) Dimensions & finish b) Grade of CRGO c) Waviness & edge camber d) Specific core loss e) Surface resistivity f) Stacking factor g) Magnetic Polarization h) Bend Test / Ductility i) Aging Property j) Edge Burr level	Major	Measure	1 sample/ lot recd.		Aprvd drgs & data sh/ IS 3024 /BP10987/ BP10988/BP10984/ BP10985/AA10914 AA10905	Aprvd drgs & data sh/ IS 3024 /BP10987/ BP10988/BP10984/ BP10985/AA10914 AA10905	TC or TR	✓	P	V	V								
			-do-	Verify	-do-	1sample / lot	-do-	-do-	-do-	✓	P	V	V								
			-do-	Test	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	1sample / lot	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-do-	-do-	-do-	-do-	✓	P	V	V								
1.03	Press Board Insulation & Press Board Moulding (Stock Item)	a) Thickness b) Width / Dia & Length c) Density d) Compressive Strength e) Conductivity f) Tensile strength g) Moisture content h) Shrinkage in air i) pH value j) Ash content	Major	Measure	5pc / lot	1sample / lot	AA21108/AA21105/ AA21109/AA21101/ TRE 184 TRE 185/ IEC 60641	AA21108/AA21105/ AA21109/AA21101/ TRE 184 TRE 185/ IEC 60641	TC or TR	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	Test	1pc/lot/type	1sample / lot	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
			-do-	-do-	-do-	-	-do-	-do-	-do-	✓	P	V	V								
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.										Notes: # Customer Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection											
**M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: CUSTOMER, P: Perform, W: Witness and V: Verification as appropriate, CHP: Customer Hold Point.																					


<div></div> <div>MANUFACTURER'S NAME & ADDRESS : BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL</div>		STANDARD MANUFACTURING QUALITY PLAN												
		ITEM : POWER TRANSFORMER UP TO 420 KV CLASS 4 X 275 MVA, 21/420 KV, 1- PHASE GENERATOR TRANSFORMER PO NO.: LOA NO DG/BSL U-6/2011/T-1/BTG+BOP EPC CONTRACT/SUPPLY/0054 PO DATE: 17/01/2018							CUSTOMER:		M/s MAHAGENCO- BHUSAWAL			
									PROJECT:		1 X 660MW BHUSAWAL TPS UNIT-6			
									BHEL WO NO.:		68001A51201			
									QP NO / REV NO		QA/TCB/31/1345 / 03			
DOCUMENT NO.:		BP-QP-415-300-0001												
DATE :		26-11-2020												
SL NO	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
					M	C/N				M	C	N		
1	2	3	4	5	6		7	8	9	D*	10**			11
		k) Electric strength in oil l) Oil absorption m) Cohesion between plies	-do- -do- -do-	-do- -do- -do-	-do- -do- -do-	1sample / lot - -	-do- -do- -do-	-do- -do- -do-	-do- -do- -do-	√ √ √	P P P	V V V	V V V	
1.04	Synthetic rubber bonded cork sheet (Stock Item)	a) Dimension b) Hardness c) Tensile strength d) Compressibility e) Recovery f) Compression set g) Flexibility h) Ageing in Oil i) Side flow j) Density	Major -do- -do- -do- -do- -do- -do- -do- -do- -do-	Measure Test -do- -do- -do- -do- -do- -do- -do- -do-	1pc/lot/th -do- 1pc/lot/th -do- -do- -do- -do- -do- -do- -do- -do-	- 1sample / lot - 1sample / lot - - - - - - - -do-	AA59802 / IS4253 -do- -do- -do- -do- -do- -do- -do- -do- -do- -do-	AA59802 / IS4253 -do- -do- -do- -do- -do- -do- -do- -do- -do- -do-	TC or TR -do- -do- -do- -do- -do- -do- -do- -do- -do- -do-	√ √ √ √ √ √ √ √ √ √	P P P P P P P P P P	V V V V V V V V V V	V V V V V V V V V V	
1.05	Nitrile Gasket (Stock Item)	a) Dimension b) Hardness c) Tensile strength d) Compression set e) Ageing in Oil (Type test)	Major -do- -do- -do- -do-	Measure -do- -do- -do- -do-	1 pc/lot -do- -do- -do- -do-	- - 1sample / lot -do- -	AA59807/TRE215/BS2751 -do- -do- -do- -do- -do-	AA59807/TRE215/BS2751 -do- -do- -do- -do- -do-	-do- -do- -do- -do- -do-	√ √ √ √ √	P P P P P	V V V V V	V V V V V	
1.06	Paper Insulated Copper Conductor (PICC) / Glued Insulated Copper conductor (GPICC)	a) Dimensions & tolerances (Bare & Insulated) b) Resistivity c) Elongation /Tensile Strength d) Proof Stress e) Break down Voltage f) Insulation Test b/n strands for bunched conductors g) Copper Purity of CC rod h) Oxygen content of CC rod	Major -do- -do- -do- -do- -do- -do-	Measure -do- -do- -do- -do- -do- -do-	Lot/sample/ size (No.of drums) 2-50 : 1 51-280 : 3 -do- -do- -do- -do- -do-	Lot/sample/ size (No.of drums) 2-50 : 1 51-280 : 3 -do- -do- -do- -do- -do-	BHEL Drawings & AA 28125/AA28128/ TRE 078/ TRE 151 -do- -do- -do- -do- -do- -do-	BHEL Drawings & AA28125/AA28128/ TRE 078/ TRE 151 -do- -do- -do- -do- -do- -do-	TC or TR -do- -do- -do- -do- -do- -do-	√ √ √ √ √ √ √	P P P P P P	V V V V V V	V V V V V V	
1.07	Continuously Transposed Copper Conductor (CTC) / Glued CTC (where applicable)	a) Dimensions & tolerances (Bare & Insulated) b) Resistivity c) Elongation / Tensile Strength d) Proof Stress e) Flexibility & adherence of	Major -do- -do- -do- -do-	Measure Test -do- -do- -do-	Lot/sample/ size (No.of drums) 2-50 : 1 51-280 : 3 -do- -do- -do-	Lot/sample/ size (No.of drums) 2-50 : 2 51-280 : 3 -do- -do- -do-	BHEL Drawings & AA 28129/AA 28127/ TRE 036/ AA12024/ -do- -do- -do-	BHEL Drawings & AA 28129/AA 28127 TRE 036/ AA12024/ -do- -do- -do-	TC or TR -do- -do- -do- -do-	√ √ √ √	P P P P	V V V V	V V V V	Manufacturer shall conduct insulation test of bunched conductor on 100% basis
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.										Notes: # Customer Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection				
**M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: CUSTOMER, P: Perform, W: Witness and V: Verification as appropriate, CHP: Customer Hold Point.														



