

उत्तर पश्चिम रेलवे

CE's CIRCULAR NO 135

Sub:- Execution of USFD testing of Rail/Weld.

In order to carry out USFD testing of rails and welds as per Need based concept, following procedures are laid down.

1.0 PLANNING AND DEPLOYMENT

- 1.1 Each USFD machine either SRT or DRT will have nominated jurisdiction and operators as per workload. The jurisdiction of machines and operators should fit with the-jurisdiction of Sectional Sr. DEN/ DEN for proper monitoring of USFD work. Jurisdiction of each USFD team should be rotated with other USFD teams atleast once a year.
- 1.2 Planning for weld testing has to be done separately. There should be separate batch for USFD testing of welds who will do weld testing with hand probing, in case no spare capacity is available with the Rail testing batch. If spare capacity is available, the same batch of Rail testing will-carry out weld test also.
- 1.3 Monthly programme for USFD testing should be issued by Sr. DEN/cord.
- 1.4 During the work of USFD, Track man should be available at a scale of 5 Nos. per. DRT, 3 Nos. per SRT & 2 nos. per weld tester. Extra man if required should be taken from concerned gang where the USFD work is going on. Outsourcing to be resorted out for providing man for testing, if required.
- 1.5 Testing of Fish plated track has to be done with SRT and LWR track with DRT. However in the jurisdiction of DRT, the stretches with Fish plated joints such as girder bridges and other scattered locations, testing to be done with SRT time to time as per required frequency.
- 1.6 All effort should be made to augment departmental capacity. The aim of each division should be to have 30% surplus capacity of divisions USFD resources. To ensure no arrears in testing & also to take care of any out of course testing, testing on construction projects etc. Outsourcing of USFD should be done barest minimum as far as possible. Due to increased work load of USFD testing, if outsourcing is inescapable the proposal for outsourcing on important route can only be done with prior approval of PCE.
- 1.7 For proper maintenance of USFD equipment after expiry of the guarantee period, divisions should make timely arrangements for repairs of electronic and mechanical parts under AMC with original equipment manufacturer. Action should be taken to finalise AMC well in time so that contract remains available all the time and no machine remains idle on account of break down.
- 1.8 The procurement of spare for a machine shall be done from Original Equipment Manufacturers (OEMs) of that machine only, in order to achieve consistent and assured quality of testing. However mechanical spare of trolley, standard items such as, battery, battery charger etc. can be procured from open market. Spare batteries shall also be arranged as and when expecting backup time of battery becomes low.

2.0 QUALITY OF TESTING & RECORD KEEPING.

- 2.1 Each Sr. DENs & DENs in divisions should be well conversant with basics of USFD testing i.e. Theory of USFD, Knowledge of USFD equipments & parts, Calibration, sensitivity, Testing procedure & Interpretation of flaw and should be capable to check the USFD testing independently covering all aspects.
- 2.2 Sr. DENs & DENs should go to field frequently. Test check on quality of USFD Testing done by USFD operators as per check list enclosed as **Annexure-A**, shall be the integral part of their field inspection. Sectional ADENs should do test check of quality of USFD testing as per para 4.3 of USFD manual-2012 at least once in a month. DEN/ADEN/ Track in-charge of USFD in division will monitor the quality, output and up keep of machines.
- 2.3 Sensitivity setting of machine, shall only be done using standard rail test piece as per Fig-3 and Fig-20(a) of 'Manual for Ultrasonic Testing of Rails and Welds' 2012 for rails and AT Welds respectively. Standard Rail Test Piece & IIW (International Institute of Welding) block should be available with each USFD team for sensitivity setting & checking of the correct functioning of the machine.
- 2.4 Maintain proper record of testing, observations and echo amplitude and echo pattern in the register in the format as per **Annexure-B**. The details should be supplemented with A-scan recorded during testing.
- 2.5 Besides above, record of testing should also be stored in the memory of machine and downloaded in the computers and to be sent every month to HQ office. The details of USFD testing done daily should be uploaded on TMS module.
- 2.6 On detection of each IMR/DFWR defect SSE/USFD will take action as per para 6.4 & 8.14 of USFD manual & communicate immediately to Sectional SSE/JE who will also take action as per provision of USFD Manual.
- 2.7 The detailed reporting procedure of USFD working should be as follow:

SSE/USFD should submit 03 days report to AEN keeping an extra copy for SSE of the section. 03 days report should also be sent by SSE / USFD to Sr. DEN/DEN and the record of USFD should be available during inspection by higher officers.

