

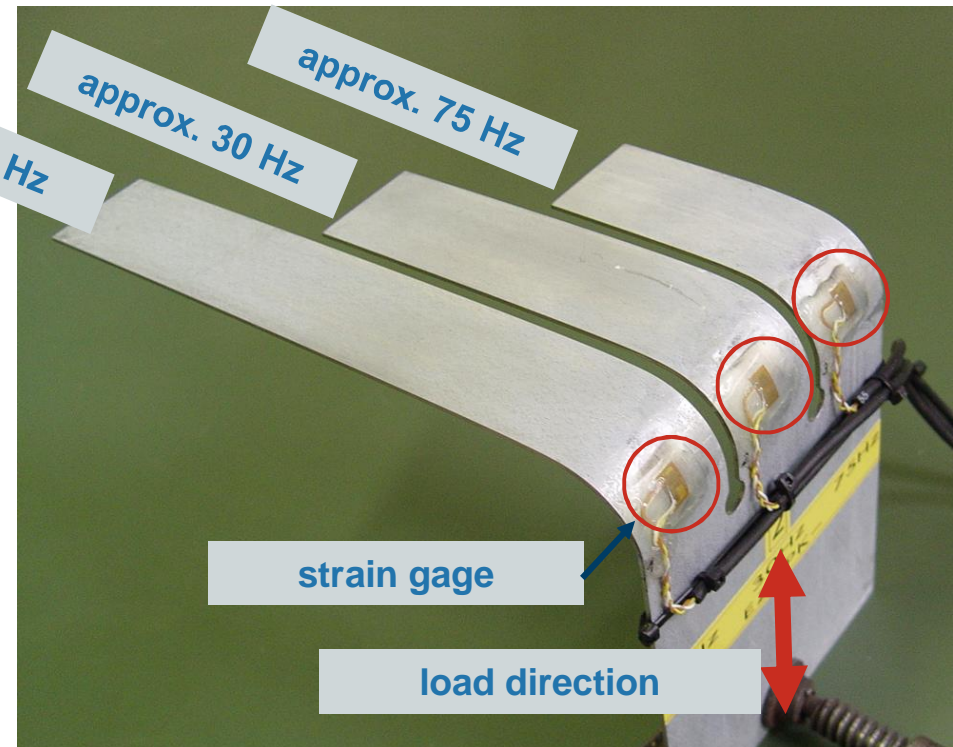
vibration-test for RESS

1. quantification the load of different vibration profiles with a test specimen
2. proposal for a test-profil

evaluated profiles for vibration test

- vibration signal of a car on proving ground (example)
- random vibration ISO12405 vertical
- 8g-Sweep UN38.3
- 2g-Sweep proposal

test specimen



sweep-signal

The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the RESS.