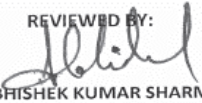
<div></div> <div>MANUFACTURER'S NAME & ADDRESS :</div> <div>BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL</div>		STANDARD MANUFACTURING QUALITY PLAN												
		ITEM : POWER TRANSFORMER UP TO 420 KV CLASS							CUSTOMER:		M/s MAHAGENCO- BHUSAWAL			
		4 X 275 MVA, 21/420 KV, 1- PHASE GENERATOR TRANSFORMER PO NO.: LOA NO DG/BSL U-6/2011/T-1/BTG+BOP EPC CONTRACT/SUPPLY/0054 PO DATE: 17/01/2018							PROJECT:		1 X 660MW BHUSAWAL TPS UNIT-6			
									BHEL WO NO.:		68001A51201			
									QP NO / REV NO		QA/TCB/31/1345 / 03			
									DOCUMENT NO.:		BP-QP-415-300-0001			
							DATE :		26-11-2020					
SL NO	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C/N					M	C	N	
1	2	3	4	5	6		7	8	9	D*	10**			11
		enamel covering f) Break down Voltage g) Copper Purity h) Oxygen content	-do- -do- -do-	-do- -do- -do-	-do- -do- -do-	-do- -do- -do-	-do- -do- -do-	-do- -do- -do-	-do- -do- -do-	√ √ √	P P P	V V V	V V V	
1.08 a)	Insulating Paper for PICC / CTC	a) Dimensions b) Density & substance c) Tensile Strength d) Water Absorption e) Moisture Content f) pH Value g) Ash Content h) Electrical Strength i) Air Permeability j) Tear Index	Major	Measure	As per purchase spec	- 1sample / lot -do- - - - - 1sample / lot - -	BHEL Drgs./ AA21111 AA21116 / IEC60554-3/IS 9335-3/5	BHEL Drgs./ AA21111 AA21116 / IEC60554-3-5/IS 9335-3	TC or TR	√ √				

<div></div> <div>BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL</div>		STANDARD MANUFACTURING QUALITY PLAN													
		ITEM : POWER TRANSFORMER UP TO 420 KV CLASS							CUSTOMER:		M/s MAHAGENCO- BHUSAWAL				
									PROJECT:		1 X 660MW BHUSAWAL TPS UNIT-6				
		4 X 275 MVA, 21/420 KV, 1- PHASE GENERATOR TRANSFORMER							BHEL WO NO.:		68001A51201				
									QP NO / REV NO		QA/TCB/31/1345 / 03				
PO NO.: LOA NO DG/BSL U-6/2011/T-1/BTG+BOP EPC CONTRACT/SUPPLY/0054 PO DATE: 17/01/2018							DOCUMENT NO.:		BP-QP-415-300-0001						
							DATE :		26-11-2020						
SL NO	COMPONENT & OPERATIONS	CHARACTERSTICS		CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
						M	C/N				D*	M	C	N	
1	2	3		4	5	6		7	8	9	D*	10**			11
	Paper (RIP) Conenser							Appvd OGA Drwg.	Appvd OGA Drwg.						
