SLOVENSKI STANDARD
oSIST prEN ISO 20486:2016

01-oktober-2016

Neporušitveno preskušanje - Preskušanje tesnosti - Umerjanje referenčne tesnosti za plin (ISO/DIS 20486:2016)

Non-destructive testing - Leak testing - Calibration of reference leaks for gases (ISO/DIS 20486:2016)

Zerstörungsfreie Prüfung - Dichtheitsprüfung - Kalibrieren von Referenzlecks für Gase (ISO/DIS 20486:2016)

Essais non destructifs - Contrôle d'étanchéité - Étalonnage des fuites de référence des gaz (ISO/DIS 20486:2016)

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Ta slovenski standard je istoveten z: **prEN ISO 20486**

ICS:

19.100	Neporušitveno preskušanje	Non-destructive testing

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DRAFT INTERNATIONAL STANDARD

ISO/DIS 20486

ISO/TC **135**/SC **6** Secretariat: **JISC**

Voting begins on: **2016-08-30**

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Non-destructive testing — Leak testing — Calibration of reference leaks for gases

Essais non destructifs — Contrôle d'étanchéité — Étalonnage des fuites de référence des gaz

ICS: 19.100

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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The committee responsible for this document is ISO/TC 138 "Non-destructive testing", the secretariat of which is held by JISC.

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Non destructive testing — Leak Test — Calibration of reference leaks for gases

1 Scope

This draft European Standard specifies the calibration of those leaks that are used for the adjustment of leak detectors for the determination of leakage rate in everyday use. One type of calibration method is a comparison with a standard leak. In this way the leaks used for routine use become traceable to a primary standard as the ISO 9000 series of standards require. At other calibration methods the Q_{pV} was measured directly or the Q_{pV} was calculated over a known volume.

The comparison procedures are preferably applicable to helium leaks, because this test gas can be selectively measured by a mass spectrometer leak detector (MSLD) (the definition of MLSD is given in ISO/DIS 20484).

Calibration by comparison (see methods A, A_s B and B_s below) with known standard leaks is easily possible for leaks with reservoir and leakage rates below 10^{-7} Pa·m^3/s.

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Figure 1 gives an overview in which ranges the different calibration methods are recommended.

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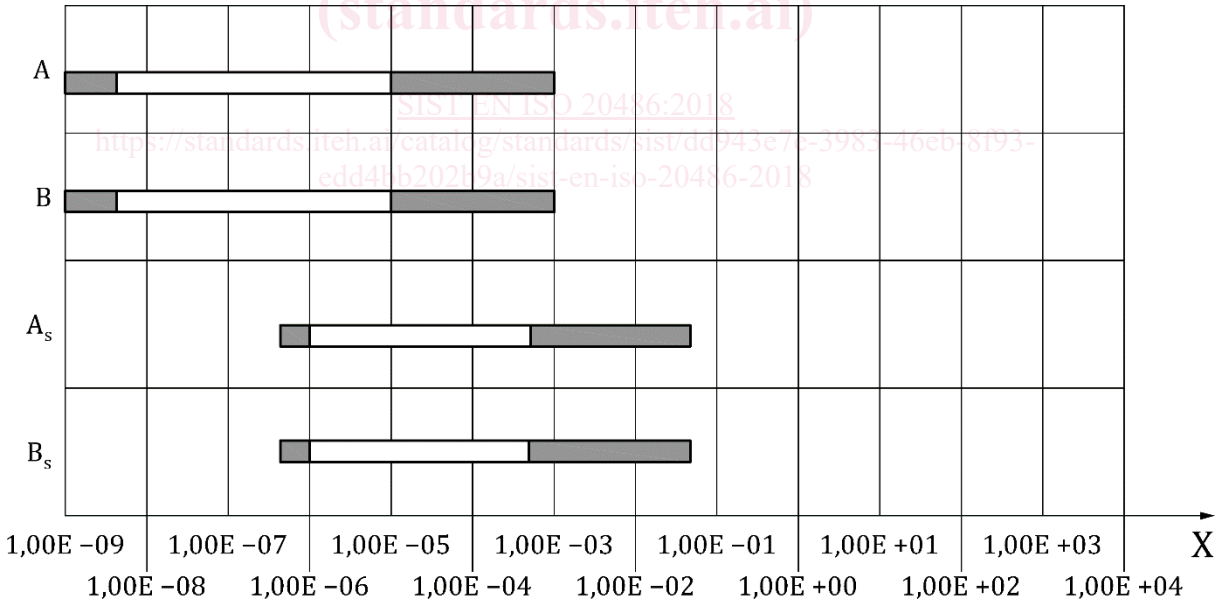

