Minimum Technical Qualifications Required for supplying Retaining Ring Forging Grade Grx4Cr Ni Mn Mo N19138 as per BHEL spec BP19383

Ref no: AME/ATQ/RETRING/01 Date: 30-01-2023

Following are the mandatory requirements. Offers of vendors not meeting these requirements will not be considered

<table>
<tr><th>S.N</th><th>Description of pre-qualification requirement</th><th>Supporting Documents required</th><th>Complied (Yes / No)</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>1.</td><td>Vendor must have manufactured and supplied at least 3 retaining ring forgings in material grade X4Cr NI Mn MoN19138 by hot forging + heat treatment process. Out of these retaining ring forging, at least one retaining of dimension Outer diameter : ≥ 400 mm, Inner Diameter: ≥ 350 mm and Height: ≥ 140 mm must have been manufactured and supplied by vendor.</td><td>In support of above, the vendor has to furnish details of 3 retaining ring supplies in the following format:
<table><tr><td rowspan="2">Retaining ring</td><td rowspan="2">Steel Grade: Stainless Steel Forgings Grx4Cr Ni Mn Mo N19138</td><td colspan="3">Dimension (in mm)</td><td rowspan="2">Name of Customer/ Year of supply</td></tr><tr><td>OD</td><td>ID</td><td>HT</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>
This should be accompanied by Self-declaration (seal signed by authorized signatory on Company's letter head) giving purchase order reference, purchase order date, customer name, quantity supplied and supply date.
Test certificate of retaining ring for all the three cases must be submitted with offer.</td><td></td></tr>
<tr><td rowspan="2">2.</td><td>a. Vendor must have in-house forging/ring rolling, heat treatment and cold expansion facility to manufacture retaining ring forging of material grade X4Cr NI Mn MoN19138 of drawing dimension. Retaining ring forging has to be manufactured by forging plus heat treatment.#
Any other process of manufacturing is not acceptable. Outsourcing of any of the above process is not acceptable.</td><td>Details of in-house manufacturing facilities are to be submitted with offer. Supplier to give Self declaration (seal signed by authorized signatory on Company's letter head) mentioning list of relevant manufacturing facilities owned by the manufacturer.</td><td></td></tr>
<tr><td>b. Electro slag re-melted steel shall be used.</td><td>Supplier to provide Self declaration (seal signed by authorized signatory on Company's letter head) containing details of in-house melting including Electro Slag Re-melting facility.
At least one mill test certificate of material grade X4Cr NI Mn MoN19138 manufactured in house to be submitted.

In case in-house steel melting facility not available, vendor to provide details of steel supplier with their manufacturing facility and experience for material grade X4Cr NI Mn MoN19138</td><td></td></tr>
</table>

3.	a)The Manufacturer, preferably should have in-house testing facilities to conduct tests as per QAP Plan QA/MT/BOI/099 Rev.00 b) If any facility of particular testing is not available in-house then Manufacturer to Outsource labs/firms for testing.	a) Self declaration (seal signed by authorized signatory on Company's letter head) giving details of in-house testing facilities. Test certificates shall cover chemical composition, mechanical properties, dimensional report, non-destructive test report etc. Testing shall be witnessed by BHEL as per QA/MT/BOI/099. b) In case of outsourcing of testing, vendor to agree to test in government/international accreditation agency approved labs.	
4.	Vendor to confirm supply shall be as per BHEL enquiry drawing and specification. Vendor to sign each page of BHEL specification, drawing and QA plan for compliance and submit with offer.		

