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SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURING AND SUPPLY OF SET OF CABLE TIE and SET OF BASE FOR CABLE TIES AS PER SPECIFICATION No.-CLW/ES/3/0131 for Three Phase Electric Locomotives and CLW/ES-C/054 Alt. B or latest (for Conventional Loco)

ISSUED BY

**ELECTRIC LOCO DESIGN OFFICE
CHITTARANJAN LOCOMOTIVE WORKS
CHITTARANJAN – 713331
WEST BENGAL**

Approved by PCEE	Signature

Recommended by CDE	Signature

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ALTERATION RECORD SHEET

Amendment No.	ALT. No.	DATE	REASON	AUTHORITY
01	1		The STR No.CLW/2021/ELDO/E/STR/118 of 'Set of base for cable ties' is merged with specification no. STR No. CLW/2019/ELDO/E/STR/0068 Alt-1 for 'Set of cable tie'.	

Schedule of Technical Requirements have been digitized and all alterations have been incorporated.

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SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF FOLLOWING FOR THREE PHASE ELECTRIC LOCOMOTIVES: -

1.0 NAME OF ITEM

SET OF CABLE TIE and SET OF BASE FOR CABLE TIES FOR THREE PHASE ELECTRIC LOCOMOTIVES and CONVENTIONAL LOCOMOTIVES.

2.0 APPLICATION

Used for binding of cables in Three Phase Electric Locomotives in Indian Railways. The items are to be manufactured as per relevant drawings and specifications.

3.0 SCOPE

The Schedule of Technical Requirements (STR) is issued to serve as a guide to manufacturers (called the “firm” hereafter) and should be read in conjunction with the relevant drawings and specifications with latest Revisions / Alterations. The technical requirements are meant to serve as guidelines only and are not exhaustive. The firm should satisfy themselves having complied with the requirements of drawings and STR. List of relevant Drawings / Specifications is listed as Annexure – I

Wherever lacking, existing CLW approved sources must also upgrade their facilities to fulfill the requirements of this STR within a period of One year from date of issue of this STR.

4.0 GENERAL REQUIREMENTS

- 4.1 The firm should have currently valid ISO-9000 certification issued by an approved agency of the International Accreditation Forum (IAF) with the activity desired clearly mentioned in the scope of certification.
- 4.2 A system of regular submission of rejection details of material giving rejection rate, cause of rejection, corrective action taken etc. on quarterly basis should be followed by firm.

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- 4.3 The firm must have system of documentation in respect of rejection at customer end, warranty replacement and failure of item supplied by them during service.
- 4.4 The firm shall have all latest relevant Standards like IS, DIN, BS etc. pertaining to product specification.
- 4.5 The firm shall have system of recording the plant, machinery and control equipments remaining out of service, nature of repairs done etc.
- 4.6 The testing & measuring equipments shall be duly calibrated and the validity of calibration should be current and verified by physically checking the calibration certificate issued by Calibration Agency from whom it was calibrated. Calibration shall be done by NABL accredited labs whose accreditation is valid on the date of calibration.
- 4.7 Firm should have adequate trained personnel and service after sales network.
- 4.8 Whenever there is any change with respect to approved QAP, the same shall be promptly submitted to CLW for approval.

5.0 QUALITY ASSURANCE PLAN (QAP)

The firm shall prepare a Quality Assurance Plan (QAP) before approval is sought and submit the same as part of compliance of this STR. The QAP shall be a comprehensive document covering the following aspects. As advised in format available at <http://clw.ggn.rcil.gov.in/> (Instructions for vendor approval – QAP format

- i) Details of Quality Control Organization of the firm along with key personnel engaged in the QC function.
- ii) Qualification log sheet of the personnel manning the quality control set up.
- iii) Process flow chart indicating process of manufacture of an individual product or for a family of products for which the process is same.

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iv) Details of Sub-Vendors:

- The name of item for which sub-vendor is approved.
- The name of approving agency
- Quality manual submitted by sub-vendor to primary vendor
- The sub-vendor to have all the requisite infrastructure of manufacturing and testing facilities, preferably under one roof. The sub-vendor to broadly meet with all the technical requirements laid down in this STR.
- The primary vendor is following periodical inspection schedule for sub-vendor strictly.
- ISO Certification details of sub-vendor also.
- The sub-vendor is also liable for assessment by CLW.

v) Inspection and testing plan of

- a) Incoming Material as per format in Annexure – IV clause – 2
- b) Process (stage inspection) as per format in Annexure – IV, Clause – 3
- c) Product (Final inspection) as per format in Annexure – IV, clause – 5

vi) All the formats used for recording inspection results.

vii) System of traceability, traceability diagram linking traceability from raw material stage to internal check and finally lot offered for inspection.

viii) All internal checks to be carried out during manufacturing shall be summarized and furnished. List of documents to be maintained for these internal checks; that need to be signed by inspecting official before issue of Inspection Certificate shall also be furnished.

ix) **QAP Format**

QAP must be submitted in the form of single document indicating name of the firm and page no. 'x' of 'y' on each page. Each page should be signed by Quality Control in-charge. The approved QAP must be a controlled document and a quality record of ISO 9001:2015 quality control system of the firm. A certificate to this effect shall be provided along with the QAP by the firm. The QAP shall be submitted in duplicate.

