

Measurement of ride performance

Ride performance shall be measured using vertical and lateral accelerometers positioned on the vehicle body as near as possible to the leading rail wheels at the centre of the vehicle.

All measured accelerations shall be filtered at 10 Hz low pass.

Average acceleration shall be taken as the mean peak acceleration measured about the zero axis. The peak and mean peak acceleration shall be calculated from the 10 Hz low pass filtered acceleration.

Parameter	Limit	Test Speed
Maximum lateral acceleration	+/-0.5g	110% design
Average lateral acceleration	+/-0.35g	110% design
Maximum vertical acceleration	+/-0.8g	110% design
Average vertical acceleration	+/-0.5g	110% design
Lateral Ride Index	3.5	100% design
Vertical Ride Index	3.5	100% design

Table 12

Sustained hunting is not permitted and is defined as greater than 0.5 Hz sinusoidal lateral oscillations of the vehicle, resulting in lateral vehicle body accelerations measured at the leading rail wheel lateral axis centre of greater than 0.35g sustained for 10 seconds or longer.

Ride index shall be calculated in accordance with the algorithm specified below:

The ride index algorithm is implemented as follows: Acceleration data is weighted by the function:

$$R_i = 7.07 (V_i)^{0.1}$$

where the i-th value refers to the peak amplitude of a frequency component derived from an FFT analyser.

The function V_i is defined as follows:

Frequency Range (Hz)	V_i (Vertical)	V_i (Lateral)
0 – 6	$0.32 fa^3$	$4.32 a^3$
6 – 20	$400 a^3 / f^3$	$650 a^3 / f^3$
20+	a^3 / f	a^3 / f

Table 13

where f = frequency, (Hz), a = amplitude, g peak ($1 g = 9.81 m/s^2$)

The total ride index is calculated from the i values by:

$$RI_{total} = \left[\sum_{i=1}^{i=n} (R_i)^{10} \right]^{0.1}$$

Notes:

5. Frequency analysis will utilise FFT analysis of at least 400 lines with 0.25 Hz resolution. Data shall be averaged over 32 averages to minimise statistical error. 16 averages is acceptable for comparative evaluations only.

6. Analysis shall be restricted to the 0.5 to 50 Hz band.
7. Weighting filters implementing the above weightings are acceptable provided:
 - integration is performed over 10-15 second periods.
 - the Integrated values are recorded over at least 3 km of track and reported as a mean and sample variance.
8. Data for analysis shall come from samples at substantially constant speed (variance \pm 5 km/h).

Test procedure

The vehicle under test shall be operated up to 110% of the maximum desired operating speed, progressively, starting at the lower speed.

Once it has been established that it is safe to do so, the vehicle speed shall be maintained constant at 100% and 110% of the maximum desired operating speed for a minimum period of 60 seconds each.

All test results shall be displayed in real time to the testing staff, for the duration of testing.