

SL. NO		COMPONENT	CHARACTERISTICS & OPERATIONS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT#	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY		REMARKS
						M	C				M	C	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.			
1.0	Steel Plates for Casing & Rings	a) Chemical Composition b) Mechanical Properties	Maj. Maj.	Chemical Mechanical	1 sample/lot -do-	1 sample/lot -do-	IS:2062 (Gr.A) IS:2062 (Gr.A)	IS:2062 (Gr.A) IS:2062 (Gr.A)	MTC / Test Report MTC / Test Report	P P	V V	Correlated test certificate and inspection reports to be maintained by Vendor. Mechanical test shall be witnessed by BHEL in case material purchased & used without correlated MTC.	
2.0	Fabricated Casing	a) Suitability of welding procedure Specification	Maj.	Procedure qualification test	Once	Once	E&D:330 Section 04	E&D:330 Section 04	Welding procedure & Qualification record	P	W	Qualification test of welder done at BHEL's/ Vendor's work may be witnessed by BHEL.	
		b) Capability of welder in adopting welding procedure	Maj.	Procedure qualification test	Periodically once in one year for each welder	Periodically once in one year for each welder	E&D:330 Section 04	E&D:330 Section 04	Qualification certificate	P	W	Records shall be maintained.	

LEGEND:

M: MANUFACTURER C: BHEL, P: PERFORM W: WITNESS AND V: VERIFICATION (AS APPROPRIATE) CHP: BHEL SHALL IDENTIFY IN COLUMN "C" AS "W".

Note: # BHEL Inspection Engineer to check, approval date/ revision no. of reference documents at the time of Inspection



MANUFACTURER'S NAME AND ADDRESS:

AS PER PO/RC

REFERENCE QUALITY PLAN

ITEM/EQUIPMENT :

METAL PART (CASING) FOR CERALIN LINED ITEMS

SQP NO.: CER/2020-21/02

REV. NO.: 00
DATE : 07.09.20

SIGN. OF MFGR

PAGE: 1 OF 2

REVIEWED BY:

APPROVED BY:

[Signature]
07/09/20

[Signature]
07/09/20

LEGEND:

Note:# BHEL Inspection Engineer to check, approval date/revision no. of reference documents at the time of Inspection



FSIP - JAGDISHPUR

INSPECTION REPORT OF CASING FOR P.F. BEND/FIE/MOE

Format No. : QAC: 4301

SUPPLIER

DRAWING NO.:

P.O.No.:

CONTRACT No.

ITEM:

DATE OF INSPECTION:

		DATE OF INSPECTION:																								
ANGLE	BEND NO.	I.D.		O.D.		AXIAL SHIFT							RADIAL SHIFT								OUT OF SQUARENESS				DP TEST	
		AHS	TES	AHS	TES	1	2	INNER					OUTER								A		B			
								1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	1	2	

Dimension of Segment and bend						Type of Flange	
	as per drawing		Actual				
X =							
Y =							
OAL =							
IAL =							
C1 =							
C2 =							
C3 =							

Pattern No. :
 Plate Thickness :
 Welder Name :

Radius :

VAR No. :

Style No.:

ITEM No. :

Approved By:

Inspected By :

Inspection Remarks by BHEL Representative :



FSIP-JAGDISHPUR

**INSPECTION REPORT OF M.S.CASING
CERALIN EXCEPT PF BEND/FIE/MOE**

FORMAT NO. QAC :4302

SUPPLIER : P.O. NO.:
ITEM : DRAWING NO.:
CONTRACT/WO : DATE OF INSPECTION :

SI. No.	CHARACTERISTIC	RANGE	OBSERVATION				
			1	2	3	4	5

INSPECTED BY:

REVIEWED BY:

INSPECTION REMARK BY BHEL REPRESENTATIVE



FSIP-JAGDISHPUR

CHECK SHEET FOR FINAL INSPECTION OF **CASING FOR PF BEND/FIE/MOE**

Format No: QAC: 4306 Rev.00

ITEM:
P.O. NO.:
P.O. DATE:

DRAWING NO.:
DATE OF INSPECTION:
SUPPLIER:

Sl. No.	Pattern No.	Angle (θ)	C2	OAL	IAL	Flange O.D.		Flange I.D.		Welding	Lug Position	Painting
						AHS	TES	AHS	TES			
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Remarks:

Inspected By:

Approved By:



FSIP-JAGDISHPUR

PAINTING CERTIFICATE

FORMAT NO. QAC :4307

SUPPLIER :-

ITEM :-

DATE OF INSPECTION :-

P.O. NO.:-

DRAWING NO.:-

Painting reference No.:-

Sl. No.	PATTERN NO	PARTY IDENTIFICATION MARK	PROPER SURFACE PREPARATION	VISUAL PAINTING	Required Minimum DFT	OBSERVED DFT

This is certified that the above MS casing are painted as per related painting scheme / Zinc Chrome Red oxide Alkyl Primer confirming to IS – 2074 and as per CE -0265.20.

