KAWASAKI STEEL TECHNICAL REPORT
No.8 (September 1983)

Characteristics of Nonslip Steel Rail Plates for Monorail Guideways

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Synopsis :

Rails of monorail and guideway systems usin g rubber tires must maintain frictional resistance in wet conditions for safe driving. Especially this fact is particularly important when the rail has steel plates on its running surface and its longitudinal gradient is more than 3%. Therefore, a nonslip type steel plate rail for above-mentioned systems has been newly developed. This plate has hot rolled semicircular grooves which are placed in the transverse and longitudin al directions, and can have the effective frictional function when the rubber tires come into contact with these lattice-shaped shallow grooves and deform elastically in their running. This paper describes experimental studies on the relationships between the groove shape, the coefficient of

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Rails of monorail and guideway systems using rubber tires must maintain frictional resistance in wet conditions for safe driving. Especially this fact is particularly important

Table 1 List of monorail and guideway system projects in Japan

City	Line name(Section)	Type	Line length (Km)	Total cost (Million yen)	Management	Construction period

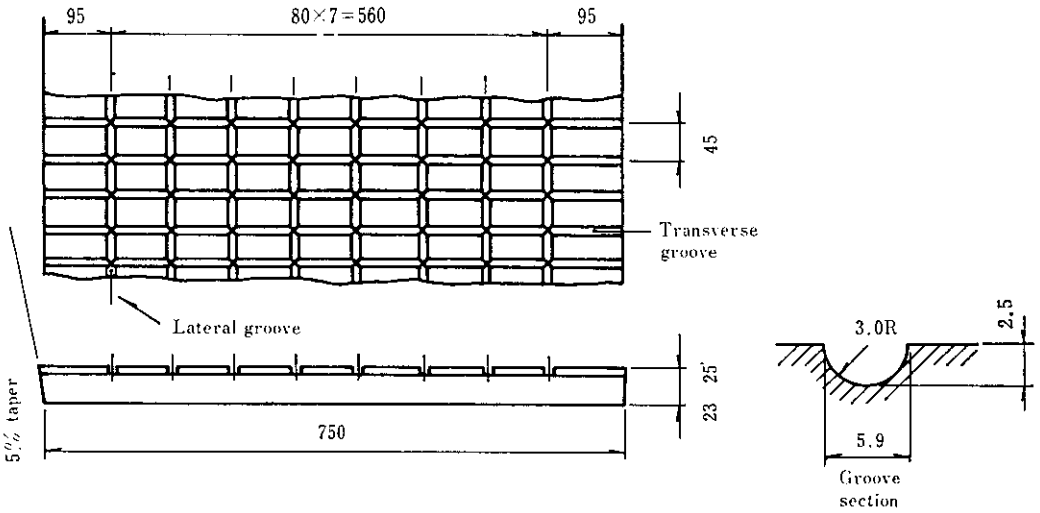

95
80×7=560
95
45
Transverse groove
Lateral groove
5% taper
25
23
750
3.0R
2.5
5.9
Groove section

Table 2 Chemical composition of test materials

(wt%)

Materials	C	Si	Mn	P	S	Nb	Al
A	0.15	0.20	0.90	0.014	0.005	—	0.029
B	0.16	0.34	1.30	0.015	0.07	0.032	0.030

Table 3 Mechanical properties

	σ_Y	σ_B	El	vE_0

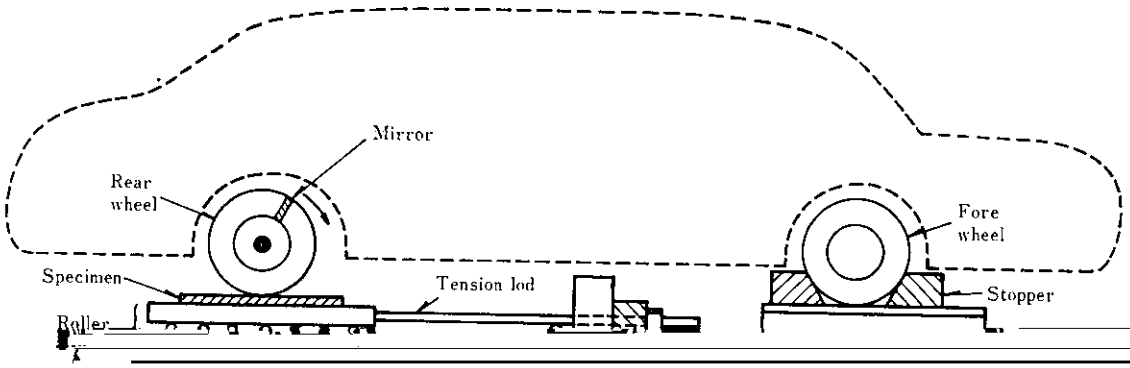


Fig. 4 Experimental equipment of friction resistance test in wet condition

Table 4 Types of specimens and experimental conditions

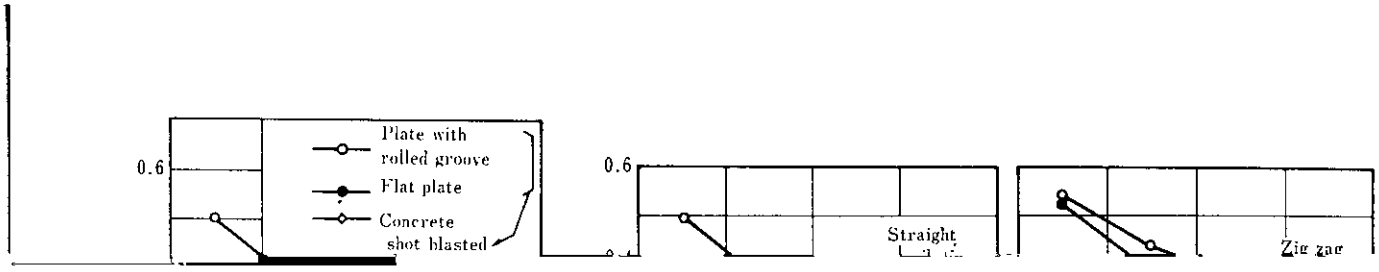
(a) Smooth (b) Straight rib (c) Zigzag rib (d) Normal type

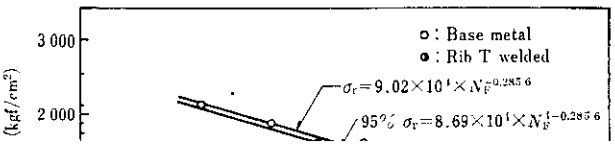
In view of the surface conditions of rolled plate, it is suggested that a particular part of rail plate is

As is evident from these curves, the grooved plates were most favorable with respect to friction in

ground down of rubber tires pass over apparently

every situation, and even in the extreme case of


0.6
Plate with rolled groove
Flat plate
Concrete shot blasted
0.6
Straight
Zig zag


3 000
2 000
(kgf/cm²)
○ : Base metal
● : Rib T welded
$\sigma_r = 9.02 \times 10^4 \times N_F^{-0.285\,6}$
95% $\sigma_r = 8.69 \times 10^4 \times N_F^{-0.285\,6}$

[redacted]