

**NOTE**

ELDD/1720 (STR)

Dated: 03.02.2015

**Sub.:** Approval of STR of Primary Current Sensor and Current Sensor for Hotel Load for three phase electric locomotives.

**Ref :** Approved general format of STR no. CLW/(Year)/ELDO/(E or M)/STR/XXXX, Rev. 'X' vide no. ELDD/1720 Pt.-I dated 10.11.2014.

Proposed STR for manufacture and supply of Primary Current Sensor and Current Sensor for Hotel Load for three phase electric locomotives is prepared (at SN-22 to 35) in line with approved format of STR vide no. ELDD/1720 Pt.-I dated 10.11.2014.  
Put up for your kind perusal please.

*Mondal*  
3/2/15  
SSE/Drg.

AEE/D-II Lathe machine and milling machine do same work. These may be placed in '00' in MAP list. Permanent magnet facility not required. Corrections have been done in MAP and testing equipments. Put up for your kind perusal at SN-36 to 42. *3/2/15*

Dy. CEE/D-II STR of Dy CEE 10-2 has been approved with modified top sheet for line up & put up. *3/2/15*  
11.3.15

CEE/Loco  
CEE/CLW  
AEE/D-II  
*3/2/15*

Subir Mondal Top sheet changed. *Mondal*  
26/3/15

AEE/D-II Check STR number with documentation section. *3/2/15*  
26/03/15

S.K. Mondal STR number incorporated from documentation Proposed STR put up duly signed by undersigned as per approved format attached on SN-36 to 49. Put up for your kind perusal pl. *Mondal*  
SSE/Drg.  
02/4/15

AEE/D-II

AEE/D-III

Proposed draft STR for Primary Current Sensor and Current sensor for Hotel load Placed at SN Side. Put up for further processes.

STUP 06/04/15

Dy. CEE/D-II

STR is submitted for approval.

Am  
09/04/2015

CEE/LOCO

- Kindly connect previous STR, if any.
- We should include minimum qualification of Design Incharge and Production Incharge from our side and not leave it to vendor.
- Certain equipments given in Para 7.0 and Annex III are conflicting.

Pl re-examine & putup accordingly. STUP 9/4

Dy CEE/D2 AEE/D-III Am 10.4.15

S. P. Menon

Re-examine and put up ~~correct~~ STUP 11/04/15

- No STR of the subject item available in this office.
- Qualification (min) and experience incorporated.
- Conflicting items deleted from ~~para 7.0~~ <sup>Annex-III</sup> and the range indicated in ~~Annex III~~ <sup>Annex III</sup> Para 7.0.

All the changes done as per requirement of CA and put up with double copy duly signed for your kind perusal pl. Am 13/4/15

AEE/D-III

- NO STR is available in this office of above mentioned item.
  - Qualification (min) and experience incorporated in STR (Annexure -IV) Page no: 12 of 14.
  - Conflicting items deleted from ~~para 7.0~~ <sup>Annex-III</sup> as the range already given in ~~Annex III~~ <sup>Annex III</sup> Para-7.0.
- Put up for further process pl. STUP 12/04/15

DY. CEE/D-11

STR submitted for approval.

PP-3

Aan

22.04.2015

CC/Luo kindly modify the top sheet and put up again.

23/4

Dy CEE/D2

Aan

25.4.15

ACE/D-11

Top sheet has been changed as advised and put up for further approval processes pl.

Step  
29/04/15

DY. CEE/D-11

Aan

30/04/2015

CC/Luo

Kindly get more details on subject like testing parameters/ results of OEM M/s LEM and redraft the STR accordingly. We may seek advice of RPSO also on this subject.

23/4/15

Dy CEE/D2

Test format of OEM may be enclosed

Aan

04.05.2015

ACE/D-11

Send a letter to OEM M/s LEM and D&D for test parameters result of current event.

Step  
7/05/15

S. K. Mondal

No reply received against above letter. Put up for your kind advice pl.

