



QA PLAN FOR: FORGINGS
QA PLAN NO: QSP/HG/104

QUALITY ASSURANCE DEPARTMENT

SHEET 1 of 2
DATE: 14/01/2016

PINO: _____
REVISION: 01

DATE: 13/10/1993

SL. NO.	COMPONENT/ASSY/ OPERATION	CHARACTERISTICS	CLASS	TYPE	QUANTUM OF CHECK	REF. DOC.	RECORD FORMAT	INSPECTION AGENCY	REMARKS
1.0	Forging stock (ingot or bloom)	a) Material certification	Major	Review	100%	Spec/ Drawing	TC	Supplier/BHEL/ Customer	
		b) Material identification	Major	Review	100%	Spec/ Drawing	TC	Supplier/BHEL/ Customer	
1.2	Forging	a) Visual and process checks	Major	Review	100%	Approved forging process	Supplier QC record	Supplier/BHEL/ Customer	
		b) Heat treatment	Critical	Heat treatment	100%	Spec	TC	Supplier/BHEL/ Customer	
		c) Marking of test samples as per drawing	Major	Review	100%	Drawing	Supplier QC record	Supplier/BHEL/ Customer	
		d) Chemical analysis	Major	Chem	Sample	Spec	TC	Supplier/BHEL/ Customer	
		e) Mechanical analysis	Major	Mech	Sample	Spec	TC	Supplier/BHEL/ Customer	
		f) Ensure proof marking for availability of machining allowance	Major	Dimensional	100%	Drawing	Supplier QC record	Supplier/BHEL/ Customer	
		g) Marking of PF nos., etc. before rough machining	Major	Review	100%	Drawing	Supplier QC record	Supplier/BHEL/ Customer	
		h) Visual & dimensional checks of rough machined forgings	Major	Visual/ Dimensional	100%	Drawing	Supplier QC record	Supplier/BHEL/ Customer	

PREPARED BY: -SD-

CHECKED BY: -SD-

APPROVED BY: -SD-

DATE: 13/10/1993

REVISION 01: 1) "Important note" has been added. 2) The "Type" field was blank for 1.2 c) & 1.2 g). 3) The "Record format" field was blank for SL. No. 1.2 c). 4) The format has been updated.

PREPARED BY: *[Signature]* 14/01/2016

CHECKED BY: *[Signature]* 14/01/2016

APPROVED BY: *[Signature]*

DATE: 14/01/2016

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QA PLAN FOR: FORGINGS
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SHEET 2 of 2
DATE: 14/01/2016

SL. NO.	COMPONENT/ASSY/ OPERATION	CHARACTERISTICS	CLASS	TYPE	QUANTUM OF CHECK	REF. DOC.	RECORD FORMAT	INSPECTION AGENCY	REMARKS
		i) UT on forging and boroscopic examination	Major	NDT	100%	Drawing	TC	Supplier/BHEL/ Customer	
		j) Final marking of PF nos., heat nos., identification, etc.	Major	Review	100%	Drawing	TC	Supplier/BHEL/ Customer	
		k) Painting, preservation, and packing	Major	Review	100%	Drawing	TC	Supplier/BHEL/ Customer	

ABBREVIATIONS: NDT - Non Destructive Testing, Mech - Mechanical, Chem - Chemical, Elec - Electrical, Spec - Specification, TC - Test Certificate, QC - Quality Control

IMPORTANT NOTE: Some of the above-mentioned tests may be witnessed by the customer. This shall be intimated at a later date.

