The acceleration, in metres per second squared, due to local gravity with the accelerometer mounted at the angle θ is:

$$a_\theta = g_l \cdot \cos\theta \quad (1)$$

where

θ is the accelerometer mounting angle, in degrees;

g_l is the magnitude for the acceleration due to local gravity, in metres per second squared.

4.4 Accelerometer output measuring instrumentation

A voltage measuring instrument, measuring the output from the accelerometer, having the following characteristics shall be used:

a) Frequency: 0 Hz (DC voltage);

b) Maximum uncertainty: 0,05 % of reading.

4.5 Earth's gravitation

The positive and negative magnitudes for the acceleration due to local gravity, expressed in metres per second squared (m/s^2), shall be used.

The value of the local magnitude of acceleration due to gravity, g_l, can be determined by measurement with absolute or relative gravimeters[17] or by use of geodetic formulae[16] or survey.

$$g_l(\phi,H) = 9{,}780\,318\,4\,(1 + 0{,}005\,302\,4\sin^2\phi - 0{,}000\,005\,9\sin^2 2\phi) - 0{,}000\,003\,086\,H \quad (2)$$

where

g_l is the magnitude for the acceleration due to gravitation at the given latitude and elevation, in metres per second squared;

ϕ is the given latitude, in radians;

H is the given altitude, in metres above sea level.

Using Formula (2), g_l can be determined with an expanded uncertainty of 0,02 % ($k = 2$).

If the magnitude for the acceleration due to local gravity is not known, then the standard acceleration due to gravity, g_n, shall be used[10]:

$$g_n = 9{,}806\,65\ m/s^2 \quad (3)$$

5 Method

5.1 General

As the acceleration due to gravitation varies with location and altitude (typical values of acceleration due to local gravity at the locations of metrology institutes are within the range of 9,78 m/s^2 to 9,83 m/s^2), the local value with four significant digits shall be used.