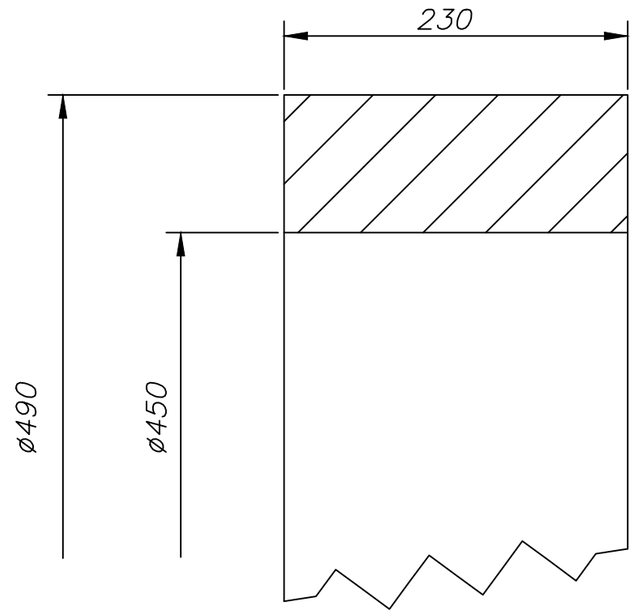
Note:-

1. Compliance of PQR (Sl.-01 to 04) is mandatory. In absence of compliance of above, vendor's offer may be rejected.
2. Offers of vendors who or whose OEM is on BHEL MISCC/unit/corporate level hold or banned/debarred, will not be considered.
3. BHEL reserves the right to ask for additional documents (if required) to verify the information declared by Vendor. In case the information submitted is found false or incorrect, the offer will be rejected and the action as per extant guideline shall be taken.
4. BHEL reserves the right to accept the offer in part or in full or cancel the tender enquiry without assigning any reason.
5. All T&C shall be governed as per BP200102. In case of discrepancies, T&C mentioned as above will be considered.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG.NO. 34028042016



TECHNICAL REQUIREMENTS:–

1. RING TO BE FORGED MEETING PROPERTIES TO BP19383 & ULTRASONICALLY TESTED AS PER SPEC.
2. MACHINE ALL OVER. 12.5
3. SHARP EDGES TO BE REMOVED.

STYLE NO. :– BP9504323910

01	SEE T.R.		001	RETAINING RING FORGED														53.50					
																	BP 19383						
59 64	65 75	78 79	25 27	29 58	59	60 77							29 31	34 45	55	56–57	58 65	72
VAR 01	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.							IT. NO.	MATL. CODE	A C	UNIT	UNIT WT.	GS
													32 33	46 54			66 71	
													VAR.	MATL. SPECN.			QTY.	
28 → CARD TYPE–3				28 → CARD TYPE–1									28 → CARD TYPE–2					

ADDITIONAL INFORMATION
W.O. 42197A407–11,21

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1, FBM – 4
IMM – 3
GTG (IMM) – 1

TYPE OF PRODUCT
OR
NAME OF CUSTOMER/PROJECT
1MJ7710–2P

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	P.SURANGE	–sd–	30.04.93	
CKD	V.K.JAIN	–sd–	01.05.93	
APPD	V.R.G.	–sd–	01.05.93	

DEPT. AME	UNTOL.DIMS.GR.		SCALE	WEIGHT(K.G.)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
CODE 404			NTS				

TITLE
RETAINING RING

DRAWING NO. 34028042016

REV. 04

SHEET NO. 1 | NO. OF SHEETS 1

REV.	DATE		
04	06.07.19	ALTD. – P.K.DUBEY–sd–	APPD. – AKM

DIMENSION 230 WAS 190.

REV.	DATE		
03	18.05.13	ALTD. – K.N.P.–sd–	CHKD. – J.K.–sd– / APPD. – M.K.M.–sd–

STYLE NO. ADDED.
DRAWING REDRAWN.

REV.	DATE		
02	24.04.98	ALTD. – DHOTE –sd–	CHKD. – P.B. –sd– / APPD. – P.B. –sd–

DRAWING REDRAWN. OLD ORIGINAL SCRAPED.

REV.	DATE		
01	11.08.95	ALTD. – –sd–	CHKD. – –sd– / APPD. – –sd–

DRAWING REDRAWN. OLD ORIGINAL SCRAPED.

SEP INVENTOYR NO.