Details of the above aspect are described in the following paragraphs. The QAP shall be approved by CLW and shall form basis of approval process.

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5.1 QUALITY CONTROL ORGANISATION

- 5.1.1 The complete organizational setup of the Quality Control Key personnel and official along with their qualification and experience should be furnished.
- 5.1.2 The Quality Control Organization should be headed by a senior level official having degree in engineering who shall directly report to plant in charge.

5.2 INCOMING MATERIAL

- 5.2.1 A complete bill of material indicating all input material items required for manufacturing of the products, governing specification and their sources of supplies as approved by the firm should be furnished.
- 5.2.2 Raw material shall be procured from CLW/RDSO approved sources wherever applicable or from reputed suppliers if no CLW/RDSO source is specified. Documentary proof of purchase and test certificate of each component shall be maintained and produced.
- 5.2.3 Record of each sub-supplier clearly showing the quantity purchased and rejected as well as cases of late delivery, if any shall be kept.
- 5.2.4 Incoming raw material shall be 100% inspected by Quality Control Department of the firm for any defect and deviation. The test results of incoming raw material with references to test certificate issued by the supplier and the results of internal tests carried out by the firm for verification may be submitted as part of QAP.

5.3 PROCESS OF MANUFACTURE

- 5.3.1 Complete process flow chart covering all steps of process of manufacture for an individual product (or for a family of product if the process is same), including the process flow of outsourced activities along with its integration with main process, shall be clearly enlisted as part of QAP.
- 5.3.2 The following details of machine used for all the steps of machining operations should be included.
- Make, model and commissioning date of the machine.
 - Accuracy.
 - Details of machining operations.

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5.3.3 Machining process should be such that all critical dimensions are final. Vague language like available or will install is not acceptable.

5.3.4 Details of jigs and fixtures used during manufacture should be furnished along with the manufacturing process wherever used.

5.3.5 List of typical Machinery & Plant, testing and measuring instruments required for manufacture is mentioned in Annexure – II. The list is for general guidance only and manufacturing operation shall be submitted and got approved by the firm as a part of QAP.

5.4 INSPECTION AND TESTING PLAN

5.4.1 Testing setup should be available in the firm's own premises capable of testing the equipments as specified in the relevant technical specification.

5.4.2 Complete Inspection and Testing Chart covering all steps of process of manufacture for an individual product including final inspection should be clearly enlisted as part of QAP.

5.4.3 The following details of Testing / measuring instruments / equipments / tools / jigs / fixtures used for all the steps of measurement and testing operations should be included:

- Make and Model of the equipment
- Name of the manufacturer
- Accuracy
- Capacity or Range
- Date of Calibration
- Due date of calibration
- Agency of Calibration

Vague language like available or will install is not acceptable.

5.4.4 The accuracy and capacity of the testing and measuring equipments shall be adequate to meet the requirements of the specification and drawing.

5.4.5 Stage inspection detailing inspection procedure, inspection parameters and method of testing / test procedure including sample sizes for destructive and non-

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destructive testing. Record of test results of stage inspection should be available and furnished.

5.4.6 List of typical Testing and measuring instruments required for manufacture is mentioned in Annexure – III. The list is for general guidance only. However, the specific Testing & measuring instruments, gauges used by the firm will also form part of QAP and shall be submitted.

5.5 FORMAT TO BE SUBMITTED WITH QAP

Format to be submitted with QAP is enclosed as Annexure – IV. Firms shall fill these formats keeping in view Para 5.0

STORAGE FACILITY

- Adequate Dust free, clean and non - humid environment for storage of raw material and finished product separately
- Adequate Dust free, clean and non-humid environment for product assembly area
- Adequate Stacking / Handling tables and racks in above storage area.

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ANNEXURE – I

LIST OF DRAWINGS, SPECIFICATIONS AND STANDARDS

Specification No. CLW/ES/3/0131 for three phase locomotives

Specification No. CLW/ES-C/054 Alt. B or latest for conventional locomotives

IS: 2102: For General Tolerance.

IS: 2500 - Latest Version –For Sampling Plan

IS: 11731 (Part – I & II) : 1986 (Reaffirmed 2001)

.....For flammability test.

IS:5762: 1970 / BS: 2782 (Part-I Method 103 C)

.....For Melting Point.

or Capillary tube method

ASTM D 792/BS: 2782 part 6 methods 620A to 620 D: 1991... For specific gravity.

