

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

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DYNAMIC TESTING OF COMBINATION GFN LINERS TO DRG. NO
RDSO/T-3707 AND RDSO/T-3708 USING 75 R RAILS ON
90 R M.G. CONCRETE SLEEPERS

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RESEARCH DESIGNS AND STANDARDS ORGANISATION
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REPORT ON DYNAMIC TESTING OF COMBINATION GFN LINERS TO Drg
No. -RDSO/T-3707 AND RDSO/T-3708 USING 75 R RAILS ON 90 R
M.G. CONCRETE SLEEPERS

1.0 INTRODUCTION :

Track Design Directorate vide their note no. CT/FD/2/P dated 8.7.96 conveyed Railway Board's orders on Item no. 856 (S.N.11) of 67th TSC for conducting Pulsator test to check the efficacy of GFN liners to drawing nos. RDSO/T-3707(GS) and 3708 (NGS) by using 75 R rails on 90 R M.G. pre-stressed concrete sleepers.

2.0 DETAILS OF TEST :

2.1 Pulsator Test : The test assembly with two rail seats having 450 mm gauge using 75 R rail and elastic rail clips MK-II to drawing no. RDSO/T-3722. GFN-66 insulating liners to Drg no. RDSO/T-3707 & RDSO/T-3708 and 6 mm thick grooved rubber sole plates were subjected to pulsating loads at 300 cpm. General arrangement of the test is shown in Fig. 1.

2.2 ERC MK-II clips having toe loads in the specified range were used as detailed in Annexure I.

2.3 The loading norms duly approved by Track Design Directorate (ref note no. CT/TD/2/P dt 19.9.96) are as under:

Stage I:-

- (a) No. of cycles : 2 million
- (b) loading : Vertical (V): 5t max to 1.0t min
Lateral (L): 2t max to 0.4t min
Ratio (L/V): 0.4

Stage II:-

- (a) No of cycles : 0.5 million
- (b) Loading : Vertical (V): 5t max to 1.0t min
Lateral (L): 3t max to 0.62t min
Ratio (L/V): 0.62

3.0 OBSERVATIONS :

3.1 Gauge widening after completion of every one lakh cycles with "no load" and "on load" were observed. Graphs for gauge vs number of cycles were plotted for the above conditions in both stages of loadings. The graph showing the gauge vs number of cycles is shown in Fig. 2.

3.2 The observed gauge and its mean value is placed at Annexure II.

3.3 On completion of Stage I loading, the assembly was taken out for visual examination of the GFN liners and it was observed that denting on the surface of the liners was very nominal and unmeasurable. The assembly was then put back under pulsator and subjected to Stage II loading.

3.4 On completion of Stage II loading, the assembly was taken out for final examination of the GFN liners and it was observed that denting remained very minor. There were no deformations of the liners as well. Photographs of both liners after Stage II loading are placed at Fig. 3, Fig. 4 and Fig. 5.