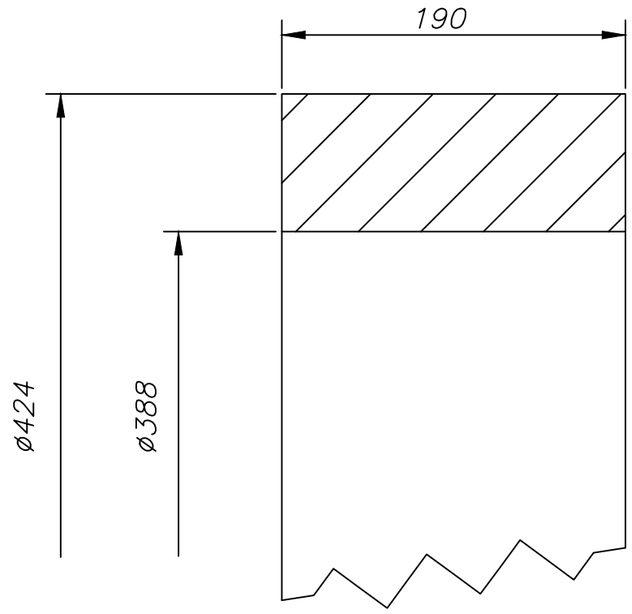
SIGN. & DATE

REF. DRG. NO.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG.NO. 34028042020



TECHNICAL REQUIREMENTS:–

1. RING TO BE FORGED MEETING PROPERTIES TO BP19383 & ULTRASONICALLY TESTED AS PER SPEC.
2. MACHINE ALL OVER. 12.5
3. SHARP EDGES TO BE REMOVED.

STYLE NO. :– BP9504323928

01	SEE T.R.		001	RETAINING RING FORGED						BP 19383									
59 64	65 75	78 79	25 27	29 58	59	60 77			29 31	34 45		55	56–57	58 65		72
VAR 01	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.			IT. NO.	MATL. CODE		A C	UNIT	UNIT WT.		GS
									32 33	46 54				66 71		
28 → CARD TYPE–3				28 → CARD TYPE–1					28 → CARD TYPE–2										

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN any WAYDETRIMENTAL TO THE INTEREST OF THE COMPANY.

REF. DRG. NO.

SIGN. & DATE

SEP INVENTOYR NO.

ADDITIONAL INFORMATION
W.O. 44249A407–11

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1, FBM – 4
IMM – 3
GTG (IMM) – 1

TYPE OF PRODUCT
OR
NAME OF CUSTOMER/PROJECT
1MJ763–2P

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	VASU	–sd–	14.03.95	
CKD	J.C.G	–sd–	15.03.95	
APPD	V.K.J./P.B	–sd–	10.06.95	

REV.	DATE		
04	18.07.19	ALTD.	–P.K.DUBEY–sd–
		CHKD.	– AKM
		APPD.	– AKM

WEIGHT ADDED.

REV.	DATE		
03	18.05.13	ALTD.	– K.N.P.–sd–
		CHKD.	– J.K.–sd–
		APPD.	– M.K.M.–sd–

STYLE NO. ADDED.
DRAWING REDRAWN.

REV.	DATE		
02	06.01.99	ALTD.	– –sd–
		CHKD.	– –sd–
		APPD.	– –sd–

IN T.R.1 BP19383 WAS BP10787.

REV.	DATE		
01	24.09.98	ALTD.	– –sd–
		CHKD.	– –sd–
		APPD.	– –sd–

MATL. SPEC. WAS BP10787.

DEPT. AME	UNTOL.DIMS.GR.		SCALE	WEIGHT(K.G.)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
CODE 404			NTS	35			

TITLE
RETAINING RING

DRAWING NO.
34028042020

REV. 04

SHEET NO. 1 | NO. OF SHEETS 1

NON-MAGNETIC CORROSION RESISTANT STEEL FORGINGS Gr. X 8 CrMn N18 18K

1) GENERAL :

This specification governs the quality of forged and cold expanded, non-magnetic, corrosion resistant, steel forgings for Gr: X8CrMn N18 18K variety.

2) APPLICATION :

For manufacture of cap ring forgings of AC motors.