UN38.3 8g-sweep

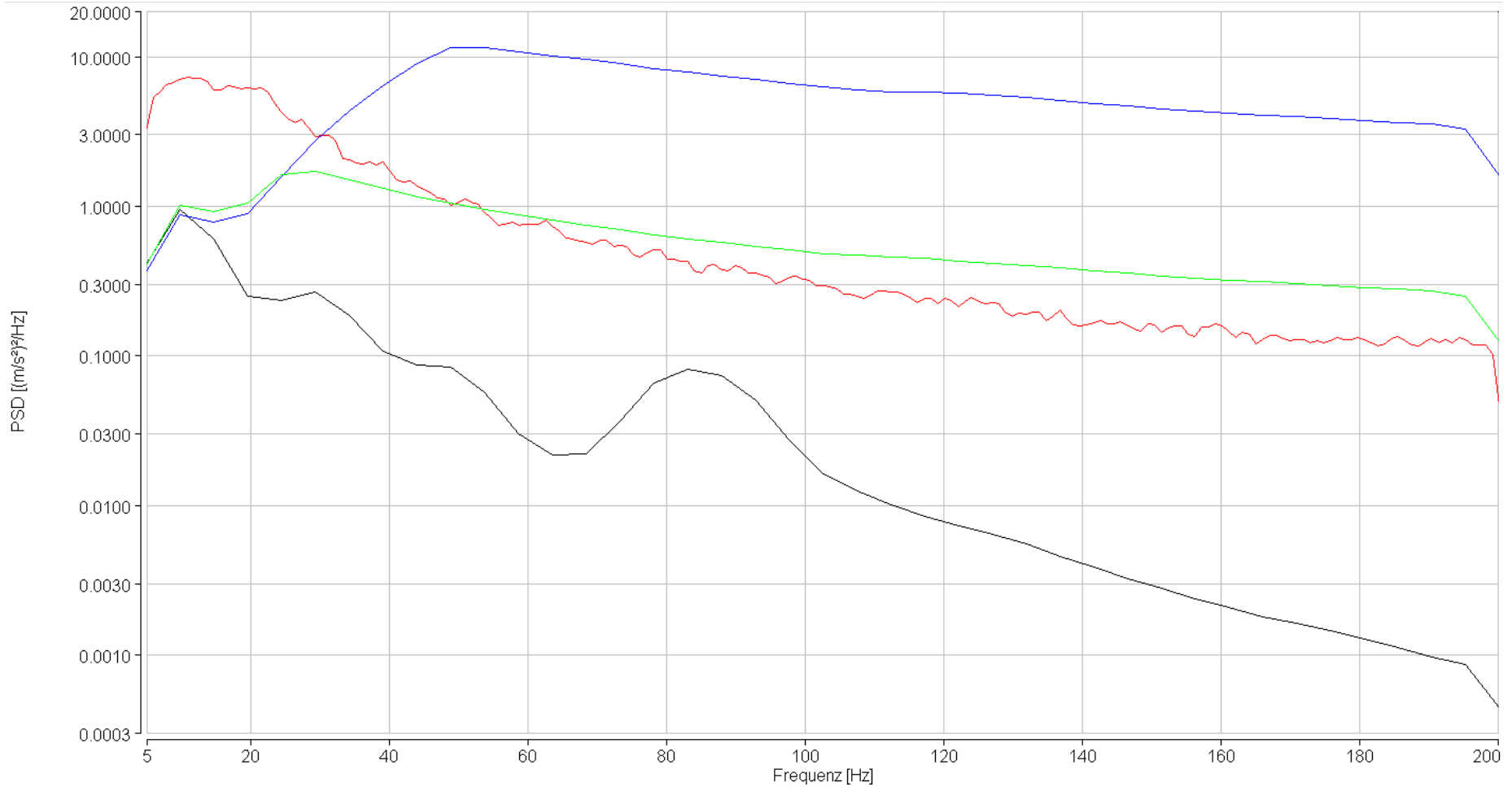
from 7 Hz to a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz.

Proposal 2g-sweep

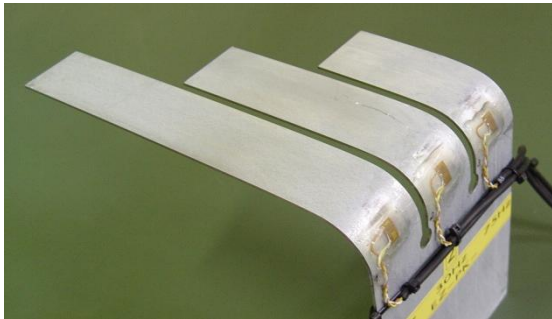
from 7 Hz to a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 gn occurs (approximately 25 Hz). A peak acceleration of 2 gn is then maintained until the frequency is increased to 200 Hz.

power spectral density (PSD) of test-profil

- vibrationsignal from proving-ground (example) — black line
- random vibration ISO12405 vertical — red line
- 8g-sweep UN38.3 — blue line
- 2g-sweep proposal — green line