INSPECTED BY:

REVIEWED BY:

INSPECTION REMARK BY BHEL REPRESENTATIVE

QUALITY REQUIREMENTS

Following quality requirement is for the suppliers of M.S. Casings of BHEL FSIP, Jagdishpur. Each supplier participating in Rate Contract shall go through the Terms & Condition of this document thoroughly and participate in RC as per their facilities and 'Process Maturity' in line with this document. Supplier may has to submit documentary proof/present physically of all requirements as and when required by BHEL.

A. RAW Material

1. M.S. Sheet:-

- As per BHEL Drawing
- Receipt and Issue of material used for BHEL supply shall be maintained as per enclosed Annex-A
- Correlated test certificate of material will be required along with each dispatch of M.S Casing.

2. Welding Electrode:-

- As per latest revision of document no. E&D 330 section 04.
- Photocopy of invoices of procurement of welding rod/flux core wire may be asked by BHEL against its PO to ensure type/make & quality of electrode used.

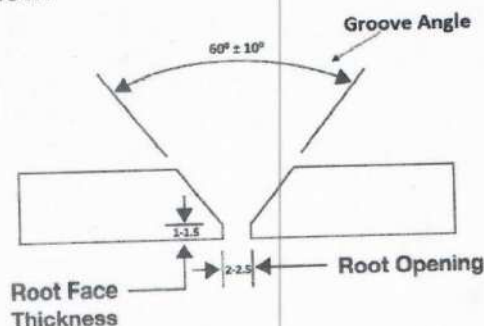
3. Paint:-

- As per latest revision of document no. E&D 330 section 05.
- Any other painting requirement will be indicated in drawing /painting scheme. It will be provided by BHEL separately with PO.
- Photocopy of invoices of procurement of paint may be asked by BHEL against their PO to ensure quality & make of paint used.

B. Fabrication/In-Process

1. Fabrication of M.S.Casing:

- As per BHEL Document E&D 306 (Latest revision) and BHEL Drawing.
- Proper fit-up is to be maintained as below:



2. Welder Qualification:

- Once in every Year for each welder to be done strictly as per AWS D-1.1 by a third party NABL Accredited Lab. On lack of valid welder qualification certificate Casing manufacturing may be hold by BHEL until submission of the same. BHEL may witness welder qualification.

[Signature]

[Signature]

3. Welding/Hard facing: (Strictly as per E&D: 330)

- Proper Penetration Required
- No Grinding on Weld bead allowed
- Grinding of all gas cut portion to be ensured (including lifting lug)

4. Machining:

- Surface roughness of 6.3 micron or as specified in drawing to be achieved at complete machining portion.
- **Grinding/welding is strictly prohibited on machined portion.**

5. Painting: As per BHEL Document E&D: 330 (Latest revision) & BHEL Drawing

- Power Tool cleaning (SSPC-SP3) or Abrasive Blast cleaning for removal of dust, rust, weld, slag, spatters, oil, grease etc. before painting is must.
- No thinner to be added in paint.
- Rusting of received material at BHEL FSIP will be treated as use of poor paint/process and the same will be out rightly rejected or Repainting will be done on the risk and Cost of supplier on the discretion of BHEL.
- Any other painting requirement will be indicated in drawing / painting scheme. It will be provided by BHEL separately.

C. Instruments for Inspection

1. Duly spirit leveled surface plate
2. One meter Right Angle (Tri square)
3. 01 meter height gauge
4. 02 nos. Vernier Caliper, Range (0-1000 mm & 0-300 mm)
5. 02 nos. Measuring Tape, Range (0-3000mm & 0-5000mm)
6. Ultrasonic wall thickness gauge (i.e. D' meter)
7. Digital Coating thickness gauge for checking thickness of paint
8. Feeler gauge, spirit level, 01 meter scale, Plumb Bob
9. Proper Materials Handling / movement, instrument like as overhead crane/ Hydra etc
10. Digital Surface roughness gauge for checking the roughness of machined parts.
11. Hardness tester for checking the hardness of hard facing
12. Any kind of other instrument as per requirement of BHEL shall be arranged by the supplier

All above Instrument's Calibration should be traceable to NABL/BHEL approved Lab. BHEL reserves the right to stop inspection in case of unavailability of above instruments.