3) CONDITION OF DELIVERY :

Forged and cold expanded to achieve mechanical properties mentioned in Cl. 11.

Forgings shall be supplied in the rough machined the stress relived condition, unless otherwise specified.

Our order shall specify the strength category (0.2% Rp Proof Stress) required.

4) COMPLIANCE WITH NATIONAL STANDARDS :

There is no Indian Standard covering this type of material.

5) DIMENSIONAL AND TOLERANCE :

The dimension of the forgings shall be as stated on the drawing or order. If the order/drawing calls for finished dimensions, the forgings are to be delivered with all side machining allowances of 3 to 4 mm to this finished dimensions after rough machining. The surface roughness shall be maximum R2=6 µm for the non-destructive test, clause 12.

6) MANUFACTURE :

Material shall be manufactured from killed steel.

7) HEAT TREATMENT :

The material is to be forged and cold expanded within 300^{0}C. A hot cold deformation is not permissible. No age-hardening is permitted. The forgings are to be stress-relieved, at least 5 hours at 3500^{0}C ± 20^0 C K after the cold expansions.

8) FREEDOM FROM DEFECTS :

The forgings shall be sound, clean and free from cracks, flakes, seams, segregations, harmful non-metallic inclusions other defects.

9) CHEMICAL COPOSITION :

The chemical composition of the steel shall be as follows :

Element	Percentage	
	Minimum	Maximum
Carbon	-	0.12
Silicon	-	0.80
Manganese	17.50	20.00
Phosphorus	-	0.05
Sulphur	-	0.015
Chromium	17.50	20.00
Nitrogen	0.40	-

10) TEST SAMPLES :

One tangential test samples shall be selected per heat treatment batch, per consignment for mechanical properties. Tangential samples area to be taken from the forged specimen from the center of the wall thickness after the last heat treatment.

11) MECHANICAL PROPERTIES :

11.1 Tensile :

When tested in accordance with IS:1608/DIN 50145 & 50125 the test pieces shall show, the properties given in the table below :

11.2 Impact value :

Charpy-ISO-V-Notch when tested in accordance with IS: 1498/DIN 50115 the test pieces shall show the properties given in the table below, mean of three tests shall be taken.

*0.2% Proof Stress N/mm^2 Min	% Elongation $5.65\sqrt{So}$ GL, Min	Reduction in Area Percent Min	Charpy Impact Value –ISO-V-Notch "J" Min.
550	37	61	130
600	35	60	125
650	32	59	120
700	30	58	110
750	28	57	105
800	26	55	100
850	24	54	95
900	22	53	90
950	20	52	80
1000	18	51	75

***Note :**

1. Strength category (0.2% Rp) shall be specified in the order.
2. The measured 0.2% proof stress is permissible to exceed the required minimum value by 150 N/mm^2 maximum.
3. The tensile Strength shall be mentioned for information in Test certificate.

12. NON DESTRUCTIVE EXAMINATION :

12.1 Ultrasonic Examination :

The ultrasonic testing shall be performed on 100% of the external surface with a standard test probe in radial direction and width 45 deg. Angular probe, twice in periphery direction and twice in axial direction. Test frequency shall be 1 or 2 MHz. The desired surface finish shall be less than or equal to 6 µm.

Note :

With the calibrator attenuator, the back-wall or edge echo is adjusted to 100% screen height and then increase the gain by 12 dB. Any texture noise / grass echoes appearing should not exceed 20% of screen height.

The ultrasonic testing shall be performed as per BHEL Corporate Standard AA 085 01 18 and the following shall be the unacceptable defects (category I of AA 085 01 18).

a) Ccracks, flakes, seams and laps.

b) Defects giving indication larger than that from a 2 mm diameter equivalent flaw

C) Groups of defects with maximum indication less than that from a 2 mm diameter equivalent flaw which cannot be separated at testing sensitivity if the back-echo is reduce to less than 70x.

D) Defects giving indications of 1 and 2 mm diameter equivalent flaws separated by a distance less than four times the size of the larger of the adjacent flaws.