The Above instructions are abstracts of manual for USFD testing of rails & welds 2012 for guidance only & does not supersedes provision of any manual and Railway Board's instruction on the subject matter.

(No : W/432/0/CE Dated: 01.05.2015..)


(P. K. Sanghi) 11/5/15
Pr. Chief Engineer

Enclosed : (1) Check list of USFD testing (Annexure-A).

(2) Proforma for record keeping (Annexure-B).

Check list for USFD testing

Date of Inspection:

SECTIONDIVISION.....KM/TP.....LINE.....

Machine used for testing: Single Rail Tester/ Double Rail Tester

Machine make and number:

Track Structure on test location:

Whether Stretch is having D-Marked Rails: Yes/No

SN	Item of Works	Observation/ Values Recorded	Remarks
A.	USFD Team		
1	Operator (s)		
(a)	Name		
(b)	Competency Certificate Details		
(c)	Competency Certificate valid	Yes/No	
2.	Adequate staff for handling/ lifting of machines	Yes/No	
B.	USFD Machines & condition		
1.	Machine used is RDSO approved	Yes/No	
2.	Availability of Requisite Tools & plants		
1	Sensitivity block	Yes/ No	
2	IIW block for calibration	Yes/ No	
3	Standard Rail test piece	Yes/No	
3.	Visual Condition of electronic unit	Proper/ Not proper	
4.	Visual condition of Trolley	Proper/ Not proper	
5.	Condition of Probes & shoes		
1	Right Hand Side		
(a)	0 degree	Proper/ Not proper	
(b)	70 degree(F)	Proper/ Not proper	
(c)	70 degree (B)	Proper/ Not proper	
2	Left Hand Side		
(a)	0 degree	Proper/ Not proper	
(b)	70 degree(F)	Proper/ Not proper	
(c)	70 degree (B)	Proper/ Not proper	

3	For Flange testing		
(a)	70 Degree 2 MHz	Proper/ Not proper	
(b)	70 Degree 2 MHz (Side looking probe)	Proper/ Not proper	
(c)	45 degree 2 MHz	Proper/ Not proper	
4	Alignment of probes & Lifting System with respect to centre line	Central/ eccentric	
6.	Check on Characteristics of Machine		
(a)	Date of Check		
(b)	Whether due or not (Monthly Check)	Due/ Not Due	
7.	Condition of Battery	Charged/ Not Charged	
8.	Condition of Audio Alarm	Sounding/ not sounding	
9.	All controls of electronic unit i.e. depth range, gain, reject etc. properly functioning	Yes/No	
10	Whether Watering arrangement for probes is functional	Yes/No	
11.	Availability of spares		
(i)	0°, 4 MHz Double crystal Probes: 8 No.	Yes/ No	
(ii)	0°, 2 MHz Double crystal Probes: 4 No	Yes/ No	
(iii)	70° (F & B) probes, 2 MHz Single crystal: 8 No	Yes/ No	
(iv)	45°, 2 MHz Single crystal Probes: 2 No	Yes/ No	
(v)	70°, 2 MHz Single crystal Probes: 6 No	Yes/ No	
(vi)	70°, 2 MHz Single crystal Probes (SLP): 2 No	Yes/ No	
(vii)	0°, 2/2.5 MHz Single crystal Probes: 2 No	Yes/ No	
(viii)	Connecting Cable (Flaw detector with junction box): 6 No.	Yes/ No	
(ix)	BNC Connector: 6 no.	Yes/ No	
(x)	IIW Block (as per IS:1408): 2	Yes/ No	
(xi)	60x50x50 mm steel block (as per steel grade 45 C8 to IS: 1875-1992): 1 no.	Yes/ No	
(xii)	Battery Charger: 1 no.	Yes/ No	
(xiii)	Fuse: 12 No.	Yes/ No	
(xiv)	Step gauge: 1 no.	Yes/ No	
C.	Check on Sensitivity settings and calibration		
1.	Calibration Check		
(a)	Calibration for 300/200 mm longitudinal wave using 0°, Double crystal Probe	Proper/ Not proper	
(b)	165 mm Direct shear wave calibration for 70°, 2 MHz Single crystal Probe	Proper/ Not proper	