D. BHEL Inspection/Audit

1. Inspection call shall be raised by the vendor at least 1-2 days in advance by email to BHEL QC with a copy to MM having specific call number & details of items offered for inspection i.e. name of item as per PO, drawings number, variant number, stage of inspection, PO number, quantity offered, proposed date of inspection etc.
2. Call will be raised along with its dimension report actually measured and fill by vendor's QC/production at the required format of inspection. Each inspection call will have following disclaimer in the email:
"Material is ready for inspection as per above schedule. However, only positive variation in Quantity may be there. All the calibrated Measuring instruments are available with us for the above inspection. We have ensured that casing is fabricated as per BHEL specifications. [I.e. material conforms IS: 2062 Grade A (Latest Revision). Fabrication is done strictly as per E&D: 306 and welding is carried out as per E&D: 330]. The above lot offered to you is already checked at our end and found acceptable."
3. **No items shall be dispatched without clearance by BHEL.**
4. BHEL Authorized representative/ Inspectors will have right of inspection/Audit/Photography of BHEL product at any supplier's premises without prior notice. Documentary evidence of compliance of above quality requirement shall be maintained by vendor and may be verified by BHEL.
5. In case of violation of quality requirements, BHEL Reserves the right to out rightly reject/ Hold for Rectification/Rectify at risk and cost of Supplier. BHEL also reserves the right to cancel the Purchase order or perform Risk Purchase.
6. **PDI/inspection done by BHEL at vendor's does not absolve vendor of their responsibility to supply a quality product as per specification/drawings etc. Vendor has to rectify / replace the casing if the casing is not manufactured as per drawing & discrepancy observed later after receipt at BHEL's work or at BHEL's customer site.**



QR/20-21 Rev.00

Annexure-A

Vendor Name and address

Ref No.....

Date: _/ _/ _

M/s. BHARAT HEAVY ELECTRICALS LIMITED
 FABRICATION, STAMPING & INSULATOR PLANT
 JAGDISHPUR INDUSTRIAL AREA, DISTT. AMETHI U.P.227817

Kind Attention-

Invoice No. -


Invoice Date -

Sub: Material used against BHEL Purchase Order No. Dated.....

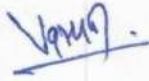
Dear Sir,

With reference to above order, we are submitting our material test certificate for following material
 used in manufacturing of M.S. casing.

Sl. No.	Plate Thickness	Test Certificate No.	Opening Balance	Material Consumption	Closing Balance



Authorised Signatory



(For Internal Use Only)

Document No.: E&D: 330

Rev. No.: 00

Date of Revision: 04.07.2019

Issue no: 01

WELDING & PAINTING PROCEDURE

BHARAT HEAVY ELECTRICALS LIMITED
FSIP, JAGDISHPUR
AMETHI -227817

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Copy No. 01
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Issue to: UNIT INTRANET PORTAL
Date of Issue: 04.07.2019
Issued by: Engineering

Distribution list of **Welding Procedure E&D: 330, Rev. No. 00, Date of Rev. 04.07.2019 Issue No: 01**

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01

Unit Intranet Portal

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FSIP, JAGDISHPUR

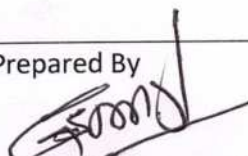
WELDING & PAINTING PROCEDURE

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04	Welding Procedure	00	04.07.19
05	Painting Procedure	00	04.07.19

Prepared By



Functional Chief (Engineering)

Approved By



HOD (Engineering)

BHARAT HEAVY ELECTRICALS LIMITED
FSIP, JAGDISHPUR

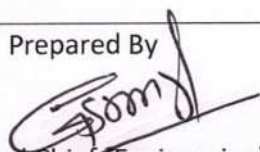
WELDING & PAINTING PROCEDURE

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2.0 RECORD OF REVISIONS

Revision Date	Section No.	Revision No.	Clause No.	Nature of Changes
04.07.19	All	00	--	Updation in line with merger of CS-FP & IP

Prepared By



Functional Chief (Engineering)