12.1 Liquid Dye penetration Examination

Liquid dye penetrate test is to be carried out in 100% surface of the forgings to examine freedom from cracks as per DIN 54152 part I and the indications are to be recorded and marked on the forging.

12.2 Liquid Dye penetration Examination

Liquid dye penetrate test is to be carried out in 100% surface of the forgings to examine freedom from cracks as per DIN 54152 part I and the indications are to be recorded and marked on the forging.

13 INSPECTION AT SUPPLIER'S WORKS :

Whenever specified tests and inspection are to be conducted in the presence of BHEL's representative.

BHEL representative shall have free access at all times while the work on the contract is being performed to all parts of the manufactures works. The manufacture shall offer BHEL's representative all reasonable facilities, without charge to satisfy the later that the material is being furnished in accordance with this specification.

The manufacture shall prepare and provide necessary test specimens for testing to be carried out at his premises. If facilitate are not available at his work the manufacturer shall make necessary arrangements for carrying out the prescribed tests elsewhere.
The manufacture shall notify BHEL in advance about readiness of the material for inspection and testing. BHEL reserves the right to test the materialat BHEL's works and the final acceptance of the material shall be based on these test results.

14 REWORK :

Repair or elimination of insignificant defects not be carried out without the prior permission of BHEL.

15. TEST CERTIFICATE :

Three copies of test certificates shall be supplied, unless otherwise stated on the order in the 'test certificate' proforma annexed to this specification, (Annexure-I).

In addition, the supplier shall ensure to enclose one copy of the test certificate alongwith their dispatch documents to facilitate quick clearance of material.

16. PACKING AND MARKING :

Forgings shall be suitably packed to prevent corrosion & damage during transit.

Machine surfaces shall be properly protected with anti-corrosive compounds.

Each package or forgings (when supplied separately) shall be legibly marked with paint with the following information:-

BP 19381: Non-magnetic Corrosion resistance steel forgings Gr:X8CrMnN18 18K.

BHEL Order No.

Drawing No. (on the inner surface)

Consignment or identification No.

Batch No.

Weight

Supplier's Name.

17. REJECTION AND REPLACEMENT :

If the forging does not comply with the requirements of this specification during receipt inspection at BHEL or if any defect is found during the course of preparation, machining, testing or erection such forging shall be rejected notwithstanding any previous certification. of satisfactory testing and/or inspection.

The manufacturer shall undertake to replace the rejected forgings at his own cost and the rejected forgings shall be taken back by the supplier after fulfilling the commercial terms and conditions.

Recommended Test Certificate Format For Forgings

Annexure-1

Supplier's Name and Address

1. Customer:
2. TC No. & Date.
3. PO No.:
4. Process of Making Ingot:
5. Deoxidation Process:
6. Forging Method
7. BHEL's Reference for Approval of Bloom
8. Discard Top _____ % Bottom _____ %
9. Reduction Ratio
10. Batch No.:
11. Heat/Melt No.
12. Spec. No.
13. Test Bar Size & Nor
14. Supplier of the ingot/bloom/ Bloomsand TC reference.
15. Ingot to Bloom / Bloom to Blank:

15 FORGINGS COVERED BY TEST CERTIFICATE

Sl No	Drawing No & Item No	Description	Quantity & Weight

16. CHEMICAL COMPOSITION (PERCENT)

Element	C	Si	Mn	S	P							
As Per Specn	Min.											
	Max.											
Actual Values												

17. HEAT TREATMENT
(To be accompanied by Recorder Chart, Wherever called for)

Condition	Heating Rate. °C/Hr.	Temp °C	Soaking Time, Hrs.	Cooling Rate. °C/Hr	Cooling Medium

18 MECHANICAL PROPERTIES

	T.S N/mm²	Y.S 0.5/0.2% Proof N/mm²	% Elongation 5.65√S0 GL	% R.A. Min.	Hardness BHN(Min.3 values)	Impact Value Joules	Bend Test: Angle of bend	Bend Test: Dia of mandrel	Bend Test: Result
As Per Specn	Min.								
	Max								
Actual Values									

