

Addendum & Corrigendum Slip No. 2
To
Manual for Flash Butt Welding of Rails (Revised Jan 2012)

1. **Clause 5.6.2:** Existing clause shall be replaced with following:

5.6.2 Approval of QAP:

The Quality Assurance Programme (QAP) of each individual Flash Butt Welding Plant shall be got approved by RDSO.

- (a) For stationary welding Plant, the Quality Assurance Programme (QAP) shall be submitted to RDSO through concerned railway administration, who shall scrutinize and approve by ensuring compliance to this manual.
- (b) For Mobile Flash Butte welding Plants, the procedure given in Annexure-X of this Manual shall be followed.

The Quality Assurance Programme (QAP) shall contain the information given in Annexure-XI.

2. New Annexure VI-F, Annexure-X and Annexure-XI shall be added.

ANNEXURE-X

(Para 5.6.2)

Procedure to be followed for approval of Quality Assurance Program (QAP) for Mobile Flash Butt Welding Plants

- 1.0 The mobile flash butt welding plants used on railways are mostly outsourced. In order to expedite the approval of QAP and minimize the time gap between award of contract and start of work, the following procedure shall be followed.

- 2.0 Submission of General Quality Assurance Programme:**
 - 2.1 The general QAP, in triplicate, containing the information as per Annexure-XI of Manual shall be submitted to RDSO by agency/ Plant owner separately for each Mobile Flash Butt welding Plant proposed to be deployed. Availability of Railways' order will not be required at this stage.
 - 2.2 The complete QAP (excluding details of welding team, details of contract agreement and standardized welding parameters) so submitted by firm will be scrutinized and approved by RDSO after ensuring compliance of relevant provisions of this manual.
 - 2.3 One approved copy of General Quality Assurance Programme will be returned to agency, which has approached for approval.

- 3.0 Approval of Welding Team:**
 - 3.1 Once the contract is awarded, the firm will approach concerned Zonal railway for approval of welding team as per Para 13 of Manual.
 - 3.2 The competency certificate to welding operators and supervisors will be issued by Chief Track Engineer of Zonal Railway after conducting necessary test as per Manual and other instructions on subject.

- 4.0 Submission of Final Quality Assurance Programme:**
 - 4.1 After agency has got the welding team approved by concerned Zonal Railway, the firm will undertake internal test to provisionally fix the welding parameters for rails of different sections/ metallurgy as required to be welded as per contract.
 - 4.2 After completing above exercise, the agency will submit the final Quality Assurance Programme (Duly updating the earlier approved General QAP with details of welding team approved by Zonal Railway with competency certificates, proposed

welding parameters as decided by firm during internal test and details of contract agreement) in quadruplicate to RDSO through concerned Railway Administration for standardization of welding parameters and then approval of final QAP.

5.0 Standardization of Welding Parameters:

- 5.1 After final QAP submitted is found satisfactory during scrutiny, the standardization of welding parameter for concerned Rail section/ UTS as requested by agency/ zonal railway will be undertaken by RDSO as per Para 5.6 of Manual.
- 5.2 The standardized welding parameters will be advised to agency/ zonal Railway.

6.0 Approval of Final Quality Assurance Programme (QAP):

- 6.1 After standardization of welding parameters, the standardized welding Parameters will be included in final QAP submitted.
 - 6.2 The copy of final QAP approved by RDSO duly containing the standardized welding parameters shall be issued to the concerned railway and firm for undertaking the Flash Butt welding work as per provisions of this Manual.
 - 6.3 The adherence to provisions of Manual and QAP will be ensured by concerned Zonal Railway.
- 7.0 The Final Quality Assurance Programme (QAP) of a particular Mobile Flash Butt welding Plant need not be re-approved by RDSO unless there is major change in Quality Control setup or new type of rail to be welded or there is a revision/amendment to FBW Manual to provisions related to quality assessment of FB welds/procedure of welding/ methodology of standardization of welding parameters. In case of change of operator, Zonal Railways shall take action for approval of welding team and revised QAP incorporating the revised details shall be approved by Chief Track Engineers of Zonal Railways. The final decision whether there is major change in Quality Control setup or not will rest with Chief Track Engineers of Zonal Railway, where plant is being deployed.

ANNEXURE-XI

(Para 5.6.2)

Information to be provided in Quality Assurance Programme for Mobile Flash Butt Welding Plants

1. Cover page of the QAP
This shall indicate the Name and relevant details of Agency; Details of Mobile Flash Butt Welding machine (Make, Model & Serial no.etc.); Details of Contract along with agreement no. & name of Zonal Railway awarded the Contract.
2. Index.
3. Brief description about the firm/ company and General information about the addresses and contact numbers of office and work stations, branches and sister concerns and the details of ISO certification, if firm is already a ISO certified company having Operation and maintenance of Mobile Flash Butt Welding Plant in scope. If firm is not already ISO certified, ISO certification including Operation and maintenance of Mobile Flash Butt Welding Plant in scope shall be ensured before submission of Final QAP.
4. If firm is ISO certified,
 1. Quality policy of the company as per ISO certification.
 2. Certificate to this effect that the approved QAP is a controlled document and a quality record of ISO quality control system of the vendor.
5. Organization chart emphasizing quality control set-up.
6. Qualification and experience of key personnel and officials deployed for operation and in quality control cell including supervisor and welders of the machine.
Details of competency certificate of the welders issued by Zonal Railway as per clause 13.2 of Manual shall be specifically indicated.
7. Brief description on the Mobile Flash Butt Welding Machine and other machinery & plant deployed. (Serial no., model no., make, date of manufacturing, AMC details and brief working procedure of the machine).
(MFBW machine must have facility for display and storage of all the welding parameters in re-producible electronic forms at the time of F.B. welding of rail joints. A certificate in this regard along with brief on the facility for display/ storage capacity of the machine must be specifically mentioned in the QAP).
8. Recommended Welding parameters for various rail sections and rail metallurgies as per operating manual of FBW machine specified by Manufacturer.
9. Process flow chart for complete process (from receipt of rail to dispatch of welded panels).
10. Procedure for Standardization of welding parameters as per clause 5.6 of manual. (The parameters finally approved by RDSO shall be included in final QAP).
11. Procedure of field approval of welding procedure as per clause 5.7 of Manual.