Approved By



HOD (Engineering)

BHARAT HEAVY ELECTRICALS LIMITED
FSIP, JAGDISHPUR

WELDING & PAINTING PROCEDURE

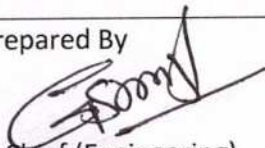
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3.0 DISTRIBUTION LIST

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FSIP, JAGDISHPUR

WELDING & PAINTING PROCEDURE

Document No.: E&D: 330
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4.1 WELDING PROCEDURE:

4.1.1 The welding procedure outlined will be followed to ensure uniform and good quality welding.

4.1.2 The welding must be Arc / Flux cored after maintaining proper fit up.

4.1.3 The material specification of welding electrodes/Flux core wire to be as below:

A **Electrode: MS - E 6013**

Arc welding (2.5 mm , 3.15 mm or 4.0 mm):- make

Advani- Oerlikon: Overcords	D&H : Medio	Rockweld: V-117	I.O.L/ESAB: Vordian/Ferrospeed plus
--------------------------------	----------------	--------------------	---

Electrode: SS - E 7018

Arc welding (2.5 mm , 3.15 mm or 4.0 mm) : - make

Advani-Oerlikon: Supercito	D & H : Supra Therme	ESAB: Ferro Weld-2 / ESAB 36 H
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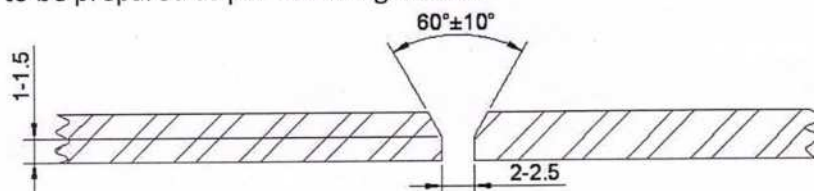
B MIG WELDING:- (Flux core wire 1.6 mm or 1.8 mm)

Solid wire core for MS -- ER 70S-6

For SS-- ER-308 L /ER309 L

Make- Ador /D&H/Esab/D&H Sechron/Cotmac

4.1.3 Edges to be prepared as per following sketch:



4.1.4 Root pass welding to be carried out by using 2.5 mm welding electrodes ,further filling may be done either by 3.15 mm or 4.0 mm electrodes/Root pass welding to be carried out by 1.2 mm to 1.8 mm dia flux core wire ,further filling by 1.2 mm to 1.8 mm flux core wire.

4.1.5 Ensure root weld is uniform and penetration is proper.

4.1.6 Between two passes, remove slag and clean weld surfaces.

Prepared By

[Signature]

Functional Chief (Engineering)

Approved By

[Signature]

HOD (Engineering)

BHARAT HEAVY ELECTRICALS LIMITED
FSIP, JAGDISHPUR

WELDING & PAINTING PROCEDURE

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4.1.7 In case of undercut grind the weld surface smooth and fill up with 2.5 mm welding electrode/wire core.

4.1.8 Employ down hand method for welding.

4.2 CHECK POINTS:

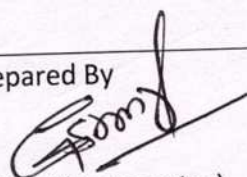
Audit checks are conducted for the quality of welding of every ceralin item. The Die Penetration test is to be carried as per E&D:331 after each root pass.

The visual examination of welding is to be carried out as per detail below:

1. The weld shall be free of cracks.
2. The face of weld shall be flush with the surface of base metal & weld shall merge smoothly with base metal. Undercut shall not exceed 1 mm & welding reinforcement shall not exceed 3 mm.
3. The root of weld shall be inspected & there shall be no evidence of cracks, incomplete fusion or inadequate joint penetration.
4. The weld shall be free from overlap.
5. The weld shall be free from accumulated slag the sum of the greatest dimensions of which shall not exceed 6 mm.
6. Grinding is not allowed on weld bead.
7. Grinding of all gas cut portion to be ensured (including lifting lug)

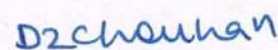
4.3 Welder Qualification: Welder qualification test to be done strictly for each welder as per AWS D-1.1 by a third party NABL accredited lab once in a year.