19. SURFACE FINISH (When called for in the order/drg.)

20. DIMENSIONAL INSPECTION

21 NON-DESTRUCTIVE TESTS

Nature of Test	Acceptance level	Instrument used	Range	Results	Any other detail
Ultrasonic					
Radiographic					
Dye penetrant/ Magnetic Particle					

22 METALLOGRAPHIC EXAMINATION
(To be conducted if called for and photo micrographs to be attached along with a report)

Location of Sample	Etchant used	Magnification	Constituent observed	Percentage %
Microstructure	Macroetch	Inclusion Rating		

23. OTHER TESTS if ANY (MACROSCOPIC, SULPHUR PRINTS, ETC)

24. IDENTIFICATION OF FORGINGS AS PER PURCHASE SPEC.

We hereby certify that the items mentioned above have been tested and inspected in our presence and are found to be in accordance with drawings, specifications and purchase order

SIGNATURE, NAME & SEAL OF THE INSPECTING OFFICER
DATE

SIGNATURE, NAME & SEAL OF THE CHIEF OF QUALITY CONTROL/ CHIEF METALLURGIST OF THE SUPPLIER
DATE

INSTRUCTIONS

a) Details of all heat treatment processes carried out should be furnished sequentially in 17
b) Test certificates are to be furnished as per Purchase order and specification in A4 size preferably in translucent paper
c) All the entries including signature should be in block capitals.
d) If testing is done by outside agencies, the original TCs shall be furnished.
e) The actual TC may comprise more than one A4 size paper, if needed, to facilitate filing up of details.

STAINLESS STEEL FORGINGS Gr. X 4 CrNiMnMo N 19138

SUPERSEDES BP 19383 Rev.01

1 GENERAL :

This Specification governs the quality of stainless steel forgings of Gr: X4CrNiMnMo N 19138 variety.

2 APPLICATION :

For manufacture of retaining ring for 2 pole squirrel Cage Motors.

3 CONDITION OF DELIVERY :

Forged, and heat treated to achieve mechanical properties mentioned in Cl.11.

Forgings shall be supplied in the rough machined and Stress Relieved Condition, unless otherwise specified.

4 COMPLIANCE WITH NATIONAL STANDARDS :

There is no Indian Standard covering this type of material.

5 DIMENSIONAL AND TOLERANCE :

The dimensions of the forgings shall be as stated on the drawing or order. If the order / drawing calls for finished dimensions, the forgings are to be delivered with all side machining allowances of 3 to 4 mm to this finished dimensions after rough machining. The surface roughness shall be maximum Ra=6 µm for the non-destructive, clause 12.

6 MANUFACTURE :

Material shall be manufacture by an electric process or any other approved process.

7. HEAT TREATMENT :

The material shall be heat treated to achieve the mechanical properties specified in clause 11.

8. FREEDOM FROM DEFECTS :

The forging shall be sound, clean and free from cracks, flakes, seams, segregation harmful non-metallic inclusion or other defects.

9. CHEMICAL COMPOSITION :

The chemical composition of the steel shall be follows :

Element	Percent	
	Minimum	Maximum
Carbon	-	0.15
Silicon	-	1.00
Manganese	7.00	10.00
Phosphorus	-	0.030
Sulphur	-	0.020
Chromium	17.50	20.00
Nitrogen	0.20	0.40
Molybdenum	2.50	3.50
Nickel	12.00	15.00

10. TEST SAMPLE :

One tangential test sample shall be selected per heat per heat treatment batch, per consignment for mechanical properties. Tangential samples are to be taken from the forged specimen from the center of the wall thickness after the last heat treatment.

11. MECHANICAL PROPERTIES :

11.1 Tensile :

When tested in accordance with IS:1608/DIN 50145 & 50125 the test pieces shall show, the properties given below :

Tensile Strength	-	700 – 900 N/mm^2
0.2% Proof Stress	-	410 N/mm^2 Min.
Elongation on 5.65$\sqrt{So}$ Gauge length	-	35 Percent Minimum

12. NON DESTRUCTIVE EXAMINATION :

13. Ultrasonic Examination :

The ultrasonic testing shall be performed on 100% of the external surface with a standard test probe in radial direction and width 45 deg. Angular probe, twice in periphery direction and twice in axial direction. Test frequency shall be 1 or 2 MHz. The desired surface finish shall be less than or equal to 6 µm.