ACE/D-11

Mondal  
11/8/15

Reminder letter to OEM with new address as LEM Switzerland and letter to RDSD too.

21/08/15

Subir Mondal

Draft letter to bison & RDSD separately attached for your kind perusal pl. ~~Handed~~ 21/8/15

ABE/D-II

letter signed.

21/08/15

S.K. Mondal

Reminder Lr. to OEM & RDSD sent on 25/8/15 After 2 months no reply received till date. So proposed STR may <sup>pl.</sup> be forwarded to CA for further remarks. ~~Handed~~ 17/10/15

ABE/D-II

As per CEE/LOC instruction HUB office asked OEM M/L LEM to provide testing parameter results and other information of subject item vide letter No. ELDO/1201/CSJ dated 6.05.15 placed at SN-7P. But no response received to HUB office. Again after 3 months of previous letter HUB office again asked OEM M/L LEM through reminder letter placed at SN-PO regarding to provide the same information. RDSD was also asked for same info.

Type Alex's STR information Priority

But still date no Reply is received from RDS as well as OFM M/S LEW.

In view of above put up for further process.

Sumit  
17.10.15

~~DY. (EE/D-I)~~  
Prism.

AS  
17.10.15

~~Prism~~ Fax No. 080-26771777

Reminder letter to M/S GLOBETEK regarding previous letter response. through all three route i.e (i) Mail (ii) Fax (iii) Post Correspondence, asking firm to furnish the list of employees testing facilities & Technical specification of LT 2005-S family & LT 2005-S base current Transducers.

Sumit  
23.10.15

S.K. Wani

Necessary corrections as per your instruction indicated in SN-87 & 88 (both pages) are put up (SN-89 to 95).

Put up for further process. Dated 16/11/15  
→ AEE/D-III

STR is modified as per CEE/COO instruction. (placed at SN - 89 to 95)

Put up for further approval please.

Sumit  
18.11.15

DY. CEE/D-I

Am  
02/12/15

CEE/COO

& current sensor

- A STR for primary current sensor for Hotel Load has been prepared by ELDO.
- An effort was made to get more info from existing CEM & RDSO (No 78, 79, 80) but could not get success.
- In view of above the STR may kindly be approved.

राम. 3  
8/12

CEE

Sumit  
08-12-2015

CEE/COO

राम. 3  
9/12

DY. CEE/D-I  
Am

10.12.2015

REE/D-III

Update records & put in documentation.

Am  
12.12.15

Sumit

96

**4. Stage Inspection / Test Plan**

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

Acceptance Limit	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./specn.
(a)	(b)	(c)	(d)	(e)	(f)

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

**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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**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)	(f)
Design in – charge		BE in Engg./ Diploma in Engg.		03 Yrs for diploma in Engg.
Production in – charge		BE in Engg./ Diploma in Engg.		03 Yrs for diploma in Engg.
Quality Inspection in–charge		BE in Engg./ Diploma in Engg.		03 Yrs for diploma in Engg.

**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./specn. ,
(a)	(b)	(c)	(d)	(e)

Document Reference	Record No.	Format	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)

(ii) Proposed Jig & Fixture

Sl. No.	Process/ Activity	Work Instruction Ref.	Jig & Fixture Drg. Ref	In-house/ outsource
(a)	(b)	(c)	(d)	(e)

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ANNEXURE – III

**11.0 LIST OF MEASURING AND TESTING EQUIPMENTS**

Sl. No.	Name of Measuring & Testing	Capacity/Rating	Remarks	Essential/Optional
1.	Performance testing facility	Suitable Capacity	The Transducer/Sensor is to be tested with it's nominal current, 3 times during assembly and 4 times during final test	Essential
2.	Dielectric Tester	Suitable range	For measuring dielectric strength of semi conductor material	Essential
3.	Voltage surge tester	Suitable range	For testing sustainability against surge impulse voltage	Optional
4.	High voltage work bench	Up to 20 KV, 50 Hz	For high voltage insulation test	Essential
5.	Cooling chamber	- 28° C to 55 ° C	To check Environmental sustainability of device	Essential
6.	Temp. Control oven	Up to 100 ° C	To perform temperature rise test (dry heat & damp heat)	Essential
7.	Humidity test chamber	Suitable range	To check humidity effect on device	Essential
8.	Vibration, Shock & bump tester	Suitable range	For vibration withstanding capability of device	Optional
9.	Corrosion Tester	Suitable range	To check sustainability of device under corrosive atmosphere	Optional
10.	Burn in test set up	Suitable range	To check sustainability of device under extreme operating condition	Essential

