NORTH EASTERN RAILWAY

CE'S P.WAY CIRCULAR NO.69 OF 1982.

CASE NO.W/275/8/Pt.IV/W-4A.

ULTRASONIC FLAW DETECTION OF RAILS:

The following procedure for testing of rails, classification of rail flaws and the action to be taken in case of defective rails,etc.has been formulated based on the Railway Board's letter No. 73/WG/MR/1 dated 26.2.74 and amendment dated 30.8.1974 and also the recommendations of the 53rd Track Standards Committee vide item 717 of July, 1977, The instructions given may please be followed with immediate effect:-

(2) IDENTIFICATION:

2.1 Single Line: Rails shall be identified as left hand or right hand rails in the direction of increasing kilometrage.

2.2 Double Line:The rails shall be identified as left hand or right hand on Up or Dn line in the direction of traffic.

2.3 Numbering of rails: Rails shall be counted starting from first joint occuring after the Telegraph post and proceeding in the direction as mentioned in para 2.1 and 2.2, above.

(3) CLASSIFICATION OF FLAWS:

Flaws detected by PWI/RED shall be classified as REM and OBS,as detailed below:

CLASSIFICATION:

(I) Rail Head:

(a) 111/211

Transverse breakage or fissure (progressive crack originating from within head). — REM

(b) 112/212

Horizontal longitudinal separation in the head. — OBS Under the following conditions:-

1. If the crack is within 5 mm of the rail table and it has not reached any of the sides or end-face of the rail head and neither vertical, longitudinal nor transverse component of the crack is present.

2. If the defect is more than 5mm below the rail table but the back echo is persistant with more than 50% of the amplitude of that at an adajacent sound location.

3. If the defect is beyond 5mm from rail table and back echo is suppressed by more than 50% amplitude but only for a continuous length of not exceeding 10cm & provided neither vertical longitudinal nor transverse component is present. There should not be more than 2 such defects separated by atleast 1 metre in a standard rail length. REM in conditions other than items 1 to 3 above.

(c) 113/213 Vertical longitudinal split in the head.	REM

(II) WEB.

(a) 1321/2321 Web horizontal crack at top fillet radius	REM
(b) 1322/2322 Web,horizontal crack at bottom fillet radius	REM
(c) 1323/2323 Web,horizontal crack not at fillet radius	REM
(d) 133/233 Web,vertical longitudinal splitting	REM
(e) 135/235 Web,cracking at holes	OBS if only one crack of length less than 50mm in one bolt bole is observed.Otherwise it should be declared REM.It is necessary for the sectional PWI to open the fishplate and examine the crack whether it would come within the purview of REM after the test has been done

(f) 238	Away from rail end web diogonal cracks not at hole.	REM	
(III)	/Welding/Weld Zone.		
(a) 471	Built up, welding transverse cracking across the built up weld	REM	
(b) 421	Thermit welding, transverse crack in the body of the weld.	REM	
(c) 422	Thermit welding, horizontal crack	REM	
(IV)	Head, Surface:		
(a)	1221/2221 Head, surface, breaking out, OBS running surface (scabbing)	OBS	
(b)	1222/2222 Head, surface, breaking out, gauge corner (~~selling~~) SCALING	OBS	If there is no visual prominent transverse crack observed or if no prominent transverse crack indication is by angle probe, it will be classified as OBS
(c) -/2251	Away from rail ends head wheel or driver burns, isolated	OBS	
(d) -/2252	Away from rail ends, head wheel burn, continuous & repeated	OBS	Under other conditions the flaw will be classified under code 211 as REM.
(V)	Welded built-up: 472 Welding, building up, horizontal cracking.	OBS	

(VI) Foot origin:

The defects of foot origin generally do not give any indication in ultrasonic,testing,if PWI/RFD during his testing finds any such flaw,he shall take action to mark it as REM.Sectional PWI and his staff during routine inspection if they notice defects,they should take action to mark the rails as REM.

(4) MARKING OF DEFECTS BY PWI/RFD:

4.1 All REM defects shall be painted with red crosses,one exactly at the point of flaw,on the web,and one corresponding to it on the foot of the rail on gauge-side,so as to readily identify the flaws during trolley inspections.

4.2 Code 211 REM flaw shall be further marked with red square around the red cross mark.

4.3 All OBS flaws shall be painted with yellow crosses,one exactly on the point of flaw on the web and one on the foot of the rail on gauge-side.

NOTE:(i) In the case of weld failures,the single red mark shall be put by the side of weld on the web and foot,if it is not exactly possible to mark on the weld.

(ii) Where the head and web are separated by a horizontal crack the red mark shall be at the centre with a horizontal head line extending to the full width of the crack.

(iii) The marking of each flaw should be done afresh on every run of UFD.

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(5) REPORTING:

The PWI/RFD shall record daily the particulars of the rail flaw detection in the proforma at annexure 'A' in four copies and submit the same one to PWI of the section, one to AEN and one to DEN/Sr.DEN, retaining one as office copy. Every month PWI/RFD will prepare a consolidated statement of all the defects found by him and submit in proforma annexure 'A' to CE's office.

Monthly returns giving the number of REM/OBS flaws and length of track tested data-wise and action taken to replace the rails or otherwise shall be submitted by the DEN/Sr.DEN to CE's office on proforma Annexure 'B'.

(6) ACTION TO BE TAKEN BY SECTIONAL PWI:

6.1 Rails with REM flaw marked with red cross:

All efforts should be made to remove the rails very early. Till then the sections where the REM rails exist, shall be watched by the keyman of the section during his routine inspection of the gang-best. Further to this, it would be supplemented by the night patrolling/watchmen as the case may be to be introduced in such sections for which instructions have already been issued vide this office letter No.W/537/0/W-4A dt.20.5.1982.

Efforts should also be made to remove REM rails in curves sharper than 3 degree within 7 days & in other locations in a period of 60 days. If it is not possible to remove these rails within the period stipulated, speed restrictions of 50 KMPH shall be imposed on MG section and 70 KMPH for BG sections.

6.2 REM rails marked with red cross and a red square around:

If in a rail length there is only one such flaw fishplating shall be done immediately by provision of joint and shoulder sleepers. This fishplate is permitted if the flaw is more than 6 metres from the rail end in case of fishplated track. If there are more than one flaw in a rail with clause 6.1.

6.3 Rails with OBS flaw marked with yellow cross:

Such rails should be kept under observation and watched by the keyman of the section as well as by the Inspecting officials for any further development in the flaw, and action taken in accordance with clause 6.1.

NORTH EASTERN RAILWAY

(ANNEXURE'A')

DAILY REPORT OF ULTRASONIC TESTING OF RAILS.

(TO BE SUBMITTED BY PWI- RFD)

Date of testing Section UP/DN/SINGLE
Division R.F.D.Machine NO. Between Station
Section: Operators Name Kilometre.

In bet	Rail section and year of laying	Brand mark on the rail	Left Hand			Right Hand			REMARKS
			Rail nos. with flaw	Classification of flaw	REM OBS	Rail no. with flaw	Classification of flaw	REM OBS	
1	2	3	4	5	6	7	8	9	10