4.0 REMARKS :

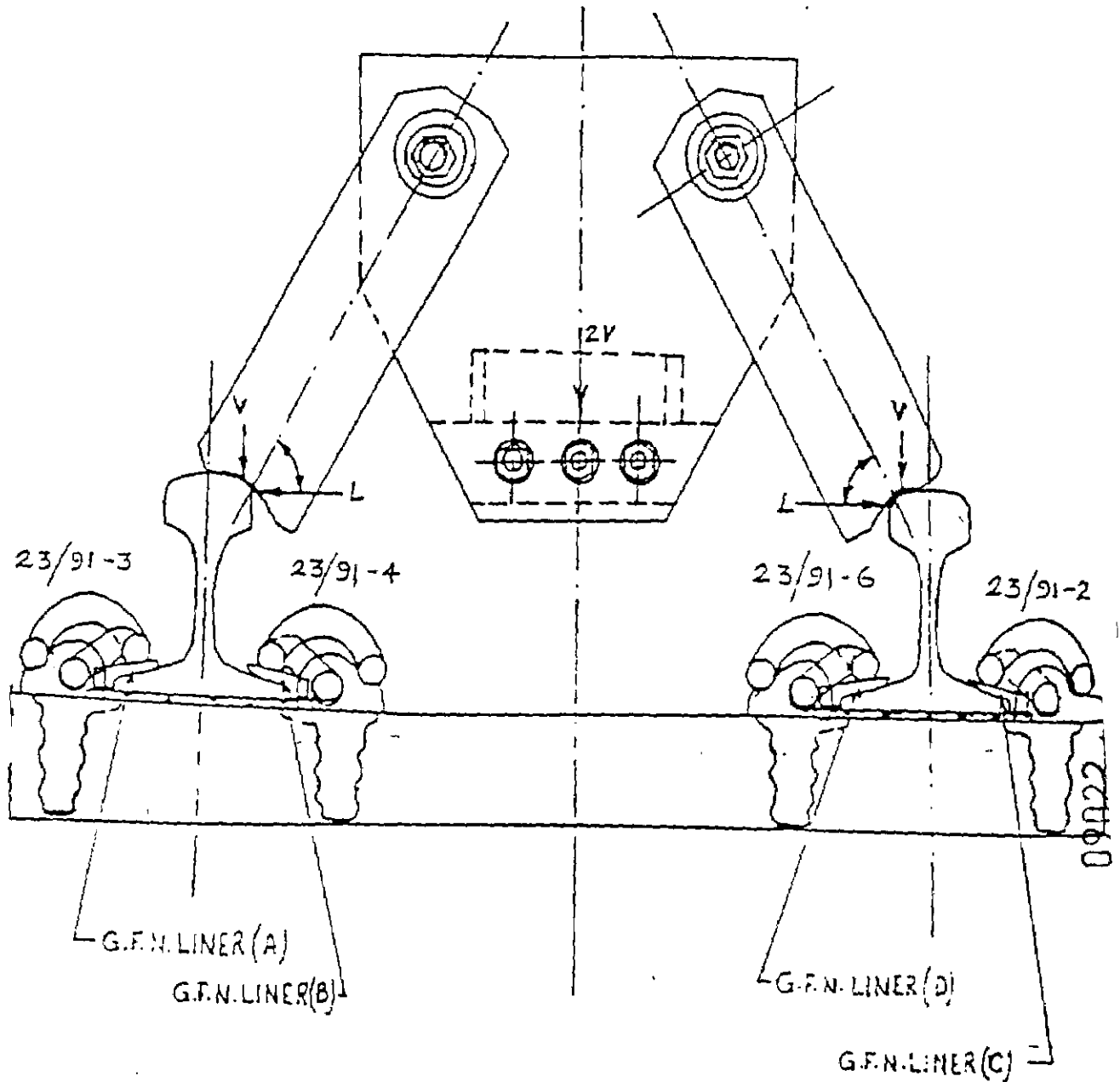
- (i) The GFN liners to drg. no. RDSO/T-3707 and RDSO/T-3708 withstood the stipulated loading cycles under the Pulsator.
- (ii) The loss of toe loads of the clips was found in range of 4.6% to 8.5% of the original toe load.
- (iii) Average value of the gauge in loaded condition for Stage-I loading after two million cycles is 494.95 mm. Under Stage-II loading the average value of the gauge after 0.5 million cycles is 502.13 mm. The nominal gauge of the assembly was 490 mm.

Therefore under Stage-II loading, gauge widening of 12.13 mm was observed. No substantial change in gauge widening was observed with increase in number of cycles.

FIGURE-1.

