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Methods for the calibration of vibration and shock transducers —

Part 31: Testing of transverse vibration sensitivity

AMENDMENT 1

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Partie 31: Essai de sensibilité aux vibrations transversales

AMENDEMENT 1

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7.3

Add the following subclause at the end of Clause 7:

"**7.3 Determination of the transverse sensitivity using elliptical orbits**

Annex B shall be used for testing of transverse sensitivity using elliptical orbits."

Annex B

Add the following annex after Annex A, before the Bibliography.

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Annex B
(normative)

Testing of transverse sensitivity using elliptical orbits

This annex gives a brief insight into a method that can be used to test the transverse sensitivity of vibration and shock transducers in the bi-axial transverse directions by actuating the test set up exciters in the X- and Y- directions at any phase and amplitude as described in Formulae (B.1) and (B.2). A full description of a method that can be used is included in Reference [13].

$$a_{\mathrm{X}}\left(t\right) = \hat{a}_{\mathrm{X}} \cos\left(2\pi ft + \phi_{\mathrm{X}}\right) \tag{B.1}$$

$$a_{\mathrm{Y}}\left(t\right) = \hat{a}_{\mathrm{Y}} \cos\left(2\pi ft + \phi_{\mathrm{Y}}\right) \tag{B.2}$$

where

$a_{\mathrm{X}}\left(t\right)$ is the time-varying value of the X-axis acceleration;

$\hat{a}_{\mathrm{X}}$ is the amplitude of the acceleration component along the X-axis;

ϕ_{X} is the initial phase of the acceleration component along the X-axis;

$a_{\mathrm{Y}}\left(t\right)$ is the time-varying value of the Y-axis acceleration;

$\hat{a}_{\mathrm{Y}}$ is the amplitude of the acceleration component along the Y-axis;

ϕ_{Y} is the initial phase of the acceleration component along the Y-axis;

f is the frequency of oscillation; and

t is the time.

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In general case, Formulae (B.1) and (B.2) describe an elliptical orbit motion in the X-Y plane and in those cases the transducer under test output is given by Formula (B.3).

$$V_{\mathrm{T}}\left(t\right) = S_{\mathrm{X}}\hat{a}_{\mathrm{X}}\cos\left(2\pi ft + \phi_{\mathrm{X}}\right) + S_{\mathrm{Y}}\hat{a}_{\mathrm{Y}}\cos\left(2\pi ft + \phi_{\mathrm{Y}}\right) \tag{B.3}$$

where

S_{X} is the transverse sensitivity in the X-direction;

S_{Y} is the transverse sensitivity in the Y-direction.

In addition, the expressions that describe the relationships between the magnitude $\hat{V}_{\mathrm{T}}$ and the initial phase ϕ of the output $V_{\mathrm{T}}\left(t\right)$ and the amplitudes and initial phases of the X- and Y-axis accelerations are given by Formulae (B.4) and (B.5).

$$\hat{V}_{\mathrm{T}}^{2}\left(t\right) = \left(S_{\mathrm{X}}\hat{a}_{\mathrm{X}}\cos\phi_{\mathrm{X}} + S_{\mathrm{Y}}\hat{a}_{\mathrm{Y}}\cos\phi_{\mathrm{Y}}\right)^{2} + \left(S_{\mathrm{X}}\hat{a}_{\mathrm{X}}\sin\phi_{\mathrm{X}} + S_{\mathrm{Y}}\hat{a}_{\mathrm{Y}}\sin\phi_{\mathrm{Y}}\right)^{2} \tag{B.4}$$

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