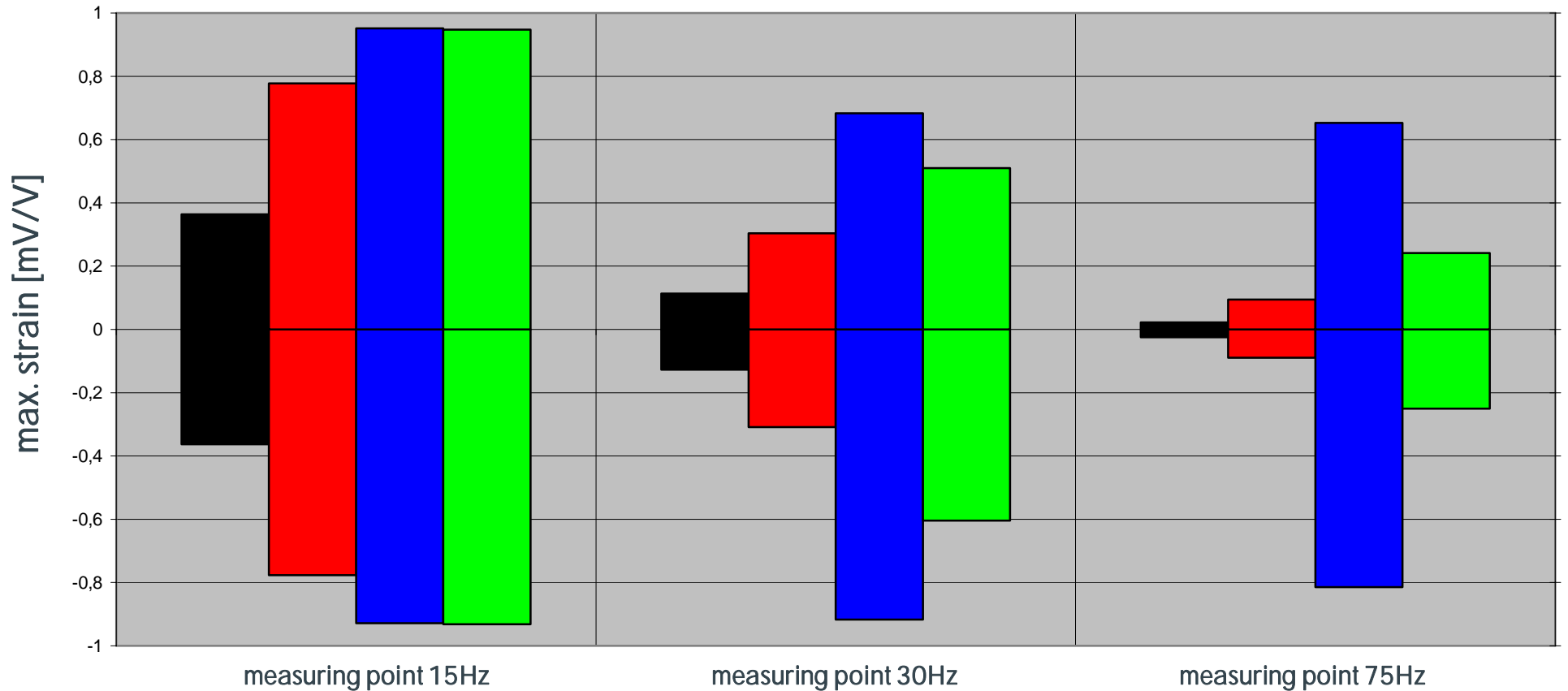


load of test specimen

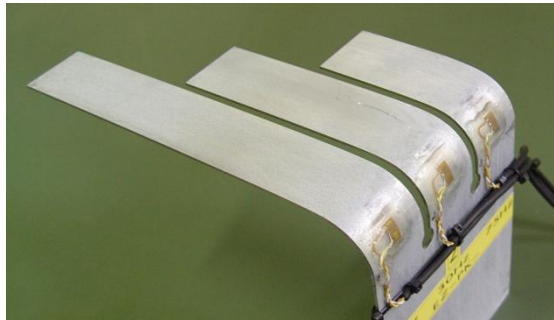


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max. strain on test specimen