STAGE-I :- $\left. \begin{array}{l} \text{VERTICAL (V)} = 5.0t / 1.0t \\ \text{LATERAL (L)} = 2.0t / 0.4t \end{array} \right\} L/V = 0.4, 2 \times 10^6 \text{ CYCLES}$

STAGE-II :- $\left. \begin{array}{l} \text{VERTICAL (V)} = 5.0t / 1.0t \\ \text{LATERAL (L)} = 3.0t / 0.62t \end{array} \right\} L/V = 0.62, 0.5 \times 10^6 \text{ CYCLES}$

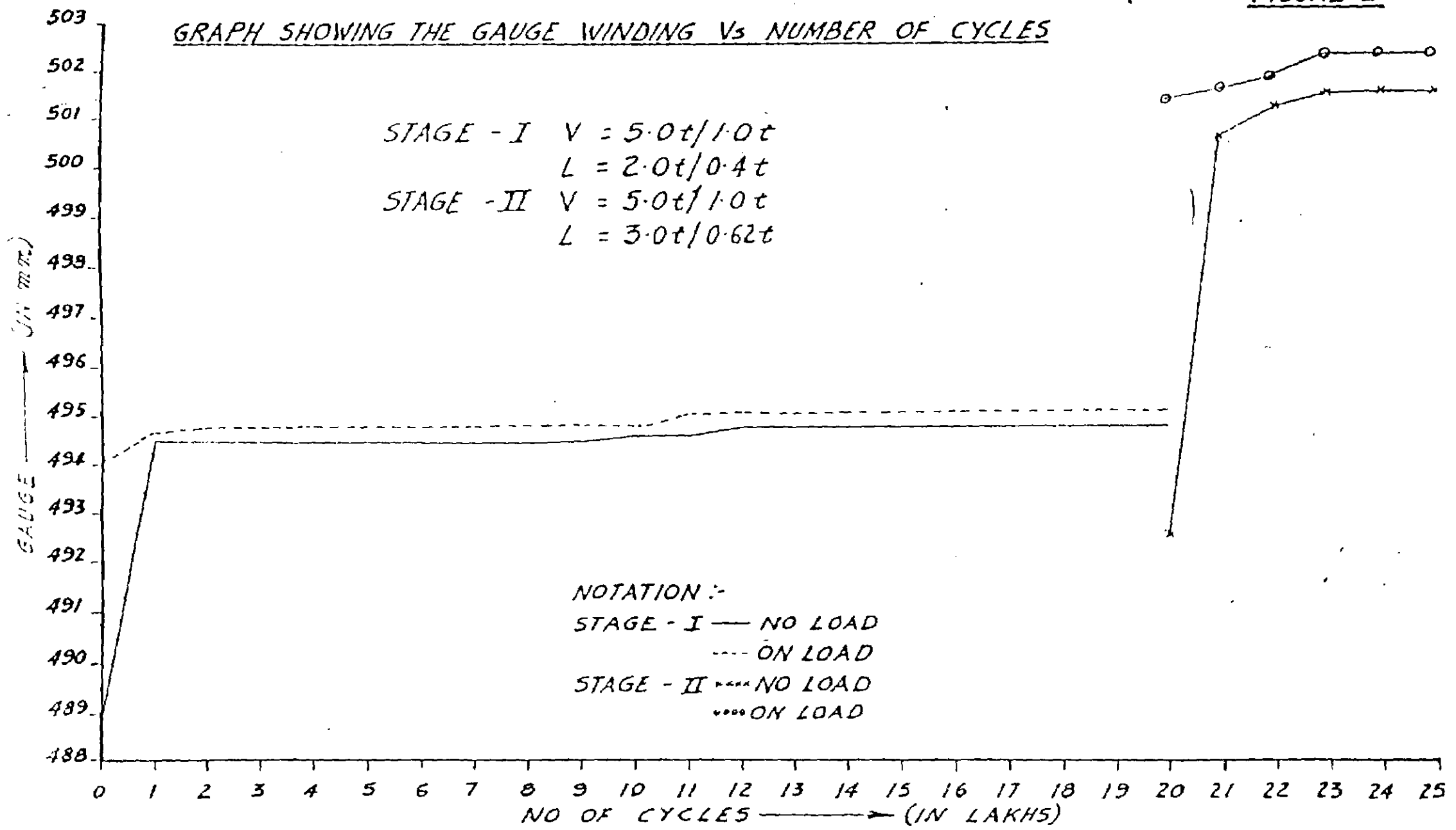


GENERAL ARRANGEMENT OF THE TEST

FIGURE-2

GRAPH SHOWING THE GAUGE WINDING VS NUMBER OF CYCLES

STAGE - I $V = 5.0t/1.0t$
 $L = 2.0t/0.4t$
STAGE - II $V = 5.0t/1.0t$
 $L = 3.0t/0.62t$