Prepared By



Functional Chief (Engineering)

Approved By



HOD (Engineering)

BHARAT HEAVY ELECTRICALS LIMITED
FSIP, JAGDISHPUR

WELDING & PAINTING PROCEDURE

Document No.: E&D: 330
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5. PAINTING PROCEDURE:

5.1. This procedure covers the requirements of primer and Final paint for M. S. Casing for in-land applications/costal region/export

5.2. This procedure specifies the painting requirements to provide adequate surface protection.

5.3. SPECIFICATION OF PRIMER/PAINT:-

Type of paint	Specification	Make
Alkyd Red Oxide Zinc Phosphate Primer	As per IS:12744 –DFT 30 Mic /coat	Berger ,Asian Paint , Dulux
General Purpose Aluminium Paint	As per IS:2339-DFT 30 mic/coat	Berger ,Asian Paint , Dulux
For costal region /Export / Special items ,paint type to be specified by the customer	As per specification provided by the customer	Berger ,Asian Paint , Dulux

SURFACE PREPARATION:-

5.3.1. Surface of component shall be thoroughly cleaned before the application of primer paint by either Power Tool cleaning (SSPC-SP3) or Abrasive Blast cleaning. The surface shall be free from dust, rust, weld, slag, spatters, oil, grease etc.

5.4. APPLICATION OF PAINT:-

5.4.1. Surface prepared as mentioned above shall be applied with one coat of Alkyd Red Oxide Zinc Phosphate primer (as per IS:12744) where no special primer is mentioned for M.S. Casing.

Prepared By

Functional Chief (Engineering)

Approved By

D2 Chauhan

HOD (Engineering)

BHARAT HEAVY ELECTRICALS LIMITED
FSIP, JAGDISHPUR

WELDING & PAINTING PROCEDURE

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5.5. GENERAL:-

- 5.5.1. Paint make Berger /Dulux / Asian shall be used as supplied by the supplier without any addition of thinner.
- 5.5.2. Primer shall be thoroughly stirred before application. Primer can either be applied on surface by brushing or spraying using compressed air uniformly. The thickness of the primer shall not be less than 30 microns/coat (where no other specifications are mentioned).
- 5.5.3. Adequate drying time is to be allowed after each coat before next coat of paint.
- 5.5.4. No painting is required in case of Stainless Steel components, unless otherwise specified.
- 5.5.5. For all machined components, rust preventive fluids shall be used (where no other specifications are mentioned).
- 5.5.6. Rusting of received material at BHEL IP will be treated as use of poor paint / process and the same will be out rightly rejected or repainting will be done on the risk and cost of supplier on the discretion of BHEL.

5.6. Inspection:-

- 5.6.1. Surface preparation, primer coating shall be checked at appropriate stages by executing agency before proceeding to next operation.

Prepared By

Functional Chief (Engineering)

Approved By

Dechouhan

HOD (Engineering)

(For internal use only)

Doc. No. E&D: 331

Rev. No.: 00

Date of revision: 04.07.2019

DYE PENETRATION TEST PROCEDURE

BHEL FSIP JAGDISHPUR

AMETHI-227817

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Prepared By  Functional Chief (Engineering)	Approved By D2chouhan HOD (Engineering)
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BHARAT HEAVY ELECTRICALS LIMITED
FSIP, JAGDISHPUR

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DYE PENETRATION TEST PROCEDURE

2.0 Record of revision

Date Revision No. Section Revised Revision

04.07.19 00 All Updated in accordance with the
merger of CS-FP & IP

Prepared By

Functional Chief (Engineering)

Approved By

D. Chohan

HOD (Engineering)

72388/2022/FSIP-RS/DM/000

BHARAT HEAVY ELECTRICALS LIMITED FSIP, JAGDISHPUR	Document No. : E&D: 331 Section No. : 03 Section Rev. No.: 00 Date of Rev : 04.07.19 Page 1 of 1
DYE PENETRATION TEST PROCEDURE	

3.0 Distribution List:

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Prepared By

Approved By

Functional Chief (Engineering)

Dr. Chauhan

HOD (Engineering)

BHARAT HEAVY ELECTRICALS LIMITED FSIP, JAGDISHPUR DYE PENETRATION TEST PROCEDURE	Document No. : E&D: 331 Section No. : 04 Section Rev. No.: 00 Date of Rev. : 04.07.19 Page : 1 of 3
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1.0 Scope:

This procedure shall be used for colour contrast (visible dye) method of liquid penetrant examination of materials for detecting discontinuities in welded joints of MS casings/ rings/ Cones.