	Bushing	b)	Routine tests (a) Measurement of tan delta at 10 KV (0.3 ,0.6 & 0.85 Ua) b) Measurement of capacitance c) Dry power frequency voltage withstand test d) Measurement of partial discharge level e) Test tap insulation test f) pressure test)	-do-	-do-	-do-	-do-	-do-	-do-	-do-	√	P	V	W	-do-
1.11	Marshalling Box & RTCC Panel	a)	Dimensional / Visual checks for wiring, Mechanical operation of Equip/Switches	Major	Measure Test	100%	100%	Customer Appd.Drgs /	Customer Appd.Drgs /	TC or TR	√	P	V	W	CHP (On one unit at Vendor Works)
		b)	Functional test of electrical control operation, interlocks and sequence of operation Verification of Wiring	-do-	Test	-do-	-do-	-do-	-do-	-do-	√	P	V	W	CHP (On one unit at Vendor Works)
		c)	Insulation test at 2 KV for 1 Min between all live terminals and earth, Insulation resistance at 500V	-do-	Test	-do-	-do-	-do-	-do-	-do-	√	P	V	W	CHP (On one unit at Vendor Works)
		d)	Paint shade, thickness and adhesion test	-do-	-do-	-do-	-do-	-do-	-do-	-do-	√	P	V	W	CHP (On one unit at Vendor Works)
		e)	Degree of protection class -IP55	-do-	-do-	-do-	-do-	-do-	-do-	-do-	√	P	V	V	By paper insertion.(Type test: Once in 5 year)
1.12	Bushing C.T.	a)	Dimensions	Major	Measure	100%	100%	IS:2705 / Appv. Drg.	IS:2705 / Aprvd Drg/DS	TC or TR	√	P	V	W	CHP
		b)	Routine tests. a) Accuracy/Ratio b) Power frequency test on Secondary c) Overvoltage interturn d) Knee point voltage & Exciting current for PS class CT e) Secondary winding resistance for PS class CT.	-do-	Test	-do-	-do-	-do-	-do-	-do-	√	P	V	W	CHP
1.13	Buchholtz Relay	a)	Type, Size & Make	Major	Visual	100%	100%	IS:3637 / TR20053B	IS:3637 / TR20053B	TC or TR	√	P	V	V	
	(Stock Item)	b)	Routine test ((a) Porosity b) 2 KV insulation test c) insulation resistance d) element test e) Gas volume test f) loss of il & surge test	-do-	Test	-do-	-do-	-do-	-do-	-do-		P	V	V	
1.14	OTI & WTI (Local & Remote) (Stock Item)	a)	Type, Size & Make	Major	Visual	100%	1sample / lot	TR 10157T/TR 10123T	TR 10157T/TR 10123T	TC or TR	√	P	V	V	
		b)	HV test at 2 KV for 1 Min	-do-	Test	-do-	10%	-do-	-do-	-do-	√	P	V	V	
		c)	Calibration & Accuracy test	-do-	-do-	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
		d)	Measurement of temperature rise with respect of heater coil current (WTI)	-do-	-do-	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.										Notes: # Customer Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection					
**M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: CUSTOMER, P: Perform, W: Witness and V: Verification as appropriate, CHP: Customer Hold Point.															

		MANUFACTURER'S NAME & ADDRESS : BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		STANDARD MANUFACTURING QUALITY PLAN										
				ITEM : POWER TRANSFORMER UP TO 420 KV CLASS						CUSTOMER:		M/s MAHAGENCO- BHUSAWAL		
				4 X 275 MVA, 21/420 KV, 1- PHASE GENERATOR TRANSFORMER						PROJECT:		1 X 660MW BHUSAWAL TPS UNIT-6		
				PO NO.: LOA NO DG/BSL U-6/2011/T-1/BTG+BOP EPC CONTRACT/SUPPLY/0054 PO DATE: 17/01/2018						BHEL WO NO.:		68001A51201		
										QP NO / REV NO		QA/TCB/31/1345 / 03		
						DOCUMENT NO.:		BP-QP-415-300-0001						
						DATE :		26-11-2020						
SL NO	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
					M	C/N				M	C	N		
1	2	3	4	5	6		7	8	9	D*	10**			11
1.15	Valves - Gunmetal / CI (Gate / Globe)/ Butterfly (Stock Item)	a) Dimensional check b) Type, Size & Make c) Pressure test for body & seat d) Leakage Test	Major -do- -do- -do-	Measure Visual Test Test	100% -do- -do- -do-	- - 1sample / lot 1sample / lot	TR 20036V/TR 20037V TR 20020V/ TR20034V -do- -do-	TR 20036V/TR 20037V TR 20020V/ TR20034V -do- -do-	TC or TR -do- -do- -do-	✓ ✓ ✓ ✓	P P P P	V V V V	V V V V	
1.16	Pressure Relief Valve (Stock Item)	a) Dimensions, Type & Make b) Pressure operation test c) Leakage test d) HV test at 2 KV for 1 Min	Major -do- -do- -do-	Measure Test -do- -do-	100% -do- -do- -do-	- 1sample / lot - 1sample / lot	TR 20001V -do- -do- -do-	TR 20001V -do- -do- -do-	TC or TR -do- -do- -do-	✓ ✓ ✓ ✓	P P P P	V V V V	V V V V	
1.17	Magnetic Oil Gauge Indicators (Stock Item)	a) Type, Size & Make b) Calibration check of dial marking c) Switch operation d) HV test at 2 KV for 1 Min e) Operational test	Major -do- -do- -do- -do-	Visual -do- Test -do- -do-	100% -do- -do- -do- -do-	- - - - -	TR 20041 O /TR20084O -do- -do- -do- -do-	TR 20041 O /TR20084O -do- -do- -do- -do-	TC or TR -do- -do- -do- -do-	✓ ✓ ✓ ✓ ✓	P P P P P	V V V V V	V V V V V	
1.18	Air Cell for Conservator (Stock Item)	a) Dimensional check b) Surface Finish c) Acceptance Test. ((a) inflation/deflation at 10 Kpa (b) pressure test at 10KPA for 24hrs)	Major -do- -do-	Measure Visual Test	100% -do- -do-	- - 100%	TR 10150 A -do- -do-	TR 10150 A -do- -do-	TC or TR -do- -do-	✓ ✓ ✓	P P P	V V V	V V V	
1.19	Oil Pump & Motor Set (Stock Item)	a) Type, Model, Rating b) Performance Test (Input, Output, Discharge, No Load test, Locked Rotor test) c) HV test at 2 KV for 1 Min d) Leakage Test	Major -do- -do- -do-	Visual Test -do- -do-	100% -do- -do- -do-	100% -do- -do- -do-	BHELdrwg / data sh. TR 10023P/TR20011P -do- -do-	BHELdrwg / data sh. TR 10023P/TR20011P -do- -do-	TC or TR -do- -do-	✓ ✓ ✓ ✓	P P P P	V V V V	V V V V	