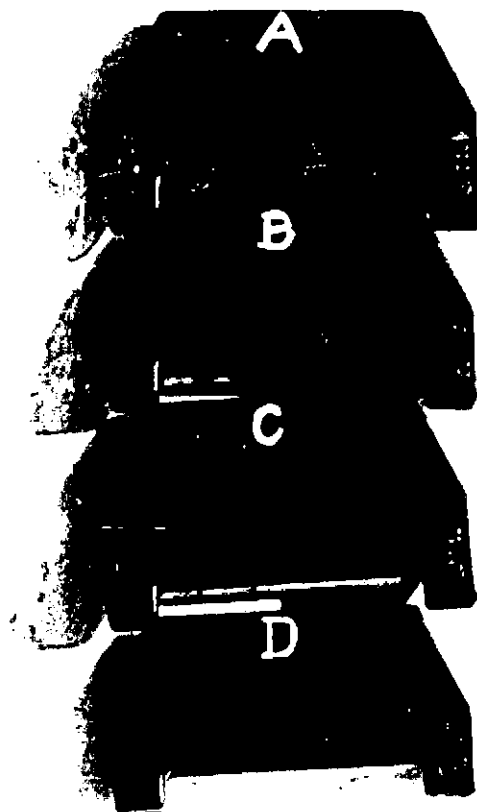


FIG. - 3

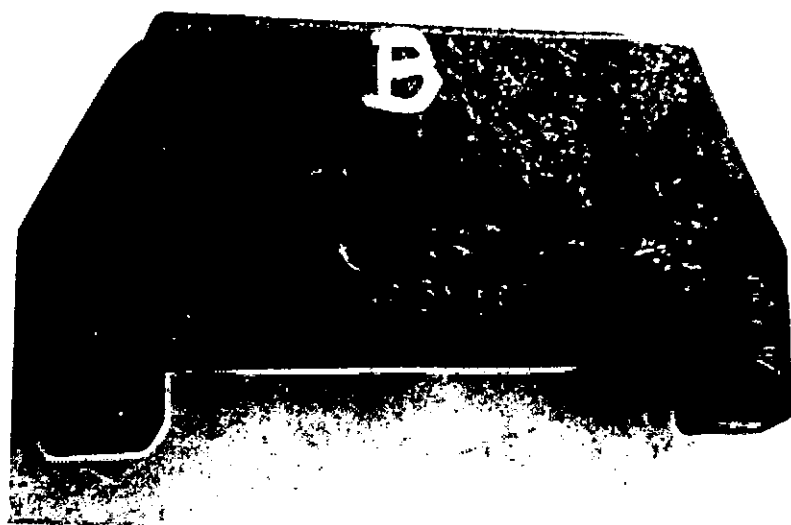


FIG.- 4

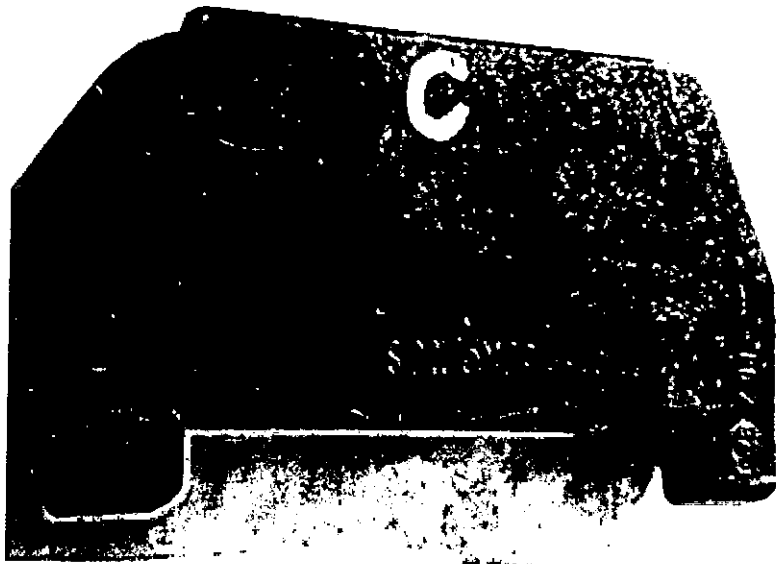


FIG. 5

ANNEXURE-I

Statement showing the Toe load of ERC Mk-II used for dynamic testing of combination GFN liners to drg. no. RDSO/T-3707 and RDSO/T-3708 using 75 R rails on 90 R M.G. concrete sleepers.

S.No.	Clip no.	TOE LOAD (Kg)		Loss of Toe Load (Kg)	Remarks
		Before Test	After test		
1	23/91-3	870	800	70 (8.0%)	Loss of toe load
2	23/91-4	875	820	55 (6.3%)	is not
3	23/91-6	840	800	40 (4.8%)	substan-
4	23/91-2	885	810	75 (8.5%)	tial.

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STAGE - I LOADING

Cycles : GAUGE (mm)

in Lakhs

NO LOAD

ON LOAD

	East Side	West Side	Average	East Side	West Side	Average
0	489.20	488.80	489.00	493.80	494.40	494.10
1	494.00	495.00	494.50	494.10	495.30	494.70
2	494.00	495.00	494.50	494.30	495.30	494.80
3	494.00	495.00	494.50	494.30	495.30	494.80
4	494.00	495.00	494.50	494.30	495.30	494.80
5	494.00	495.00	494.50	494.30	495.30	494.80
6	494.00	495.00	494.50	494.30	495.30	494.80