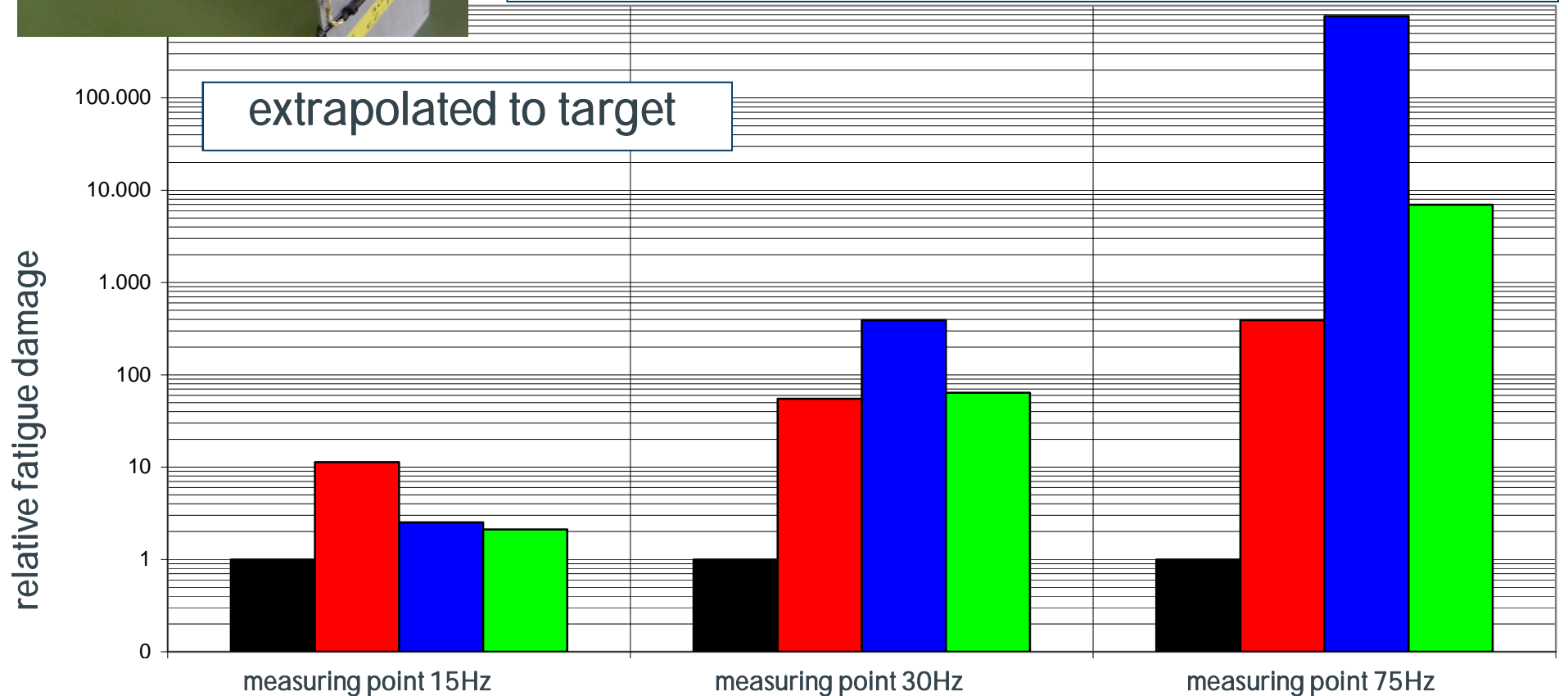


load of test specimen



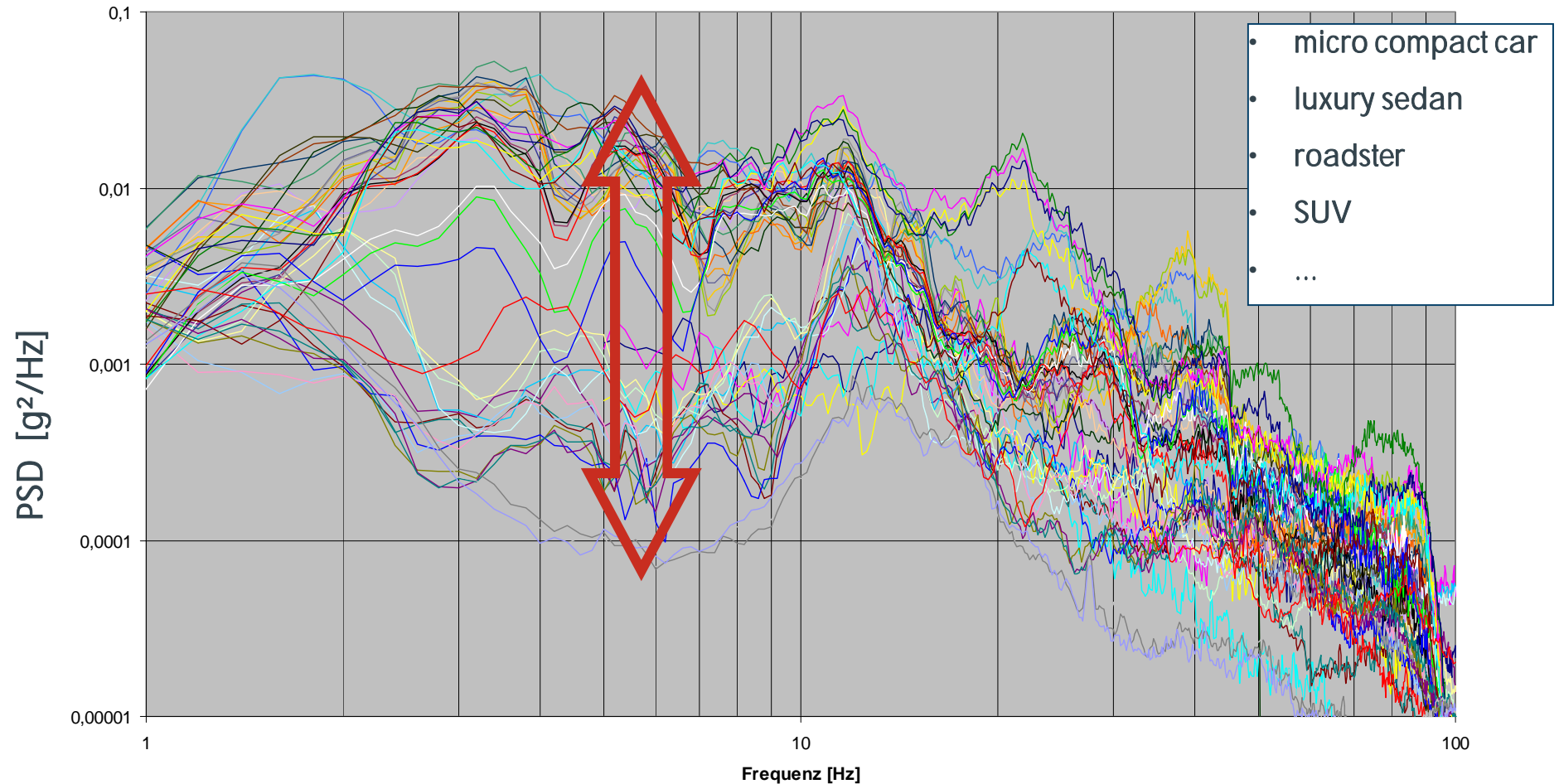
- vibrationsignal from proving-ground (example) —
- random vibration ISO12405 vertical —
- 8g-sweep UN38.3 —
- 2g-sweep proposal —