2.	Sensitivity setting of equipment and probes with help of standard rail piece	Proper/ Not proper	
(a)	Whether gain is locked after setting	Yes/ No	
3.	Check on function & sensitivity of probes		
(a)	Normal Probe (Back wall echo adjusted to full screen height)	Proper/ Not proper	
(b)	Angle probe 70° (Centre forward & backward) (Amplitude of 12 mm dia. hole to be set to 3 div. i.e. 60% of full screen height)	Proper/ Not proper	
(c)	Gauge face & Non gauge face corner probe 70° (Forward & backward) (signal amplitude from 5 mm FBH to be set 60% of full height)	Proper/ Not proper	
(d)	45° probe	Proper/ Not proper	
4.	Whether adjustment in sensitivity setting was done for variation in rail temperature	Yes/ No	
5.	Whether gain has been increased by 10 db for D Marked rails	Yes/ No	
6.	Check on equipment characteristic		
(a)	Linearity of time base of flaw detector	Proper/ Not proper	
(b)	Linearity of Amplification of flaw detector	Proper/ Not proper	
(c)	Penetrative Power	Proper/ Not proper	
(d)	Resolving Power	Proper/ Not proper	
(e)	Probe index	Proper/ Not proper	
(f)	Burn angle	Proper/ Not proper	
7.	Whether scheduled maintenance of USFD machine was done	Yes/No	
D.	Check on Work		
1.	Whether equipment is in proper working order duly calibrated	Yes/No	
.1	Battery is fully charged	Yes/ No	
.2	All controls of electronic unit properly functioning	Yes/ No	
.3	Calibration & sensitivity setting done	Yes/ No	
.4	Whether the gap between probing face and probe shoe is proper (0.2 mm)	Yes/No	
.5	Whether alignment of probes is proper	Yes/No	
.6	Adequate supply of water for coupling for all the probes is ensured.	Yes/No	

2.	Check on previous days' work		
(i)	Date of testing		
(ii)	Location of testing (from Km to Km)		
(iii)	Rail testing		
(a)	Whether all IMR defects confirmed	Yes/ No	
(b)	If No, number of additional defects		
1	Over Reported		
2	Under Reported		
(c)	Whether preventive action taken on all defects	Yes/ No	
(d)	Whether all OBS defects confirmed	Yes/ No	
(e)	If No, number of additional defects		
1	Over Reported		
2	Under Reported		
(f)	Whether preventive action taken on all defects	Yes/ No	
(iv)	Weld testing		
(a)	Type of Welds		
(b)	Whether all defects confirmed		
(c)	If No, number of additional defects		
1	Over Reported		
2	Under Reported		
(d)	Whether preventive action taken on all defects	Yes/No	
(v)	Whether the A-scans of all defects preserved in machine	Yes/No	
3.	Check on day's work		
(a)	Type of Testing	Rail/ weld	
(b)	The A-scans of all defects being preserved.	Yes/No	
(c)	The defects details are properly logged in machine.	Yes/ No	
(d)	Defects are properly entered in Register	Yes/No	
(E)	Schedule of USFD testing and adherence		
1.	Date of last USFD Testing of Inspected Stretch		
(a)	Rail testing		
(b)	Weld testing		

2.	Stipulated frequency of section		
(a)	Rail testing		
(b)	Weld testing		
3.	Whether testing is done as per Schedule	Yes/No	
4.	Proper up keep of defects register has been done	Yes/No	

Annexure-B

[illegible]