Key

X – leakage rate in Pa·m³/s
A – Method A
B – Method B
A_s – Method A_s
B_s – Method B_s
□ – normal range
■ – possible range

Figure 1a — Calibration range at calibration by comparison

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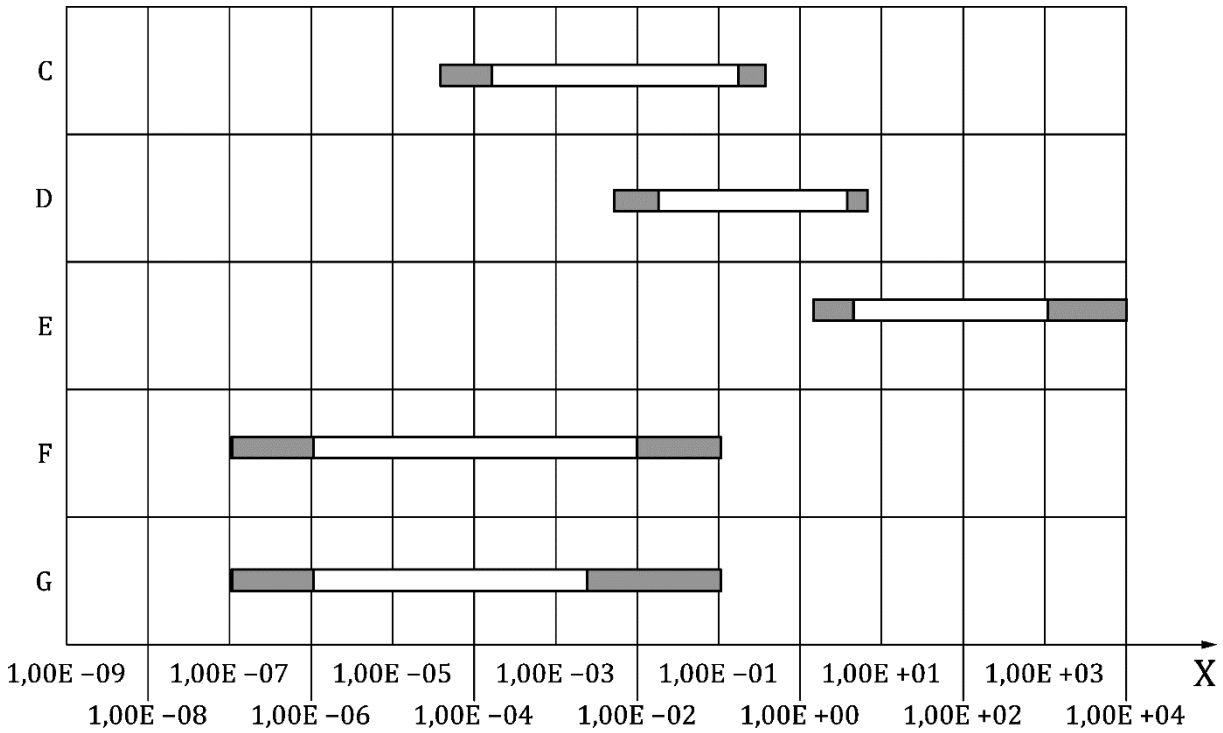

Key

X – leakage rate in Pa·m³/s
C – Method C
D – Method D
E – Method E
F – Method F
G – Method G
□ – normal range
▭ – possible range

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Figure 1b — Calibration range at calibration by

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13625, *Non-destructive testing — Leak test — Guide to the selection of instrumentation for the measurement of gas leakage*

ISO 20484, Non-destructive testing — Leak testing — Vocabulary

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20484 and the following apply.