1.20	Cooling Fan & Motor Assembly (Stock Item)	a) Type, Model, Rating b) IR Measurement c) HV test at 2 KV for 1 Min d) Power consumption & RPM	Major -do- -do- -do-	Visual Test -do- -do-	100% -do- -do- -do-	- - - -	BHELdrwg / data sh./ TR20029F -do- -do- -do- -do-	BHELdrwg / data sh./TR20029F -do- -do- -do- -do-	TC or TR -do- -do- -do- -do-	✓ ✓ ✓ ✓	P P P P	V V V V	V V V V	
1.21	Oil Flow Indicator (Stock Item)	a) Type, Model, Rating b) HV test at 2 KV for 1 Min c) Functional Test, Switch operation	Major -do- -do-	Visual Measure Test	100% -do- -do-	- - -	TR 20068 I /TR10050I -do- -do-	TR 20068 I /TR10050I -do- -do-	TC or TR -do- -do-	✓ ✓ ✓	P P P	V V V	V V V	
1.22	On Load Tap Changer / Off Circuit Tap Changer	a) Mechanical test of diverter switch Insert, 4000 switching operation (Min) b) Mili volt drop / contact resitance measurement before & after Mecanical test (4000 switching oprn) c) Sequence test	Major -do- -do-	Test -do- -do-	100% -do- -do-	100% -do- -do-	IEC-60214 & BHEL Drawings -do- IEC-60214 & BHEL Drawings	IEC-60214 & BHEL Drawings -do- IEC-60214 & BHEL Drawings	TR -do- -do-	✓ ✓ ✓	P P P	V V V	W W W	CHP CHP CHP NA for off ckt.tap switch
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.										Notes: # Customer Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection				
**M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: CUSTOMER, P: Perform, W: Witness and V: Verification as appropriate, CHP: Customer Hold Point.														

<div></div> <div>MANUFACTURER'S NAME & ADDRESS :</div> <div>BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL</div>		STANDARD MANUFACTURING QUALITY PLAN												
		ITEM : POWER TRANSFORMER UP TO 420 KV CLASS							CUSTOMER:			M/s MAHAGENCO- BHUSAWAL		
									PROJECT:			1 X 660MW BHUSAWAL TPS UNIT-6		
		4 X 275 MVA, 21/420 KV, 1- PHASE GENERATOR TRANSFORMER							BHEL WO NO.:			68001A51201		
									QP NO / REV NO			QA/TCB/31/1345 / 03		
PO NO.: LOA NO DG/BSL U-6/2011/T-1/BTG+BOP EPC CONTRACT/SUPPLY/0054 PO DATE: 17/01/2018							DOCUMENT NO.:			BP-QP-415-300-0001				
							DATE :			26-11-2020				
SL NO	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
					M	C/N				M	C	N		
1	2	3	4	5	6		7	8	9	D*	10**			11
		d) Pressure test of divertor switch compartment with oil	-do-	-do-	-do-	-do-	-do-	Withstand	-do-	√	P	V	W	CHP
		e) Mechanical test of tap selector with motor drive 500 staisfactory operations (in all) from one extreme position to the other in air	-do-	-do-	-do-	-do-	-do-	0.7 Kg/cm ² for 1Hr. IEC-60214 & BHEL Drawings	-do-	√	P	V	W	NA for off ckt.tap switch CHP
		f) Operation test of complete (functional check) tapchanger - satisfactory operation for one complete cycle	-do-	-do-	-do-	-do-	IEC-60214 & BHEL Drawings	IEC-60214 & BHEL Drawings	-do-	√	P	V	W	CHP
		g) Auxiliary circuits HV Test at 2KV for 1 min.	-do-	-do-	-do-	-do-	IEC-60214 & BHEL Drawings	IEC-60214 & BHEL Drawings	-do-	√	P	V	W	CHP
		h) Condition of Silver plating on contacts on the jop after 4000 switching operation	-do-	-do-	-do-	-do-	BHEL Drawing	Good condition	-		P	V	W	NA for off ckt.tap switch CHP
		i) Adhesion thickness check on silver plated contact	-do-	-do-	On sample basis	On sample basis	BHEL Drawings	BHEL Drawings	TC or TR	√	P	V	W	CHP
1.23	Roller Assembly (Stock Item)	a) Dimensions	Major	Measure	1Sample/lot of raw material	-	BHEL Drawings & TR20005R	BHEL Drawings & TR20005R	TC or TR	√	P	V	V	
		b) Mechanical properties	-do-	Test	-do-	-	-do-	-do-	-do-	√	P	V	V	
		c) Chemical Properties	-do-	Test	-do-	-	-do-	-do-	-do-	√	P	V	V	
1.24	Online DGA	a) Visual & Dimensional Check,	Major	Measure	100%	-	Manufacturer Data Sheet/ Standard	Manufacturer Data Sheet/ Standard	TC or TR	√	P	V	V	OEM TC shall be provided for review
		b) Calibration of Dissolved Gases & Moisture	-do-	Test	-do-	-	-do-	-do-	-do-	√	P	V	V	-Do-
		c) Make model & type	-do-	Test	-do-	-	-do-	-do-	-do-	√	P	V	V	-Do-
1.25	Fibre Optics Temperature Sensor (FOTS)	a) Acceptance test.	Major	Measure Test	100%	-	BHEL Drawings/Spec.	BHEL Drawings/Spec.	TC or TR	√	P	V	V	OEM TC shall be provided for review
1.26	Nitrogen Injection fire protection system (NIFPS)	a) Acceptance test.	Major	Measure Test	100%	-	BHEL Drawings/Spec.	BHEL Drawings/Spec.	TC or TR	√	P	V	W	CHP (At Vendor Works for Indian Vendor)
														For foreign vendor -OEM TC shall be provided for review
1.27	Silicagel Breather	a) Visual check, dimensions,	Major	Measure	100%	-	TR20040B	TR20040B	TC or TR	√	P	V	V	
		b) Pressure Test	Major	Measure	100%	-	-do-	-do-	TC or TR	√	P	V	V	
1.28	Radiator	a) DP test on lifting lug welds	Major	Measure	100%	-	TR10086R	TR10086R	TC or TR	√	P	V	W	CHP
		b) Surface cleaning by sand/shot blast of radiator Pipe.	Major	Measure	100%	-	TR10086R	TR10086R	TC or TR	√	P	V	V	
		c) Visual and Dimension	Major	Measure	100%	-	TR10086R	TR10086R	TC or TR	√	P	V	W	
		d) Air pressure testing of radiators	Major	Test	100%	-	-do-	-do-	TC or TR	√	P	V	W	CHP
		e) paint film thickness & adhesion test	Major	Test	100%	-	-do-	-do-	TC or TR	√	P	V	V	
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.									Notes: # Customer Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection					
**M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: CUSTOMER, P: Perform, W: Witness and V: Verification as appropriate, CHP: Customer Hold Point.														

