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Government of India-Ministry of Railways
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CHIEF ELECTRICAL ENGINEER,

- Central Railway, Mumbai CST-400 001
- Eastern Railway, Fairlie Place, Calcutta-700 001
- Northern Railway, Baroda House, New Delhi-110 001
- Southern Railway, Park Town, Chennai-600 003
- South-Eastern Railway, Garden Reach, Calcutta-43
- South-Central Railway, Rail Nilayam, Secund-rabad-71
- Western Railway, Churchgate, Mumbai-400 020
- Chittaranjan Locomotive Works, Chittaranjan-713 331
Director, IRIEEN, Post Box No.233, Nasik Road, Nasik – 422 101

Sub: Haulage Capacity of WAG5 Locomotive with Hitachi Traction Motor in Run through conditions on different gradients.

Single WAG5 locomotive is able to start and haul 4700 tonnes BOXN load on 1:360 gradient for gradients higher than 1:360 twin locomotives are required for starting and hauling 4700 tonne load.

Single WAG5 locomotive is able to start and haul 3300 tonne BOXN load on 1:200 gradient.

Railway are using single WAG5 locomotive for hauling 4700 tonnes load on gradient steeper than 1:360 in run through condition.

WAG5 Hitachi locos are presently provided with 18:64 gear ratio. In graded sections, use of 16:65 gear ratio gives improved performance in terms of reduced traction motor currents by 7% for the same load. It is therefore recommended that WAG5 locos deployed in gradients steeper than 1 in 360 should be provided with 16:65 gear ratio.

Computer simulation have been done on 1 in 200 and 1 in 150 gradient for 4700 tonnes load and 1 in 150 and 1 in 100 gradient for 3300 tonnes load which can be negotiated in Run Through conditions to arrive at the length of such stretches at various attacking speeds, computer simulation results are given in table I & II for 4700 tonnes BOXN load and table III & IV for 3300 tonnes BOXN loads.

Table-I

**Haulage Capacity on 1:200 compensated up gradient in
Run Through conditions for 4700 tonnes BOXN load**

Attacking Speed (KMPH)	Max. Length of 1:200 Section which can be negotiated (Km.)		Exit Speed (KMPH)	
	GR -18:64	GR - 16:65	GR -18:64	GR - 16:65
20	0.5	2.0	16	15
30	1.0	3.0	23	16
40	2.0	5.0	28	23
50	4.0	6.0	27	29
60	5.0	6.0	31	35
70	5.0	7.0	38	36

Table-II

**Haulage Capacity on 1:150 compensated up gradient in
run through conditions for 4700 tonnes BOXN Load**

Attacking Speed (KMPH)	Max. Length of 1:150 Section which can be negotiated (Km.)		Exit Speed (KMPH)	
	GR -18:64	GR - 16:65	GR -18:64	GR - 16:65
20	Not recommended	0.5	-	12
30	0.5	1.0	23	17
40	1.0	1.5	28	25
50	2.0	2.0	29	32
60	2.0	3.0	41	32
70	3.0	3.0	39	40

Table-III

Haulage Capacity on 1:150 compensated up gradient in run through conditions for 3300 tonnes BOXN Loads

Attacking Speed (KMPH)	Max. length of 1:200 section which can be negotiated (Km.)		Exit Speed (KMPH)	
	GR -18:64	GR - 16:65	GR -18:64	GR - 16:65
20	0.5	2.0	16	14
30	1.5	4.0	20	18
40	3.0	5.0	22	27
50	4.0	6.0	28	31
60	5.0	7.0	32	33
70	6.0	7.0	34	36

Table-IV

Haulage Capacity on 1:100 Compensated up gradient in run through conditions for 3300 tonnes BOXN Loads

Attacking Speed (KMPH)	Max. length of 1:150section which can be negotiated (Km.)		Exit Speed (KMPH)	
	GR -18:64	GR - 16:65	GR -18:64	GR - 16:65
Upto 20	Not recommended		-	-
30	0.8	0.75	6.5	16
40	0.85	1.0	25	26
50	1.0	1.5	36	30
60	2.0	2.0	31	34
70	2.0	3.0	43	30

2. Railways are requested to conduct field trials on the above guidelines in different sections.

It is mentioned here at are many places the gradient shown is different that actual, also in some cases only gradient is shown without compensation for curve allowance. It may be noted that above tables have considered compensated gradients. Through field trials Railways will be able to identify such areas.

Based on trials, you may issue guidelines to Drivers to enable them negotiate such stretches successfully without causing stalling and overloading of electrical equipments, RDSO may be kept apprised of the developments.

Ramesh Chandra

Encl: Nil

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