\*\* Optional activity or Measuring & testing facility may be carried out only from NABL accredited lab or any other Govt. of India authorized laboratory.

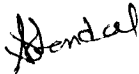
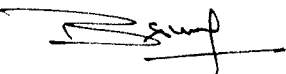
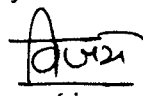
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**ANNEXURE – II**

**10.0 LIST OF MACHINERY AND PLANT**

Sr. No.	Name of Machinery & Plant	Capacity/Rating	Remarks	Essential/Optional
1.	Injection Molding M/C with die	Suitable range	For manufacturing housing of sensor	Optional
2.	Drill Machine	Suitable range	For drilling and Tapping purpose	Essential
3.	Milling machine/Lathe machine	Suitable range	For machining, Threading, Precise cutting of subjected job.	Essential
4.	Coil winding machine with digital count	Suitable range	Required for formation of coil	Essential
5.	PCB fabrication facility	Suitable range	For PCB fabrication	Optional
6.	Test Jig	Suitable range	For performance testing	Essential
7.	Soldering and de-soldering instrument	Suitable range	For PCB card preparing	Essential
8.	Coupler making facility	As per Drawing	For coupler making	Optional
9.	Sealing facility	Suitable range	For properly shielded the product	Essential

\*\* Optional activity or Machinery & Plant facility may be carried out from ISO-certified firm.

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98

ANNEXURE - I

**9.0 LIST OF DRAWINGS, SPECIFICATIONS AND STANDARDS**

**FOR PRIMARY CURRENT SENSOR**

- Specification No. CLW/ES/3/0084 ; Drawing No. CLW/ES/3/SK-1/0084 & CLW/ES/3/SK-2/0084.
- IS : 11731 (Part I & II) or any other equivalent DIN, IEC standards.

**FOR CURRENT SENSOR FOR HOTEL LOAD**

- Specification No. CLW/ES/3/0465 A ; Drawing No. CLW/ES/3/SK-1/0465 A
- IS : 11731 (Part I & II) or any other equivalent DIN, IEC standards.

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No foundry facility required.

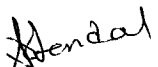
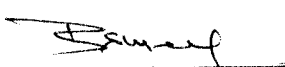
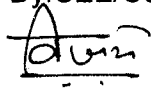
**7.0 REQUIREMENTS OF ELECTRICAL AND ELECTRONICS LAB**

Firms shall have electrical and electronics labs which should have Dust free, clean and non - humid environment preferably air conditioned. The lab shall have minimum following equipments is addition to equipments mentioned at Annexure – III:

- Digital Ammeter , Voltmeter & Multimeter of suitable range
- L, C, R Meter
- Continuity Tester
- Megger
- Vernier Caliper & Micrometer
- Oscilloscope – suitable range
- Variable Voltage Source 0 – 500 V AC/DC
- Variable Current Source both AC & DC – 0 to ± 1500 A
- Variable mA Source of suitable range.
- Oven.
- Multi channel paperless Recorder ( 32 channel).
- Precision Temperature meter.
- Current Transformer of suitable range.
- Voltage Insulation Tester.
- Optical microscope.

**8.0 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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99

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-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

**6.0 REQUIREMENTS FOR FOUNDRY FACILITIES**

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**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.

- a. Make, model and commissioning date of the machine.
- b. Accuracy.
- c. Details of machining operations.