		MANUFACTURER'S NAME & ADDRESS : BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		STANDARD MANUFACTURING QUALITY PLAN										
				ITEM : POWER TRANSFORMER UP TO 420 KV CLASS						CUSTOMER:		M/s MAHAGENCO- BHUSAWAL		
				4 X 275 MVA, 21/420 KV, 1- PHASE GENERATOR TRANSFORMER						PROJECT:		1 X 660MW BHUSAWAL TPS UNIT-6		
				PO NO.: LOA NO DG/BSL U-6/2011/T-1/BTG+BOP EPC CONTRACT/SUPPLY/0054 PO DATE: 17/01/2018						BHEL WO NO.:		68001A51201		
										QP NO / REV NO		QA/TCB/31/1345 / 03		
						DOCUMENT NO.:		BP-QP-415-300-0001						
						DATE :		26-11-2020						
SL NO	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
					M	C/N				M	C	N		
1	2	3	4	5	6		7	8	9	D*	10**			11
2.00	IN PROCESS CHECKS:													
2.01	Fabrication of Tank, Cover, Conservator, End Frame & Accessories - Welding requirement & Painting	a) WPS approval b) PQR & welder qualification c) DP test on all load bearing welds as per drawing d) Air Leakage test for min 4 HR i) Transformer Tank with turret ii) Conservator & Pipes e) Pressur test & Vacuum test with deflection measurement f) Surface cleaning by sand/shot blast g) Visual check, Paint film thickness inside & outside, paint shade, paint adhesion,	Major -do- -do- -do- -do- -do- Major	Verify -do- Test Measure -do- -do- Test	Once 100% 100% 100% One tank of each type One tank of each type 100% Random spot check	Once 100% 100% One tank of each type One tank of each type -	BHEL WPS as per ASME Sec IX -do- BHEL Drawings / AA0850129 BHEL Drawings /MTI/CITS -do- BHEL Spec. /MTI/CITS BHEL Drg./ Specs TR10005P/TR10257P	BHEL WPS as per ASME Sec IX -do- BHEL Drawings / AA0850129 BHEL Drawings /MTI/CITS -do- BHEL Spec. /MTI/CITS BHEL Drg./ Specs TR10005P/TR10257P	QW 482 TC or TR -do- -do- -do- TC or TR -do-	√ √ √ √ √ √ √	P P P P P P P	V V V W V W V	V V V W V W V	 CHP CHP
2.02	Core	a) Lamination thickness & size b) Visual Inspection of built core	Major -do-	Measure Visual	100% -do-	- -	BHEL Drawing -do-	BHEL Drawing -do-	TR -do-	√ √	P P	V V	V V	
2.03	Test on core	a) Isolation test test b/n: i) Core to yoke bolts ii) Core to core clamps iii) Core clamps to yoke bolt iv) Core to tank, if applicable	Major -do- -do- -do-	Test -do- -do- -do-	100% -do- -do- -do-	One unit of each type -do- -do- -do-	BHEL Drg/Plant Std/ TR10266P Customer Spec. -do- -do- -do-	BHEL Drg/Plant Std/TR 10266P Customer Spec. -do- -do- -do-	TR -do- -do- -do-	√ √ √ √	P P P P	W W W W	W W W W	CHP (On one unit)
2.04	Winding of Coil	a) Brazing procedure & Brazer qualification b) Visual check & Dimension of final coil c) Megger test between strands of bunched conductors d) Continuity test b/n conductors	Major -do- -do- -do-	Verify -do- Test -do-	100% -do- - -do-	100% - - -	BP0631199 / ASME Sec IX -do- BHEL Elect. Spec. & Drg. -do-	BP0631199 / ASME Sec IX -do- BHEL Elect. Spec. & Drg. -do-	TR -do- TR -do-	√ √ √ √	P P P P	V V V V	W W W W	CHP (for serveillance Check of MAHAGENCO) -Do- -Do- -Do-
2.05	Core coil assembly	a) Visual check for correctness of complete assembly including Terminal gear connections b) Electrical clearances on HV & LV Side	Major -do-	Physical Physical	100% -do-	100% -	BHEL QC checklist / BHEL Drawing -do-	BHEL QC checklist BHEL Drawing -do-	QC-CL -do-	√ √	P P	V V	W W	CHP CHP
2.06	TransformerTreatment Process	a) Drying, oil impregnation soaking - 1st process b) Servicing (visual inspection of	Major -do-	Physical -do-	100% -do-	100% -do-	TR 10266P TR 10266P /	TR 10266P TR 10266P /	TR -do-	√ √	P P	V V	V V	
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.										Notes: # Customer Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection				
**M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: CUSTOMER, P: Perform, W: Witness and V: Verification as appropriate, CHP: Customer Hold Point.														