fatigue damage on test specimen,
relative to vibrationsignal from proving-ground

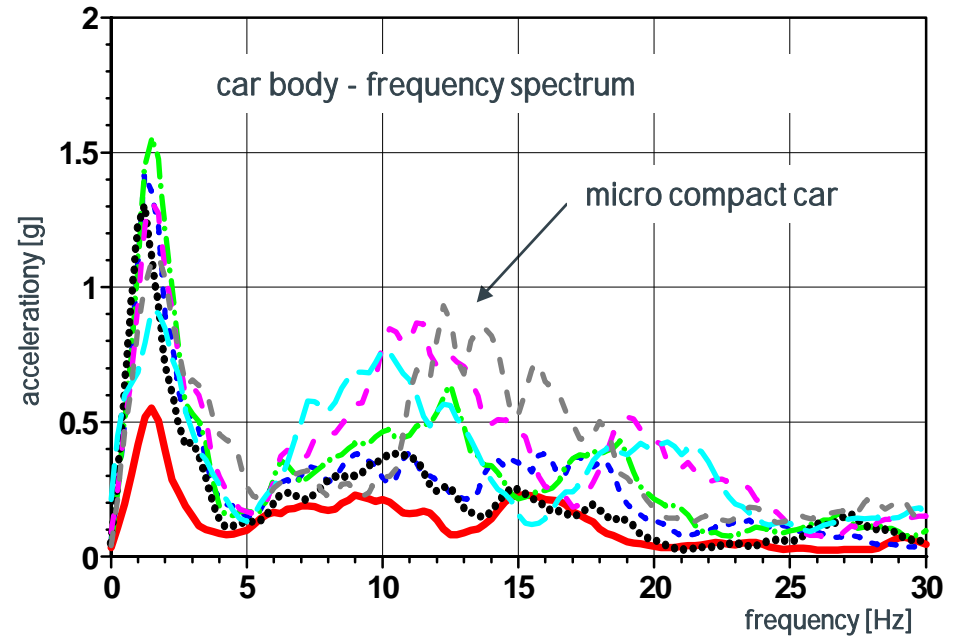
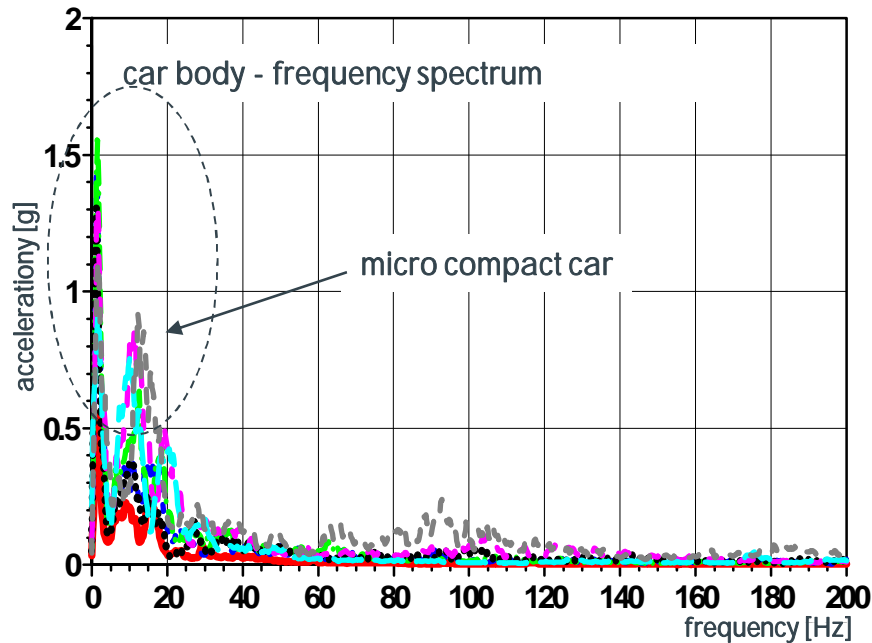


measured accelerations, power spectral density

range of measured accelerations (vertical)
on car body, approx. 50 different cars