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.

5.3.6 In case any structural work is involved, the welders shall be qualified in accordance with AWS Structural Welding Code D.1.1 or IS 817 with radiographic test. They should have undergone refresher course from reputed agencies as per IS: 817 & IS: 7310 and proper record should be maintained.

**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.

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SSE/Design <i>H. Bhandal</i>	SEE/D-I / AEE/D-III <i>[Signature]</i>	Dy.CEE/Con/D-II <i>[Signature]</i>

102

controlled document and a quality record of ISO 9001:2000 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.

**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**


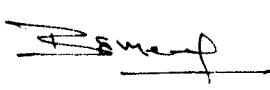
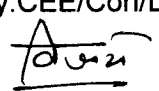
- 5.2.1 A complete bill of material indicating all input material items required for manufacturing of the products, governing specification and their sources of supplies as approved by the firm should be furnished.
- 5.2.2 Raw material shall be procured from CLW/RDSO approved sources wherever applicable 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.

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Page 4 of 13	Issued on (Nov, 2015)	STR No. CLW/2015/ELDO/(E)/ STR/0010	Rev '0'
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- iii) Process flow chart indicating process of manufacture of an individual product or for a family of products for which the process is same.
- 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

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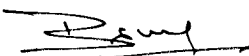
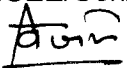


- 4.2 A system of regular submission of rejection details of material giving rejection rate, cause of rejection, corrective action taken etc. on quarterly basis should be followed by firm.
- 4.3 The firm must have system of documentation in respect of rejection at customer end, warranty replacement and 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.

- 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.

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Page 2 of 13	Issued on (Nov, 2015)	STR No.CLW/2015/ELDO/(E)/ STR/0010	Rev '0'
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**SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF PRIMARY CURRENT SENSOR AND CURRENT SENSOR FOR HOTEL LOAD FOR THREE PHASE ELECTRIC LOCOMOTIVES:-**

**1.0 NAME OF EQUIPMENT**

**PRIMARY CURRENT SENSOR AND CURRENT SENSOR FOR HOTEL LOAD.**

**2.0 APPLICATION**

Primary Current Sensor used in Three Phase (WAG9H / WAG9 / WAP7 / WAP5) & Current Sensor for Hotel Load for WAP-7/WAP-5 Electric Locomotives in Indian Railways. The equipments 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 manufactures (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.

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SSE/Design <i>Hendal</i>	SEE/D-I / AEE/D-III <i>Ramap</i>	Dy.CEE/Con/D-II <i>Aun</i>

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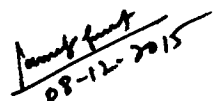
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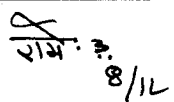
Page 1 of 13	Issued on (Nov, 2015)	STR No.CLW/2015/ELDO/(E)/ STR/0010	Rev '0'
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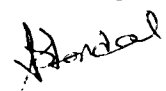
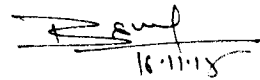
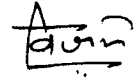
**SCHEDULE OF TECHNICAL REQUIREMENTS FOR  
MANUFACTURE AND SUPPLY OF  
PRIMARY CURRENT SENSOR AND CURRENT SENSOR FOR  
HOTEL LOAD  
FOR THREE PHASE ELECTRIC LOCOMOTIVES AS PER  
SPECIFICATION No.CLW/ES/3/0084 & CLW/ES/3/0465**

**ISSUED BY**

**CHITTARANJAN LOCOMOTIVE WORKS  
CHITTARANJAN – 713331  
WEST BENGAL**

<b>Approved By</b> CEE	<b>Signature</b>  08-12-2015
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<b>Recommended By</b> CEE/Loco	<b>Signature</b>  8/12
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<b>Prepared By</b> SSE/Design 	<b>Checked By</b> SEE/D-I / AEE/D-III  16.11.15	<b>Issued By</b> Dy.CEE/Con/D-II 
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