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PREPARED BY: *[Signature]* 14/01/2016
कृष्णा चौ. बंडारु

CHECKED BY: *[Signature]* 14/01/16

APPROVED BY: *[Signature]*

DATE: 14/01/2016

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BHARAT HEAVY ELECTRICALS LIMITED – BHOPAL
QUALITY ASSURANCE - GENERATION (QAX)
QUALITY ASSURANCE PLAN

EQUIPMENT: HYDRO GENERATOR (SEMI UMBRELLA TYPE)
Q.A PLAN NO.- QA-G/HG/ 297 REV 08 DTD 05/02/2015

PROJECT : PUNATSANGCHHU - II (6X 170 MW) HEP
CUSTOMER : PHPA-II, BHUTAN

SHEET NO. 2 OF 8

SLNO	COMPONENT/ ASSY/ OPERATION	CHARACTERSTICS	CLASS	TYPE	QUANTUM	REF DOCU/ ACCEPTANCE NORMS	RECORD FORMAT	AGENCY			REMARKS
								3	2	1	
1.	INCOMING MATERIAL INSPECTION										
1.1	STATOR FRAME PLATE	CHEM, MECH.PROPERTIES	MINOR	T	SAMPLE	AA10108 or AA10119	TC	P	V	-	TC
1.2	STATOR BAR COPPER	PHYSICAL & MECH.PROPERTIES, CONDUCTIVITY, CHEMICAL COMPOSITION, INSULATION THICKNESS, INSULATION BREAKDOWN	MINOR	T/ET	SAMPLE	AA28113	TC	P	V	-	TC
1.3	STATOR CORE PUNCHINGS	MECH. PROPERTIES, MAGNETIC CHARACTERISTICS TEST	MINOR	T	SAMPLE	HG10062	TC	P	V	-	TC
1.4	ROTOR SPIDER	CHEM, MECH. PROPERTIES	MINOR	T	SAMPLE	AA10108 or AA10119	TC	P	V	-	TC
1.5	ROTOR RIM PLATE	CHEM, MECH. PROPERTIES	MINOR	T	SAMPLE	AA10108	TC	P	V	-	TC
1.6	ROTOR RIM PUNCHING	MECH. PROPERTIES, MAGNETIC PROPERTIES	MINOR	T	SAMPLE	HG10066	TC	P	V	-	TC
1.7	POLE END PLATE	MECH. PROPERTIES & ULTRASONIC TEST	MINOR	T & UT	SAMPLE	HG06004	TC	P	V	-	TC
1.8	POLE PUNCHINGS	MECH. PROPERTIES, MAGNETIC PROPERTIES,CHEMICAL PROPERTIES	MINOR	T	SAMPLE	HG10067	TC	P	V	-	TC
1.9	ROTOR POLE COIL COPPER	PHYSICAL & MECH. PROPERTIES, CHEMICAL PROPERTIES, CONDUCTIVITY.	MINOR	T/ET	SAMPLE	AA12013	TC	P	V	-	TC
1.10	GENERATOR SHAFT FORGING (TOP & BOTTOM SHAFT)										
1.10.1		CHEM, MECH. PROPERTIES (TENSILE STRENGTH, YIELD STRENGTH, HARDNESS, ELONGATION, CHARPY IMPACT TEST) *	MAJOR	T	SAMPLE FROM EACH SHAFT	HG10035	TC	P	W	W	CHP(**)
1.10.2		BORE INSPECTION, NDT, VISUAL CHECK	MAJOR	UT & MT	100%	AA0850101	TC	P	W	W	
1.10.3		DIMENSIONAL CHECK	MINOR	T	100%	HG10035	TC	P	W	W	CHP at Vendor's works
1.11	AIR & OIL COOLER TUBES	CHEM, MECH. PROPERTIES	MINOR	T	SAMPLE	AA12130	TC	P	V	-	TC

i) * Testing of chemical properties shall be conducted by stoichiometric method on the random selected sample of generator shaft.
ii) ** CHP witnessed at Vendor's works along with a representative of BHEL approved third party inspecting agency.

ISE *Noddy*

REVISION # 1/2012
Org No. 61211 QA-G/HG/397
Rev 08

APPROVED

Engineer In-Charge 28.01.12
PHPA-II, Phuntan