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GB/T 2423.56-2018 / IEC 60068-2-64:2008

Replacing GB/T 2423.56-2006

Environmental Testing - Part 2: Test Methods - Test Fh: Vibration, Broadband, Random and Guidance

环境试验 第 2 部分：试验方法 试验 Fh：宽带随机振动和导则

(IEC 60068-2-64:2008, Environmental Testing – Part 2-64: Tests - Test Fh: Vibration, Broadband Random and Guidance, IDT)

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Foreword

GB/T 2423 *Environmental Testing – Part 2* can be divided into several parts according to the test methods.

This Part is Part 56 of GB/T 2423.

This Part was drafted as per the rules specified in GB/T 1.1-2009.

This Part replaced GB/T 2423.56-2006 *Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test Fh: Vibration, Broad-Band Random (Digital Control) and Guidance*. Compared with GB/T 2423.56-2006, this Part has the major technical changes as follows besides the editorial modifications:

--- Delete the symbol of bandwidth "B_r" (see 3.1 of 2006 Edition);

--- Add the definitions and terms of "cross-axis motion", "actual motion", "fixing point", "control methods", "single point control", "measuring points", "sampling frequency", "multipoint control strategies", "crest factor", and "test frequency range" (see 3.1, 3.2, 3.3, 3.4, 3.4.1, 3.6, 3.12, 3.13, 3.16, 3.37 of this Edition);

--- Modify the definitions of terms "multipoint average control" and "multipoint control" (see 3.4.2 of this Edition; and 3.20 of 2006 Edition);

--- Add the symbol of acceleration spectral density "ASD" (see 3.18 of this Edition);

--- Add "fictitious reference point" to the definition of term "control acceleration spectral density" (see 3.19 of this Edition; 3.5 of 2006 Edition);

--- Modify the definitions of terms "drive signal clipping", "effective frequency range", "indicated acceleration spectral density", "root-mean-square value", and "standard deviation" (see 3.21, 3.22, 3.27, 3.33, 3.34 of this Edition; 3.10, 3.11, 3.17, 3.28, 3.29 of 2006 Edition);

--- Add the symbol of frequency resolution "B_e" (see 3.26 of this Edition);

--- Add the symbol of statistical degree of freedom "DOF" (see 3.36 of this Edition; and 3.31 of 2006 Edition);

--- Modify the "random wave" into "random symbol" in the definition of term "true acceleration spectral density" (see 3.38 of this Edition; 3.33 of 2006 Edition);

--- Delete the definitions of terms "deviation", "damping ratio", "distortion factor", "frequency scanning cycle", and "window function" (see 3.3, 3.8, 3.9, 3.32, 3.34 of 2006 Edition);

--- Modify the relevant contents of “general requirements” (see 4.1 of this Edition; 4.1 of 2006 Edition);

--- Modify the relevant contents of “basic motion”; and add the NOTE (see 4.2 of this Edition; and 4.3.1 of 2006 Edition);

--- Add “measurement system” (see 4.5 of this Edition);

--- Add “control” (see 4.7 of this Edition);

--- Modify the relevant contents of “vibration response investigation” (see 4.8 of this Edition; and 4.2 of 2006 Edition);

--- Add the provision “test sample shall be installed according to the requirements of IEC 60068-2-47. In all cases, when selection a curve in IEC 60068-2-47, it is necessary to first square and then multiple it by the acceleration spectral density (ASD) or directly multiple it by the sine amplitude” (see 4.4 of this Edition; 4.4 of 2006 Edition);

--- Add the provision “the probability density function for calculating the reference point at the beginning, middle and end of the test shall last 2min each. The relevant regulations shall specify the tolerance of the normal distribution” and “Figure 2” (see 4.6.2 of this Edition; 4.3.3 of 2006 Edition);

--- Add the title “ASD and r.m.s values” (see 4.6.1 of this Edition; 4.3.4 of 2006 Edition);

--- Add the provision “if the relevant regulations stipulate that the confidence level shall be met in the test, the accuracy of the statistical result shall be calculated by Figure 3” (see 4.6.3 of this Edition, 4.3.5 of 2006 Edition);

--- Modify the selection method, formula and relevant contents of frequency resolution B_e (see 4.6.4 of this Edition; 4.3.6 of 2006 Edition);

--- Modify “acceleration spectral density” into “root mean square value of acceleration” (see 5.2 of this Edition; 5.3 of 2006 Edition);

--- Modify “initial inspection” into “initial inspection and functional inspection” (see Clause 7 of this Edition; Clause 7 of 2006 Edition);

--- Modify “vibration response” into “initial vibration response” and the relevant contents (see 8.2 of this Edition, 8.2 of 2006 Edition);

--- Modify “random vibration test” into “random test” and the relevant contents (see 8.4 of this Edition; 8.4 of 2006 Edition);

--- Modify “test duration” (see 5.4 of this Edition; 5.5 of 2006 Edition);

--- Modify “intermediate measurement” into “intermediate measurement and functional test” (see 8.4.2 of this Edition; 8.5 of 2006 Edition);

--- Modify “final measurement” into “final measurement and functional performance test” and the relevant contents (see Clause 10 of this Edition; Clause 10 of 2006 Edition);

--- Add “information to be given in the test report” (see Clause 12 of this Edition);

--- Delete the normative appendix “Vibration Response Inspection” (see Annex A of 2006 Edition);

--- Add the informative annex “Standard Test Spectra” (see Annex A of this Edition).