Note : With the calibration attenuator, the back wall or edge echo is adjusted to 100% screen height and then increase the gain by 12 dB. Any texture noise / grass echoes appearing should not exceed 20% of screen height.

The ultrasonic testing shall be performed as per BHEL corporate standard AA 085 01 18 and the following shall be the unacceptable defects (category I of AA 085 01 18).

a) Cracks, flakes, seams and laps.
b) Defects giving indication larger than that from a 2 mm diameter equivalent flaw.
c) Groups of defects with maximum indication less than that from a 2 mm diameter equivalent flaw with cannot be separated at testing sensitivity if the back – eco is reduced to less than 70%.
d) Defects giving indications of 1 to 2 mm diameter equivalent flaws separated by distance less than four times the size of the larger of the adjacent flaws.

12.1 Liquid Dye Penetration Examination

Liquid dye penetration test is to be carried out in 100% surface of the forgings to examine freedom from cracks as per DIN 54152 Part I and the indications are to be recorded and marked on the forging.

13 INSPECTION AT SUPPLIER'S WORKS :

Whenever specified tests and inspection are to be conducted in the presence of BHEL's representative.

BHEL representative shall have free access at all times while the work on the contract is being performed to all parts of the manufacture's works. The manufacture shall offer BHEL's representative all responsible facilities, without charge, to satisfy the letter, that the material is being furnished in accordance with this specification.

The manufacturer shall prepare and provide necessary test specimen for testing to be carried out at his premises. If facilities are not available at his work manufacture shall make necessary arrangements for carrying out the prescribed tests elsewhere.

The manufacture shall notify BHEL in advance about readiness of the material for inspection and testing. BHEL reserve the right to test the material at BHEL's work and the final acceptance of the material shall be based on these test results.

14. REWORK :

Repair or elimination of insignificant defects shall not be carried out without the prior permission of BHEL.

15. TEST CERTIFICATE :

Three copies of test certificates shall be supplied, unless otherwise stated on the order in the 'Test Certificate' proforma annexed to this specification, (Annexure – I).

In addition, the supplier shall ensure to enclose one copy of the test certificate along with their dispatch documents to facilitate quick clearance of material.

16. PACKING AND MARKING :

Forgings shall be suitably packed to prevent corrosion & damage during transit.

Machined surfaces shall be properly protected with anti-corrosive compounds.

Each package or forging (when supplied separately) shall be legibly marked with paint with the following information.

BP 19383: Stainless Steel Forging Gr : X4CrNiMnMo N 19138.

BHEL Order No.

Drawing No. (on the inner surface)

Consignment or Identification No.

Batch No.

Weight

Supplier's Name.

17. REJECTION AND REPLACEMENT :

If the forging does not comply with the requirements of this specification during receipt inspection at BHEL or if any defect is found during the course of preparation, machining, testing or erection such forging shall be rejected not withstanding any previous certification of satisfactory testing and / or inspection.

The manufacture shall undertake to replace the rejected forgings at his own cost and the rejected forgings shall be taken back by the supplier after fulfilling the commercial terms and conditions.

Recommended Test Certificate Format For Forgings

Annexure-1

Supplier's Name and Address

1. Customer:
2. TC No. & Date:
3. PO No.:
4. Process of Melting Ingot:
5. Deoxidisation Process:
6. Forging Method:
7. BHEL's Reference for Approval of Bloom
8. Discard: Top_____%; Bottom_____%
9. Reduction Ratio } Ingot to Bloom / Bloom to Blank
10. Batch No.:
11. Heat/Melt No.
12. Spec.No.
13. Test Bar Size & Nos.
14. Supplier of the ingot/billet/ Bloom and TC reference.