7	494.00	495.00	494.50	494.30	495.30	494.80
8	494.00	495.00	494.50	494.30	495.30	494.80
9	494.00	495.00	494.50	494.30	495.30	494.80
10	494.10	495.10	494.60	494.30	495.30	494.80
11	494.10	495.10	494.60	494.50	495.70	495.10
12	494.10	495.10	494.60	494.50	495.70	495.10
13	494.20	495.40	494.80	494.50	495.70	495.10
14	494.20	495.40	494.80	494.50	495.70	495.10
15	494.20	495.40	494.80	494.50	495.70	495.10
16	494.20	495.40	494.80	494.50	495.70	495.10
17	494.20	495.40	494.80	494.50	495.70	495.10
18	494.20	495.40	494.80	494.50	495.70	495.10
19	494.20	495.40	494.80	494.50	495.70	495.10
20	494.20	495.40	494.80	494.50	495.70	495.10
					Average	494.95

STAGE - II LOADING

Cycles in Lakh	G A U G E (mm)					
	NO LOAD			ON LOAD		
	East Side	West Side	Average	East Side	West Side	Average
0	492.50	492.50	492.50	501.60	501.10	501.35
1	501.10	500.10	500.60	501.80	501.40	501.60
2	501.80	500.50	501.20	502.00	501.60	501.80
3	502.00	501.00	501.50	502.80	501.80	502.30
4	502.00	501.00	501.50	502.80	501.80	502.30
5	502.00	501.00	501.50	502.80	501.80	502.30
					Average	502.13

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