ASTMD 638

.....For Tensile Strength.

ASTMD 638

.....For Elongation at Break.

ASTMD 570

.....For Water absorption.

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ANNEXURE – II

LIST OF MACHINERY AND PLANT

Sl. No.	Name of Machinery & Plant	Capacity / Rating	Purpose Essential / Optional **
1	Plastic injection molding machine	0-150 Tons	Essential
2	De-Humidifier air drier	Standard temperature	Essential
3	Hopper Pre drier	85°C	Essential
4	Drying Oven	0-150°C	Essential
5	Scrap grinder and Blower	Standard	Optional
6.	Weighing Scale	0-10 kg	Essential
7.	Cooling Tower	Standard	Essential
8.	Surface table	Standard	Essential
9.	Ratchet Machine/ Metal Tooth machine (For Cable Tie manufacturing)	Standard (S.S. Strip with anti magnetic property)	Essential

**Optional activity or Machinery & Plant facility may be outsourced. However the sub-vendor is also to be assessed if felt necessary.

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ANNEXURE - III

LIST OF MEASURING AND TESTING EQUIPMENTS

Sl. No.	Name of Measuring & Testing Equipments	Capacity / Rating	Essential / Optional **	Remarks
1	Steel scale / Steel Tape	0-1000mm	Essential	For length measurement.
2	Micrometers	0-25mm	Essential	For thickness/length measurement.
3	Vernier	0-300 mm	Essential	For thickness/length measurement.
4	Raw Material testing Facility	Standard	Optional	For checking raw material
5	Hardness tester	0-90 (shore D)	Essential	For measuring hardness.
6.	Mandrell (For Cable Tie Testing)	Standard	Essential	For checking tightness after binding.
7.	Bending (Flexibility) Test M/c	Standard	Optional	For checking bending of cable tie.
8.	Resistance to Cracking test M/c	Standard	Optional	For checking resistance to cracking.
9.	Tensile testing/Elongation testing Machine	0-50 Kgf	Essential	For checking Tensile/elongation properties.
10.	Moisture content test in raw material test M/c.	Standard	Optional	For checking moisture.
11.	Melting Point measurement M/c.	Standard	Optional	For checking melting point.
12.	Flammability Chamber/Bunsen burner stop watch	Standard	Essential	For checking self-extinguishing property
13.	Water absorption test M/c.	Standard	Optional	For checking water absorption.
14.	Radius Gauge (For Base for Cable TiesTesting)	Standard	Essential	For checking diameter.

**Optional activity or measuring & testing facility may be outsourced. However, the sub-vendor is also to be assessed if felt necessary.

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ANNEXURE - IV

FORMATS TO BE SUBMITTED WITH QAP

1. Organization specific to the product

Description	Name of person with contact no.	Qualification	Experience	
			Field	Year
(a)	(b)	(c)	(d)	(e)
Design in – charge				
Production in – charge				
Quality Inspection in–charge				

2. Incoming Material Control

Subject / Product / Process	Sample size & its frequency of Inspection	Parameter for inspection	Mode of Inspection / Equipments used	Acceptance Limit/criteria/specified value as per Drg/Spec.
(a)	(b)	(c)	(d)	(e)

Document Reference	Record Format No.	Action in case of rejection
(f)	(g)	(h)

3. Process Control

(i) Proposed M&P

Sl. No.	Process/ Activity	Work Instruction Ref.	Machine Details					In– house / Out source
			Lead parameter	Make	Model	Comm. Dt.	Accuracy	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)

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4. Stage Inspection / Test Plan

Subject / Product / Process	Instrument / Jig & Fixture test bench used	Inspection Stage	Parameter for inspection	Sample size & its frequency of Inspection	Document Reference
(a)	(b)	(c)	(d)	(e)	(f)

Acceptance Limit/criteria/specified value as per Drg./Spec.	Inspection Agency	Record Format No.	Action in case of rejection
(g)	(h)	(i)	(j)

5. Product Control

Subject / Product / Process	Instrument / Jig & Fixture test bench used	Parameter for inspection	Sample size & its frequency of Inspection	Document Reference	Acceptance Limit/criteria/specified value as per Drg./Spec.
(a)	(b)	(c)	(d)	(e)	(f)

Inspection Agency	Record Format No.	Action in case of rejection
(g)	(h)	(i)

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6. Calibration Plan

Instrument Description	Serial No.	Make	Model	Year of procurement	Capacity / Range	Accuracy	Periodicity of Calibration
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)

Calibration Agency	Record Format No.
(i)	(j)

7. Approved Sources for Raw Materials / Consumables

Raw Material / Consumable	Specification / Standard	Source with Address	Whether Source is controlled by CLW / RDSO / Others
(a)	(b)	(c)	(d)

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