15 FORGINGS COVERED BY TEST CERTIFICATE

S.No	Drawing No & Item No	Description	Quantity & Weight

16. CHEMICAL COMPOSITION (PERCENT)

Element		C	Si	Mn	S	P										
As Per Spec.	Min.															
	Max.															
Actual Values																

17. HEAT TREATMENT
(To be accompanied by Recorder Chart, Whenever called for)

Condition	Heating Rate, °C/hr.	Temp. °C	Soaking Time. Hrs.	Cooling Rate, °C/hr	Cooling Medium

18 MECHANICAL PROPERTIES

		T.S N/mm²	Y.S 0.5/0.2% Proof N/mm²	% Elongation $5.65\sqrt{So}$ GL	% R.A. Min.	Hardness BHN(Min.3 values)	Impact Value Joules	Bend Test		
								Angle of bend	Dia of mandrel	Result
As Per Spec.	Min.									
	Max									
Actual Values										

19. SURFACE FINISH (When called for in the order/drg.)

20. DIMENSIONAL INSPECTION

21. NON-DESTRUCTIVE TESTS

Nature of Test	Acceptance level	Instrument used	Range	Results	Any other detail
Ultrasonic					
Radiographic					
Dye penetrant/ Magnetic Particle					

22 METALLOGRAPHIC EXAMINATION
(To be conducted if called for and photo micrographs to be attached along with a report)

Location of Sample	Etchant used	Magnification	Constituent observed	Relative %	
Microstructure	Macroetch	Inclusion Rating			

23. OTHER TESTS IF ANY (MICROSCOPIC, SULPHUR PRINTS, ETC)

24. IDENTIFICATION OF FORGINGS AS PER PURCHASE SPEC

We hereby certify that the items mentioned above have been tested and inspected in our presence and are found to be in accordance with drawings, specifications and purchase order

SIGNATURE, NAME & SEAL OF THE INSPECTING OFFICER
DATE

SIGNATURE, NAME & SEAL OF THE CHIEF OF QUALITY CONTROL/ CHIEF METALLURGIST OF THE SUPPLIER
DATE:

INSTRUCTIONS

a) Details of all heat treatment processes carried out should be furnished sequentially in 17
b) Test certificates are to be furnished as per Purchase order and specification, in A4 size preferably in transparent paper.
c) All the entries including signature should be in block colour ink
d) If testing is done by outside agencies, the original TCs shall be furnished
e) The actual TC may run into more than one A4 size paper, if needed, to facilitate filling up of details.

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY PLAN FOR –RETAINING RING TO SPEC. BP19381

QUALITY PLAN NO. QA/MT/BOI/099 REV 01 **DATE: 02/04/2021**

ABBREVIATION:

V	Visual,
M	Measurement
T	Testing
PV	Process Verification

SL. NO	COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANTAM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	REMARKS
1.0		**Chemical Analysis**	T	Sample/ melt	BP19381	BP19381	TC	Record Review
2.0		**Heat Treatment**	PV	100%	BP19381	BP19381	Temp. chart	Record Review
3.0		**Mechanical properties** -Tensile Strength -Impact Value (0.2% Proof Stress, % elongation, % Reduction in Area, Charpy Impact	T	Sample/heat/heat treatment batch	BP19381	BP19381	TC	Record Review Record Review
4.0		**Surface Finish** Free from cracks, flakes, seams, segregation, harmful non-metallic inclusion	V	100%	BP19381	BP19381	TC	Record Review
5.0		**UT**	T	100%	AA0850118	Cat-I-AA0850118/BP19381	TR	Record Review
6.0		**LP**	T	100%	BP19381	BP19381	TR	Record Review
7.0		**Dimensional inspection**	M	100%	Drg./spec/PO	Drg./spec/PO	IR	Record Review

8.0		**Packing & Marking** **Machined surface protection by Anti corrosive compound** **Marking - Drg.no (on inner surface), supplier name, batch, weight & PO no.**	V	100%	Drg./spec/PO	Drg./spec/PO	TC	Record Review

PREPARED BY:	APPROVED BY
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