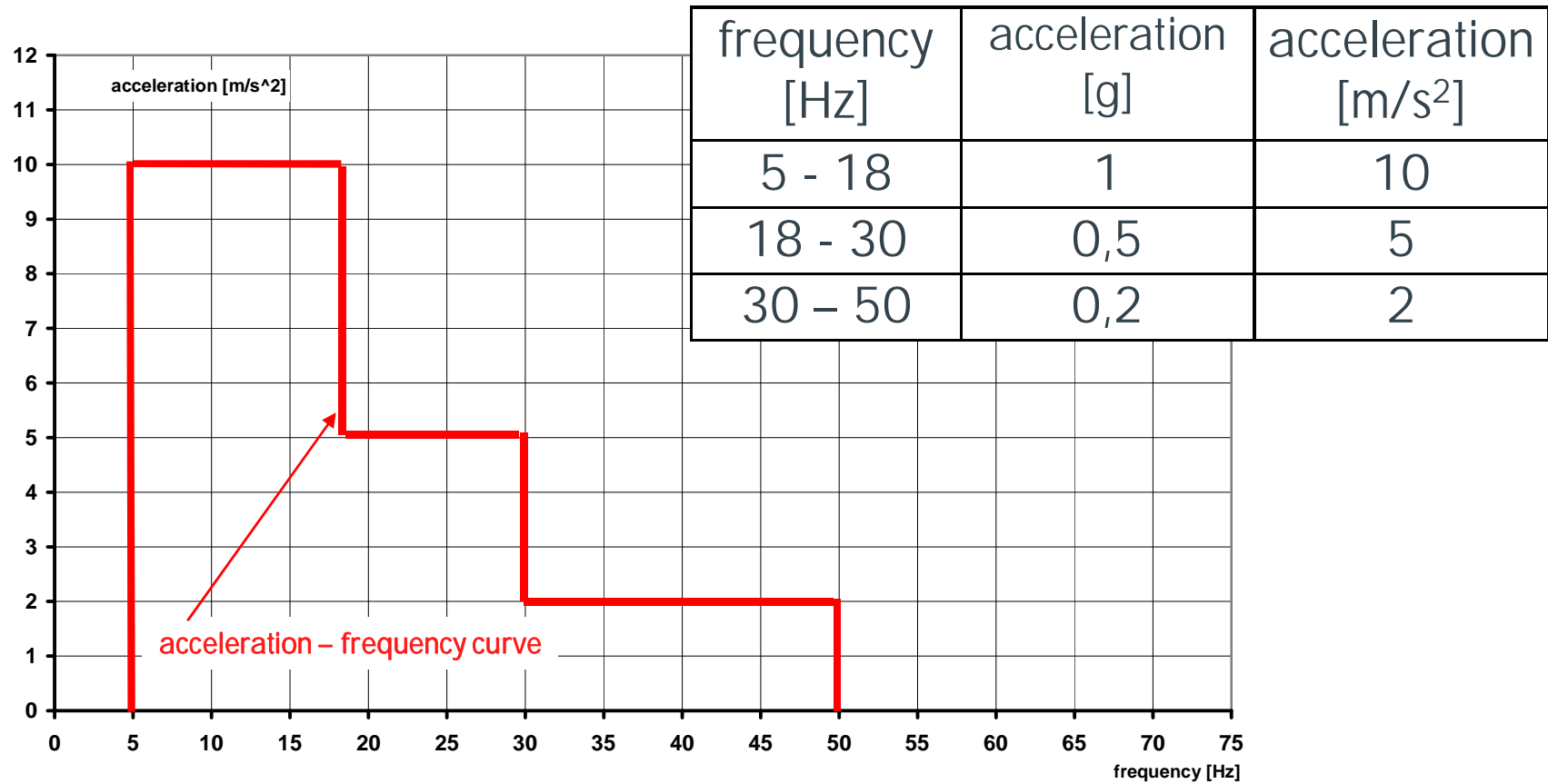


measured accelerations frequency spectrum FFT



- no significant response upwards 50 Hz
- highest peaks for micro compact car

RESS vibration test proposal



- maximum acceleration 10m/s^2 (1g), maximum frequency 50 Hz
- sinusoidal waveform with a logarithmic sweep

RESS vibration test proposal

At the request of the manufacturer, a higher acceleration level as well as a higher maximum frequency can be conducted. In the case of a higher maximum frequency, the lowest frequency can be greater than 5 Hz, but shall not exceed 10% of the highest frequency.

At the request of the manufacturer a test profile determined by the vehicle-manufacturer, verified to the vehicle application and agreed by the Technical Service can be used as a substitute of the frequency – acceleration correlation of the proposal.