2.0 METHOD AND MATERIALS:

A visible dye penetrant which can be easily seen in natural light or in artificial light shall be used (Solvent removable penetrant and Non Aqueous suspended type developer) •

3.0 SURFACE PREPARATION:

3.1 In general, satisfactory results may be obtained in the as welded, as forged, as cast and as rolled condition. Machining and grinding may be required when surface irregularities would otherwise mask the indications of unacceptable discontinuities.

3.2 Prior to penetrant examination the surface shall be carefully examined. Surface shall be free from dirt, grease, lint, scale, welding flux, spatters or any extraneous matter which may be tend to cover. Surface openings or otherwise interfere with proper evaluation of test result.

3.2.1 Adjacent areas to a minimum length of 25mm on either side of the weld shall be prepared as specified in 3.2.

3.2.2 Surfaces shall be thoroughly cleaned using acetone before applying penetrant.

3.2.3 Surface shall be dried at least 3 minutes prior to Application of Penetrant.

4.0 PENETRATION APPLICATION

4.1 The penetrant shall be applied by dipping, brushing or spraying. If the penetrant is applied by spraying, using compressed air. type apparatus, a filter shall be placed at the air inlet to preclude contamination of penetrant by oil, water or dirt that might have collected in the air lines.

Prepared By  Functional Chief (Engineering)	Approved By  HOD (Engineering)
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BHARAT HEAVY ELECTRICALS LIMITED FSIP, JAGDISHPUR	Document No. : F&D: 331 Section No. : 04 Section Rev. No.: 00 Date of Rev. : 04.07.19 Page : 2 of 3
DYE PENETRATION TEST PROCEDURE	

- 4.2 The temperature of the penetrant and the surface of the part to be processed shall not be below 16°C nor above 52°C throughout the examination period.
- 4.3 Minimum penetration time shall be 15 minutes.

5.0 EXCESS PENETRANT REMOVAL:

- 5.1 After the penetrant time specified above in column 4.3 has elapsed any penetrant remaining on the surface shall be removed, taking care to minimize removal of penetrant from the discontinuities.
- 5.2 Penetrant shall be removed by wiping with a clean lint free dry cloth. The operation should be repeated until most traces of penetrants are removed. A clean dry cloth moist with solvent (cleaner) shall then be used to wipe the surface lightly. Extreme care shall be taken to prevent over cleaning as over cleaning can and does remove penetrant from discontinuities. Under no circumstances cotton waste shall be used for removing penetrant.

6.0 DEVELOPER APPLICATION:

- 6.1 After cleaning, developer shall be applied by spraying, prior to applying the developer It must be thoroughly agitated to ensure adequate dispersion of the suspended particles. A uniform thin coating of developer must be applied. Conversely avoid the formation of parts of developer in the cavities since heavy coatings may mask indication.
- 6.2 Allow 5 minutes for the developer to dry before the start of inspection and a maximum of 30 minutes to complete the interpretation of results of the examination.

7.0 EVALUATION OF INDICATION:

- 7.1 Discontinuities open to the surface will be indicated by the bleeding out of the penetrant. Localized surface imperfection which occur from machining marks, or surface irregularities shall be ignored as non-relevant indication.
- 7.1.1 Non—relevant indication and broad areas of pigmentation, which would mask indication of defects, shall be reprocessed and retested.
- 7.2 Relevant indications are those, which result from discontinuities open to surfaces. Linear indications are those indications in which the length is more than three times the width. Rounded indications are circular or elliptical with length lesser than three times the width.

Prepared By 	Approved By 
Functional Chief (Engineering)	HOD (Engineering)

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8.0 ACCEPTANCE CRITERIA:

No cracks are permitted on any surface.

8.1 WELDS :

8.1.1 The following indications are not acceptable:

- a) Only indications with major dimensions greater than 1.6mm shall be considered as relevant.
- b) Unless otherwise specified the following relevant indications are unacceptable:
 1. Any cracks or linear indications.
 2. Rounded indications with dimensions greater than 4.8mm.
 3. Four or more rounded indications in a line separated by 1.6mm or less edge to edge.
 4. Ten or more rounded indications in any 3870 Sq. mm (6 Sq. in) of surface with the major dimension of this area not to exceed 152 Sq. mm with the area taken in the most unfavourable location relative to the indications being evaluated.

9.0 POST EXAMINATION CLEANING:

- 9.1 As soon as practical, after completion of the penetrant examination the completed parts shall be cleaned to remove residual penetrants materials.

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