12. Quality Assurance System covering the following:

- (a)** Scope
- (b)** List of standards, codes and reference documents.
- (c)** Inspection & Testing process of incoming rails as per clause 2 to 4 of Manual.
- (d)** Detailed description of procedure of regular welding of rails.
 - (i) Welding Process and In process check:
 - Inspection of Copper/ Melloroy electrodes for electrical contact.
 - Rail alignment.
 - Welding sequence including stripping for mobile flash butt welding plants.
 - (ii) Weld Record for each joint duly indicating actual weld parameters vis-à-vis parameters standardized by RDSO.
 - (iii) Post weld heat treatment for 110 UTS & HH rails, if applicable.
 - (iv) Post weld straightening.
 - (v) Finishing of joints to achieve geometrical standards given in Annexure IV of Manual.
 - (vi) Marking of joints for Mobile FBW plants. (Marking code shall be assigned by RDSO at the time of approval of final QAP).

The formats duly indicating the frequency of in process check shall be part of QAP.

(e) Product Control:

- (i) Tests for every flash butt welded joint.
 - Visual inspection.
 - Dimensional check.
 - Ultrasonic test.
- (ii) Additional Tests on sample flash butt welded joint.
 - Hardness test.
 - Transverse Load test.
 - Macro examination.
 - Micro examination.

Formats as per Manual for each of the above mentioned tests shall form part of QAP.

(f) System Control as per clause 11 to 14 of Manual as under:

- (i) Handling of high strength rails (90UTS HH and 110UTS), if applicable.
- (ii) Periodical maintenance of mobile flash butt welding machine as per procedure and frequency laid down by OEM (Original Equipment Manufacturer).
- (iii) Periodical inspection of mobile flash butt welding machine by OEM or his authorized representative at an interval of two years or execution of

20,000 joints whichever is earlier to conduct technical audit of its health, as per clause 14.1 of Manual.

(iv) Availability of sufficient stock of genuine spares.

(g) List of various gauges/ templates e.g. feeler gauge, straight edge etc. along with their calibration status and plan.

13. Quality Assurance System- Inspection & Testing covering the following:-

S. No.	Process	Sample size and frequency of inspection/testing	Parameters for inspection/tests	Method/measuring/ equipments	Accuracy	Acceptance limit/ specified value	Reference documents	Standard format no. for maintaining results	Rejection details (reprocessed/ scrapped)

14. List of tools & plants and testing equipments available with MFBW machine for execution of rail welding alongwith calibration status and plan.

15. List of Registers maintained and their standard formats with unique number.

Following registers/records are mandatory:

1. Record of Weld Register (Proforma as per Annexure –III of Manual),
2. Dimensional Check Register (Proforma as per Annexure –VIA of Manual),
3. USFD Test Register (Proforma as per Annexure – VIB of Manual),
4. Hardness Test Register (Proforma as per Annexure – VIC of Manual),
5. Transverse Load Test Register (Proforma as per Annexure – VID of Manual),
6. Macro Examination Register (Proforma as per Annexure – VIE of Manual),
7. Micro Examination Register (Proforma as per Annexure – “VI F” of Manual).
8. Daily Progress Register (Proforma as per Annexure –‘A’ attached),
9. Joint Rejection Register (Proforma as per Annexure –‘B’ attached),
10. Customer Complaint Register (Proforma as per Annexure – ‘C’ attached).

16. Welding parameters to be approved by RDSO:- A blank format as prescribed in operating manual of FBW machine shall be part of final QAP for entering the welding parameters to be standardized by RDSO.

17. The QAP covering all the information must be given in the form of single document indicating name of the firm, effective from, document no., revision number and page no. 'x' of 'y' on each page. Each page shall be signed by (with name and designation) 'Prepared by', 'Checked by' (QC in-charge) and 'Approved by' by competent authority. In case of General QAP, details of welding team, details of contract agreement and standardized welding parameters need not to be included.

**Annexure-VI F
(Para-5.6.4.10)**

Micro Examination of Welded Joints

1. Date, month and year
2. Joint No.
3. Rail section
4. Date of Testing
5. Remarks on Microstructure at 100X magnification with grain size
6. Signature
7. Summary – (at the end of the month)

No. of joints welded during the month (Rail section-wise)

No. of joints checked (Rail section-wise)

No. of joints rejected (Rail section-wise)

**Annexure-‘A’
(of Annexure -XI)**

Daily Progress

Date	Rail Section	Joint No.		Total No. of joints welded on date	No. of Joints Tested	No. of Joints found defective with reason	Remarks	Signature
		From	To					

Summary – (at the end of the month)

No. of joints welded during the month (Rail section-wise)

No. of joints checked (Rail section-wise)

No. of joints rejected (Rail section-wise)

**Annexure-‘B’
(of Annexure -XI)**

Joint Rejection

1. Date, month and year
2. Joint No.
3. Date of Testing of joint
4. Cause of Rejection
5. Date of Re-welding
6. Re-weld joint No.
7. Remarks
8. Signature

**Annexure-‘C’
(of Annexure -XI)**

Customer Complaint

Sl. No.	Date	Name & Designation of the Customer	Complaint	Signature of Complainant	Corrective Action Taken by the work executing agency	Signature of work executing agency