3.1
unknown leak
leak having a stable and repeatable leakage rate of known order of magnitude that can be determined by calibration

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3.2
reference leak
calibrated leak which may be used to calibrate another leak

Note 1 to entry: The uncertainty of the reference leak is lower than the required uncertainty of the leak to be calibrated.

3.3
calibration of a reference leak
set of operations which establish, under specified conditions, the relationship between leakage rate values represented by an unknown leak and the corresponding known values of the leakage rate

Note 1 to entry: In the case of calibration by comparison, the known values of the leakage rate are represented by a standard leak.

Note 2 to entry: Normally, the result of a calibration is given as the leakage rate value for the reference leak.

3.4
calibrated leakage rate
result of the calibration of a reference leak under the given calibration conditions

3.5
nominal leakage rate
leakage rate of a leak calculated for specified reference conditions

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Note 1 to entry: In leak detection, leakage rates are commonly given in units of pV-throughput (Pa·m^3/s, mbar l/s, cm^3/min). These are only a precise measure of gas flow if the temperature is given and kept constant. Flow units such as mass flow (g/y) or molar flow (mol/s) are sometimes used to overcome this problem.

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4 Reference conditions for nominal leakage rates

To make leaks comparable the nominal leakage rate of a leak shall be given for the following reference conditions:

Ambient temperature: 20 °C

Atmospheric exhaust pressure: 1 000 mbar

Vacuum exhaust pressure: < 100 mbar

The reference inlet pressure is given by the leak reservoir pressure or the application requirement.

5 Classification of leaks

5.1 Permeation leak

This type of leak is normally made with a tracer gas reservoir. It has the best long-term stability but an appreciable temperature coefficient (approximately 3,5 %/K). Typical leakage rates are in the range from 10^{-10} Pa·m^3/s to 10^{-4} Pa·m^3/s.

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5.2 Conductance leaks

5.2.1 Capillary leak

This type of leak is available with or without a tracer gas reservoir. It has a low temperature coefficient (approximately 0,3 %/K) but easily blocks if not handled with care. Typical leakage rates are greater than 10^{-7} Pa·m^3/s

5.2.2 Aperture leak (orifice)

Orifice leaks are seldom used in practice, as they are difficult to manufacture and even more prone to blocking than capillaries.

5.2.3 Compressed powder leak

This type of leak uses metal powder compressed into a tube. They are usually offered without reservoir. They are used for routine check of the sensitivity of leak detectors but they are not stable enough to be used as calibration leaks.

6 Calibration by comparison

6.1 Methods A, A_S, B and B_S

There are two ways of calibrating leaks by comparison with known standard leaks. Both methods require the knowledge of the order of magnitude of the leakage rate to be measured. The methods differ in using one or two standard leaks, resulting in different uncertainties of measurement. In the following, the two methods are designated as A, A_s, B and B_s:

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Method A: Comparison to <u>one</u> standard leak normally with a leakage rate of the same order of magnitude, calibration with vacuum method

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Method A_s: Comparison to <u>one</u> standard leak normally with a leakage rate of the same order of magnitude, calibration with sniffing method

Method B: Comparison to <u>two</u> standard leaks with leakage rates normally lying on either side of the unknown leakage rate, calibration with vacuum method

Method B_s: Comparison to <u>two</u> standard leaks with leakage rates normally lying on either side of the unknown leakage rate. Calibration with sniffing method

Method A is most suitable for use on site as only one standard leak is used. It is generally applicable but is most reliable when the leakage rate of the unknown is close to that of the standard leak. This is because the measurement uncertainty is directly dependent on the linearity of the leak detector in use. (See 8.1.2.1). As the linearity error cannot be measured independently, it has to be estimated. To keep the linearity error small, the operating characteristics of leak detector should not change during calibration (e.g. automatic ranging should be disabled).

For more precise calibrations, where a definite measure of uncertainty is required or if a standard leak with a leakage rate close to the unknown is not available Method B should be used. By the use of two reference leaks, the non-linearity of the leak detector is accounted for (see 8.1.2.2).

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