

Casing Accelerometers

Accelerometers are widely accepted in the field for collecting casing vibration data. Casing Accelerometers maybe judged according to ISO 8579-2 standard (1993) for acceptance testing while ISO 10816 applies to equipment operating in the field.

The forcing frequencies generated in gearboxes can be considered as originating from two different levels of sources.

- 1) The high speed gear mesh frequency and harmonics.*
- 2) The lower frequency shaft rotational, bearing roller, and associated equipment; pumps, fans etc.*

The ISO 10816 standards can be used to apply to the sources in point 2 and also some gearing when the highest GMF is around 400 hz. This standard applies velocity limits to frequency bands ranging from 2-1,000 hz or 10-1,000 hz depending on the equipment.

Accelerometers collect acceleration data, and to convert to velocity data must be integrated. This process introduces a phase shift that suppresses higher frequency information and amplifies lower frequency information hence the frequency bands listed in the previous paragraph.

When the gear mesh frequencies and harmonics exceed the 1,000 hz level a different analysis approach must be considered. Because of the high frequency suppression its important to analyze the data as acceleration in units of G (gravitational acceleration). 2.5 times gear mesh frequency and above typically exhibit low energy even at higher G values so we typically only need to analyze those frequencies up to 3 times gear mesh frequency.

API 613-5 (Special Purpose Gear Units for Petroleum, Chemical and Gas Industry Services) recommends overall acceleration (G) amplitudes of < 4 g's at frequency bands between 2.5 kHz -10 kHz during acceptance testing. Considering that API only suggests overall amplitudes during acceptance testing but now also allowing for configuration variations and differences in the field, we, based on operational experiences recommend the following general settings for units operating in the field:

Indication from the acceleration probe "PEAK" values:

$$A_{(max)} < 8 \text{ g}$$

$$A_{(Alarm)} = 14 \text{ g}$$

$$A_{(shutdown)} = 20 \text{ g}$$

Example:

- If the tooth mesh frequency is: 5440 Hz, then @ 2 times = 10,880 Hz*
- We would like to be able to obtain and see those values which are < 2.5 times tooth mesh frequency up to approx. 14 KHz*

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