

**Government of India**  
**Ministry of Railways**  
**Research, Designs & Standards Organisation**  
**Manak Nagar, Lucknow - 226 011**

EL: 3.2.1/2/JCG

Dt. .12.82

1. **SPECIAL MAINTENANCE INSTRUCTION NO. RDSO/ELRS/SMI/102**  
**Procedure for repairing the defective welds of transformers fitted**  
**on ac electric Locomotives:**

1. **Object**

Railways have reported many cases of oil leakage through the a.c. loco transformers tanks mainly on indigenous transformers on account of cracking of the welds at specific locations. The cracks were generally observed in the welded (fillet welds) joints near the tank corners under A33/a34 bushings & as well as on the tank walls.

The following welding procedure has been laid down for the proper welding of the se cracks. The procedure under this S.M.I. emphasises to ensure the use of correct quality/size of electrode and welding sequence to repair (i) fillet welds between the tank wall and the support plates (ii) cracks on the tank well.

2. **INSTRUCTIONS:-**

2.1. **Weld Preparation:-**

The full portion of the cracked/defective fillet weld and plate material shall be gauged out up to the roof either by pneumatic gauging or by, electrode cutting by using suitable brand/quality, of electrode. The cutting electrode namely Chamfer-tooth of M/s L&T, SDE brand of M/s D&H Scheron, E-900 of M/s Cosmic Engineering (Orlton-Son) & Gricon gauge of M/s, General Electric & Equipment Ltd., Bombay have been approved for this purpose.

Gauge out single V groove with angle of 60° - 70° extending its roof upto inside surface of the sound metal.

2.2 **Tests:-**

The gauged out V grooved portion shall be subjected to moflux or dye penetration test to ensure complete removal of cracks.

2.3 **Precautions:-**

Irrespective of weld length the tank rim should be baited and tack welded with tank cover before welding to prevent distortion due to heat during welding.

#### 2.4 **Type of Electrode:-**

Any brand of electrode approved by RDSO against IRS class CI of IRS M-28 may be used for welding of transformer.

3.15 mm size shall be used for root run and 4.0/5.0 mm size for subsequent runs.

#### 2.5 **Welding:-**

The gauged V grooved area shall be cleaned for oil, grease and loose burns. Carry out the Welding either in flat or vertical-Horizontal position.

For fillet weld min. 6 mm fillet shall be ensured and for butt welding a 1.5 mm re-enforcement shall be achieved. Weld should be uniform with equal leg lengths on both planes in case of fillets. There should be no surface defect like exposed porosity etc.

For roof pass 3.15 mm electrode shall be used to get complete penetration in both fillet and butt welds. The back side of the butt shall be gauged out to a depth of 2.3 mm followed by a sealing run with 4 mm electrodes. The crater ends shall be filled up, by going back to a distance of 8 mm and then with drawn the electrode from the pool.

#### **Precaution:-**

In no case fillets welds along the three or more axis should meet at a point. In such cases either scalloping or drilling out the common point may be done.

#### 2.6 **Welding Sequence:-**

In case of long welded seams it is preferable to adopt back step sequence by Stratton the weld from the mid point of the seam and depositing increments in opposite direction alternatively against the direction of welding progress as shown in the sketch-I.

#### 2.7 **Dressing:-**

In case of butt welds, the reinforcement may be ground flushed with base metal surface for better fatigue strength.

#### 2.8 **Test after welding:-**

The welds may be subjected to dye/penetration/magnaflux test in critical areas to ensure freedom from cracks.

#### 3. **INSTRUCTION DRAWING:-**

#### 4. **APPLICATION:-**

All ac electric locomotive fitted with BHEL and NGEF transformers and a.c. EMU's fitted with BHEL transformers.

5. **AGENCY FOR IMPLEMENTATION:-**

All a.c. electric loco and AC EMU sheds and shops.

6. **REFERENCE:-**

- (i) BHEL weld repair procedure, issued by BHEL vied their letter No. WE & S/G: 567 dt. 27.5.82.
- (ii) M & C Directorate Note No. M & C/W/I/10 dt. 4.8.82.
- (iii) Par 2.1.5 of the records notes of discussions held between BHEL & RDSO at Jhansi on 26/27.7.82 issued vied RDSO's letter No. EL/3.2.1.2/CG dt. 20.8.82.

Distribution:- As per enclosed list.

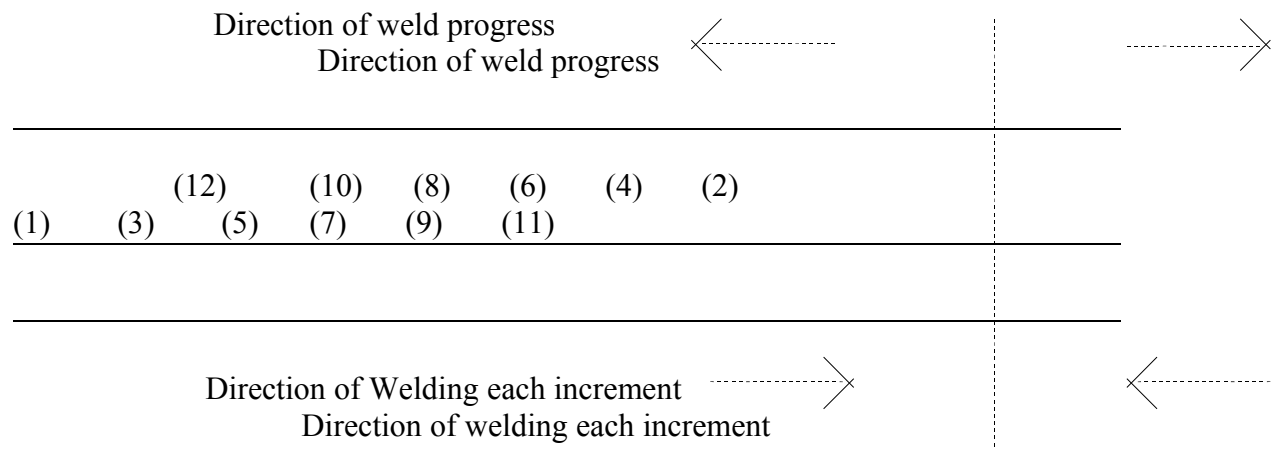


(K. VISHWA KUMAR)  
for Director General Elect.

Encls/Mailing List.

### **SKETCH - I**

#### **Mid Point**



Back step sequence welding.

**Note:-** welding of each increment will be made according to the numbers marked alternatively