	MANUFACTURER'S NAME & ADDRESS : BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		STANDARD MANUFACTURING QUALITY PLAN											
			ITEM : POWER TRANSFORMER UP TO 420 KV CLASS						CUSTOMER:		M/s MAHAGENCO- BHUSAWAL			
			4 X 275 MVA, 21/420 KV, 1- PHASE GENERATOR TRANSFORMER						PROJECT:		1 X 660MW BHUSAWAL TPS UNIT-6			
			PO NO.: LOA NO DG/BSL U-6/2011/T-1/BTG+BOP EPC CONTRACT/SUPPLY/0054 PO DATE: 17/01/2018						BHEL WO NO.:		68001A51201			
								QP NO / REV NO		QA/TCB/31/1345 / 03				
								DOCUMENT NO.:		BP-QP-415-300-0001				
								DATE :		26-11-2020				
SL NO	COMPONENT & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS	
					M	C/N				M	C	N		
1	2	3	4	5	6		7	8	9	D*	10**			11
		a) active part, tightening of all joints, clamping, bracing, etc) c) Drying, oil impregnation - 2nd process	-do-	-do-	-do-	100%	BHEL Drg. TR 10266P	BHEL Drg. TR 10266P	-do-	✓	P	V	V	
3.00 TYPE TESTS, SPECIAL TESTS & ROUTINE TEST														
3.01	TYPE TESTS & SPECIAL TESTS	a) Type tests as per customer contractual requirement	Major	Test	100%	100%	IS 2026/IEC-60076/CITS	CITS or sub- mission of type test Record of Equivalent Job	TC / TR	✓	P	V	W	CHP
3.02	ROUTINE TESTS:	a) Routine tests as per customer approved tests schedule	Major	Test	100%	100%	IS 2026/IEC-60076/CITS	IS 2026/IEC-60076/CITS	TC / TR	✓	P	V	W	CHP
4.00 PRE-SHIPMENT CHECKS:														
4.01	Transformer	a) Nitrogen gas / Dry Air tightness b) Mounting of of gas/air cylinders with regulators c) Regularization of pressure and mounting of impact recorder d) Check on completeness of TRFR for shipping	Major -do- -do- Major	Verify -do- -do- -do-	1 -do- -do- -do-	1 -do- -do- -do-	BHEL QC-Check List /BHEL DRAWINGS BHEL Drawings/ TR 10165 S	BHEL QC-Check List TR 10165 S BHEL Drawings/ TR 10165 S	QC-CL QC-CL TR QC-CL	✓ ✓ ✓ ✓	P P P P	V V V V	V V V V	
LEGEND: * RECORDS, IDENTIFIED WITH "TICK" (✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. **M: MANUFACTURER/SUB-SUPPLIER, C: MAIN SUPPLIER, N: CUSTOMER, P: Perform, W: Witness and V: Verification as appropriate, CHP: Customer Hold Point.										Notes: # Customer Inspection Engineer to check, approval date/revison no. of reference documents at the time of Inspection				
Abbreviation : W : Customer Hold Point (CHP) - Not to proceed without Customer clearance TR : Test record issued by BHEL TC : Test certificate / Inspection report / Observation report issued by BHEL Supplier / Vendor CITS : Customer inspection test schedule MTI : Mechanical Test Instructions QC-CL : BHEL Quality Control Check List DS : Customer approved data sheet														
Notes: 1 BHEL BPL WILL SUBMIT DETAILS OF TESTS WHICH ARE 'WITNESS' & 'CHP' CATEGORY AS PER TECHNICAL SPECIFICATION AND CUSTOMER INSPECTION TEST SCHEDULE FOR CUSTOMER. 2 IN CASE OF DIFFERENCE BETWEEN BHEL DOCUMENT (SPEC., STD, DRG) & CONTRACT SPEC. OF THE CUSTOMER, THE LATER SHALL BE BINDING CONSIDERING DEVIATIONS MUTUALLY AGREED BETWEEN BHEL & CUSTOMER 3 THE LATEST REVISION / EDITION / AMENDMENT OF BHEL SPECIFICATIONS, STANDARDS & BHEL DRAWINGS AND NATIONAL / INTERNATIONAL STANDARDS SHALL BE FOLLOWED. 4 THE ITEMS APPEARING IN THIS QA PLAN BUT NOT APPLICABLE TO THE SPECIFIC DESIGN / CONTRACT MAY BE CONSIDERED AS OMITTED. 5 ALL TESTING & MEASURING INSTRUMENTS SHOULD BE CALIBRATED AND RELEVANT CALIBRATION RECORDS SHALL BE AVAILABLE WITH THE MANUFACTURER OF THE ITEMS.														