This Part adopts translation method to equivalently use IEC 60068-2-64:2008 *Environmental Testing – Part 2-64: Tests – Test Fh: Vibration, Broadband Random and Guidance*.

The Chinese documents that have a consistent correspondence with the internal documents referenced normatively in this Part are as follows:

--- GB/T 2298-2010 Mechanical Vibration, Shock and Condition Monitoring – Vocabulary (ISO 2041:2009, IDT);

--- GB/T 2421.1-2008 Environmental Testing for Electric and Electronic Products – General and Guidance (IEC 60068-1:1988, IDT);

--- GB/T 2422-2012 Environmental Testing - Guide to Drafting of Test Methods - Terms and Definitions (IEC 60068-5-2:1990, IDT)

--- GB/T 2423.10-2008 Environmental Testing for Electric and Electronic Products - Part 2: Tests Methods - Test Fc: Vibration (Sinusoidal) (IEC 600068-2-6:1995, IDT);

--- GB/T 16499-2017 Guide for the Preparation of Electrical and Electronic Safety Publications and the Use of Basic Safety Publications and Group Safety Publications (IEC Guide 104:2010, NEQ)

This Part made the following editorial modifications:

--- Modify the standard name.

This Part was proposed by and under the jurisdiction of National Technical Committee for Standardization of Environmental Conditions of Electric and Electric Products and Environmental Test (SAC/TC 8).

Drafting organizations of this Part: Guangzhou University; the fifth electronic research

Environmental Testing - Part 2: Test Methods - Test Fh: Vibration, Broadband, Random and Guidance

1 Scope

This Part of GB/T 2423 demonstrates the adequacy of specimens to resist dynamic loads without unacceptable degradation of its functional and/or structural integrity when subjected to the specified random vibration test requirements.

Broadband random vibration may be used to identify accumulated stress effects and the resulting mechanical weakness and degradation in the specified performance. This information, in conjunction with the relevant specification, may be used to assess the acceptability of specimens.

This Part is applicable to specimens which may be subjected to vibration of a stochastic nature resulting from transportation or operational environments, for example in aircraft, space vehicles and land vehicles. It is primarily intended for unpackaged specimens, and for items in their transportation container when the latter may be considered as part of the specimen itself. However, if the item is packaged, then the item itself is referred to as a product and the item and its packaging together are referred to as a test specimen. This standard may be used in conjunction with GB/T 2423.43-2008, for testing packaged products.

If the specimens are subjected to vibration of a combination of random and deterministic nature resulting from transportation or real-life environments, for example in aircraft, space vehicles and for items in their transportation container, testing with pure random may not be sufficient. See GB/T 2424.26-2008 for estimating the dynamic vibration environment of the specimen and based on that, selecting the appropriate test method.

Although primarily intended for electrotechnical specimens, this standard is not restricted to them and may be used in other fields where desired (see Annex A).

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 2423.43-2008 Environmental Testing for Electric and Electronic Products -

Part 2: Test Methods - Mounting of Specimens for Vibration Impact and Similar Dynamic Tests (IEC 60068-2-47;2005, IDT)

GB/T 2424.26-2008 Environmental Testing – Part 3: Supporting Documentation and Guidance - Selecting Amongst Vibration Tests (IEC 60068-3-8:2003, IDT)

IEC 60050-300 International Electrotechnical Vocabulary – Electrical and Electronic Measurements and Measuring Instruments – Part 311: General Terms Relating to Measurements – Part 312: General Terms Relating to Electrical Measurements – Part 313: Types of Electrical Measuring Instruments – Part 314: Specific Terms according to the Type of Instrument

IEC 60068-1 Environmental Testing – Part 1: General and Guidance

IEC 60068-2-6 Environmental Testing – Part 2-6: Tests – Test Fc: Vibration (Sinusoidal)

IEC 60068-5-2 Environmental Testing – Part 5-2: Guide to Drafting of Test Methods – Terms and Definitions

IEC 60721-3 (all parts) Classification of Environmental Conditions – Part 3: Classification of Groups of Environmental Parameters and Their Severities

IEC Guide 104 The Preparation of Safety Publications and the Use of Basic Safety Publications and Group Safety Publications

ISO 2041 Vibration and Shock – Vocabulary

3 Terms and Definitions

For the purpose of this document, the following terms and definitions apply.

NOTE: The terms used are generally defined in IEC 60050-300, IEC 60068-1, IEC 60068-2-6, and IEC 60068-5-2 and ISO 2041. If a definition from one of those sources is included here, the derivation is indicated and departures from the definitions in those sources are also indicated.

3.1 Cross-axis motion

Motion not in the direction of the stimulus; generally specified in the two axes orthogonal to the direction of the stimulus.

NOTE: The cross-axis motion should be measured close to the fixing points.

3.2 Actual motion

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