<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> PREPARED BY:  SATYENDRA KUMAR SINGH DY. ENGINEER/QA-TCB </div> <div style="text-align: center;"> REVIEWED BY:  ABHISHEK KUMAR SHARMA MANAGER / QA-TCB </div> </div>														

MAHAGENCO - BHUSAWAL TPS 1 X 660 MW UNIT-6								
Comments on Document/Drawing.- QAP of generator transformer Drawing no: BP-QP-415-300-0001. REV03								
SL. No.	DCPL/MahaGenco Comments dtd 06.05.2020	BHEL reply	DCPL/MahaGenco Comments on Rev 01 dtd 18.07.2020	BHEL reply	DCPL/MahaGenco Comments on Rev 02 dtd 11.11.2020	BHEL reply	DCPL/MahaGenco Comments on Rev 02 dtd 21.12.2020	BHEL reply
1	In Sr.No 1.09 Transformer oil please add in SK value and Ageing Characteristic .	As per M/s MSETCL BID Specification no: DG/BSL U-6/ 2011/T-1 Section-1, Insulating Oil shall conform to IS 335 and according to latest IS 335-2018, SK value and ageing Characteristics are not required. Hence not added.	Noted.	---				
2	Please include on-line dissolved gas analysis system (DGA), Fibre optic temperature measurement/monitoring system (FOTS) and Nitrogen injection fire protection protection system in in Component & Operation column list.	Agreed and Incorporated in QAP at clause no 1.24, 1.25 and 1.26. This is inform that DGA, NIFPS system are not dispatched along with Transformer, therefore shall also be made available for review separately.	Noted, However Please add CHP at Mahagenco/TPI in remarks column for online dissolved gas analysis system (DGA), Fibre optic temperature measurement/monitoring system (FOTS) and Nitrogen injection fire protection protection system	This is to note that online dissolved gas analysis system (DGA), Fibre optic temperature measurement/ monitoring system (FOTS) are improted items,hence CHP at foreign vendor works is not feasible thereforer OEM Test certificates shall be provided to customer for record review before testing of transformer. For NIFPS -CHP applicable at Vendors Works for indigenous supply, If procured from foreign vendor, OEM TC shall be provided.	Noted. Add a note for NIFPS.	Note added at clause 1.26 in remarks column.	Noted	
3	Please include Silica breather in Component & Operation column list.	Agreed and incorporated in QAP at clause no 1.27	Noted.	---				
4	Please include radiators in Component & Operation column list and add CHP in remarks column for radiator .	Agreed and incorporated in QAP at clause no 1.28	Noted.	---				
5	Routine test, Type test and Special test for for Generator transformer shall be carried out as per Vol.IVA, Section-2, Clause No.6.1 to 6.3. Inspection & Testing Plan (ITP) shall be elaborated with CHP.	In line with Vol.IVA, Section-2, Clause No.6.1 to 6.3, Customer Inspection test schedule (CITS) doc no. TRE/68001/CITS Rev00, MDL Doc. no. BP-DG-415-301-0013 was submitted for approval. Commented copy received to M/S BHEL. CITS Rev 01 is under finalization and shall be submitted in due course.	Please list out test serially as per Vol.IVA, Section-2, Clause No.6.1 to 6.3 under Routine test, Type test and Special test for for Generator transformer for clarity of test details to be carried out.	In line with Vol.IVA, Section-2, Clause No.6.1 to 6.3, Customer Inspection test schedule (CITS) doc no. TRE/68001/CITS Rev02, MDL Doc. no. BP-DG-415-301-0013 was submitted for approval. Commented copy received to M/S BHEL. CITS Rev 03 is under finalization and shall be submitted in due course by BHEL Engg.	Noted. Please submit the revised document.			
6	M/s BHEL shall submit test certificate from supplier for OTI and WTI.	OTI and WTI are already part of Submitted QAP. TC's Shall be submitted accordingly.	Noted.	---				
7	In Sr. No 1.10 and 1.12 Please add CHP at Mahagenco/TPI in remarks column for condenser bushings and bushing CT.	Agreed and Incorporated.	Noted.	---				
8	In Sr. No 1.22 Please add CHP at Mahagenco/TPI in remarks column for off circuit tap changer(OCTC).	Agreed and Incorporated.	Noted.	---				
9	In Sr. No 2.05 Please add CHP at Mahagenco/TPI in remarks column for core coil assembly.	Agreed and Incorporated.	Noted.	---				
10	Please include a cover sheet of the document indicating, Client, Project, Consultant & document No- BP-QP-415-300-0001.	Cover sheet added	Please correct/add Customer Name as Mahagenco instead of " MSETCL " and include logo of Client, Project, Consultant & document No-BP-QP-415-300-0001 on cover sheet of the document.	Agreed and Added.	Noted			
11	Pressure Test for tank shall be included with CHP.	Agreed and Incorporated.	Noted.	---				
12	Separate document shall be submitted for Field Quality Plan (FQP).	FQP is not in scope of BHEL Transfromer sales. FQP shall be seperately submitted by Power sector-BHEL.	Noted. BHEL Noida, to ensure that the document is a part of final documentation.	---				
DCPL/MahaGenco Comments on Rev 01 dtd 17.07.2020								
SL. No.			DCPL/MahaGenco Comments on Rev 01 dtd 18.07.2020	BHEL reply	DCPL/MahaGenco Comments on Rev 01 dtd 11.11.2020	BHEL reply	DCPL/MahaGenco Comments on Rev 02 dtd 07.12.2020	
13			Correct/add Customer Name as Mahagenco instead of " MSETCL " and include logo of Client, Project Consultant & document No-BP-QP-415-300-0001 on cover sheet of the document.	Agreed and Added.	Noted			
14			Sr.No.1.10 (Bushing)- Add list of following point a) Measurement of tan delta at 10 KV (0.3 ,0.6 & 0.85 Ua) b) Measurement of capacitance c) Dry power frequency voltage withstand test d) Measurement of partial discharge level e) Test tap insulation test f) pressure test.	Agreed and Added.	Noted			
15			Sr.No.1.11 (Marshalling box & RTCC panel)- Add 2KV for 1 minute insulation test between all live terminals and earth, Insulation resistance at 500V and also Please add CHP at Mahagenco/TPI in remarks column.	Agreed and added. CHP added for inspection at Vendors works on one unit.	Noted			
16			Sl.No.1.12 (Bushing C.T) - Add- a) Accuracy/Ratio b) Power frequency test on Secondary c) Overvoltage interturn d) Knee point voltage & Exciting current for PS class CT e) Secondary winding resistance for PS class CT.	Agreed and Added.	Noted			
17			Sr.No.1.13 (Buchholz Relay) -Add list of following point a) Porosity b) 2 KV insulation test c) insulation resistance d) element test e) Gas volume test f) loss of il & surge test g) IP-55 degree of protection on enclosure leak/pressure test .	Test were added in Routine tests. However IP-55 Degree of Protection on enclosure is a Type test. Therefore valid Type test certificate shall be provided for Customer Review.	Noted			
18			Sr. No 1.16 (pressure relief device)- Add CHP at Mahagenco/TPI in remarks column .	Pressure Relief Device are Stock Item and Procured in Batches, therefore CHP can not be provided at this stage,However Test Certificate shall be provided for Customer review.	Noted			
19			Sr. No 1.18 (for Air cell for conservator) Please add inflation/deflation at 10 Kpa, pressure test at 10KPA for 24hrs and also add CHP at Mahagenco/TPI in remarks column for Air cell for conservator.	Test were added in acceptance tests. Since Aircell are Stock Item and Procured in Batches, therefore CHP can not be provided at this stage,However Test Certificate shall be provided for Customer review.	Noted			
20			Add CHP at Mahagenco/TPI in remarks column for Sl.No. 1.24, 1.25 and 1.26. (online dissolved gas analysis system (DGA), Fibre optic temperature measurement/monitoring system (FOTS) and Nitrogen injection fire protection system).	This is to note that online dissolved gas analysis system (DGA), Fibre optic temperature measurement/ monitoring system (FOTS) are improted items,hence CHP at foreign vendor works is not feasible thereforer OEM Test certificates shall be provided to customer for record review before testing of transformer. For NIFPS -CHP applicable at Vendors Works for indigenous supply, If procured from foreign vendor, OEM TC shall be provided.	Noted. Add a note for NIFPS.	Note added at clause 1.26 in remarks column.	Noted	
21			Sr. No.1.28 (Radiators)- Add list of following point a) DP test on lifting lug welds b) Surface cleaning by sand/shot blast of radiator header d) paint film thickness e) paint film adhesion test.	Agreed and Added. This is to note that headers are part of Transformer Tank accessories fabrication and Radiator Banks were seperately manufactured.	Noted			
22			Sr.No.2.01 (Fabrication of Tank, Cover, Conservator, End Frame, Welding requirement & Painting) please add this point a) Surface cleaning by sand/shot blast of radiator header .	Agreed and Added.	Noted			
23			Add in notes all testing & measuring instruments should be calibrated and relevant calibration records shall be available with the manufacturer of the items.	Agreed and Added	Noted			
Additional MahaGenco Comments on Rev 02 dtd 11.11.2020								

24					In Sl.No.1.10 (OIP/RIP , Bushing) , Sl.No.1.11 (Marshalling box & RTCC panel) & Sl.No.1.12 (Bushing C.T) Please make correction as only CHP at Mahagenco/TPI in remarks column instead of “ CHP (for Bhel. Make bushing , for bushing procured from other source TC shall submitted for review). ”	CHP incorporated at clause 1.10, 1.11 & 1.12. However for bushings Imported from foreign vendors shall be entitled for TC review.	Noted	
25					In Sl.No. Sl.No.1.11 (Marshalling box & RTCC panel Please make correction as only CHP at Mahagenco/TPI in remarks column instead of “ CHP (on one unit at vendor works). ”.	This point has got already discussed at point 15 of this comment reply sheet and noted by M/s Mahagenco.	Noted	
26					In Sr. No 1.14 (for OTI & WTI) please add-Measurement of temperature rise with respect of heater coil current.	Agreed and Incorporated	Noted	
27					In Sr. No 1.15 (for Valves) please add-a) Pressure test for body & seat b)Seepoage test with insulating oil.	Incorporated Pressure test for body and seat at clause no 1.15 'c', However seepage test with insulating oil is a type test and conducted once in three years. Valid Type test certificate shall be submitted for review.	Noted. Include the same as note.	
28					In Sr. No 1.18 (for Air cell for conservator) Please add CHP in remarkS column.	This point has got already discussed at point 19 of this comment reply sheet and noted by M/s Mahagenco.	Noted	
29					In Sr. No 2.04 (Winding of coil) Please add Surveillances Mahagenco/TPI check in remarks column.	Incorporated in remarks column of clause 2.04, However CHP is given for serveillance check only. If customer representative is not available for inspection, BHEL will proceed further and TC review shall be acceptable to M/S MAHAGENCO.	Noted. BHEL to raise prior call for inspection as be contract.	
30					Sr.No.2.01 (Fabrication of Tank, Cover, Conservator, End Frame, Welding requirement & Painting) Please make correction as CHP at Mahagenco/TPI in remarks column instead of “ CHP (on one unit at vendor works). ”.	Agreed and Incorporated.	Noted	