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Fasta gasdetektorer med ultraljud – Allmänna fordringar och provningsmetoder

*Fixed Ultrasonic Gas Leak Detectors (UGLD) –
General requirements and test methods*

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English Version

Fixed Ultrasonic Gas Leak Detectors (UGLD) - General requirements and test methods

Détecteurs de fuites de gaz à ultrasons (DFGU) fixes -
Exigences générales et méthodes d'essai

Ortsfeste Ultraschall-Gasleckage-Detektoren (UGLD) -
Allgemeine Anforderungen und Prüfverfahren

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN 50724:2023) has been prepared by CLC/TC 31 "Electrical apparatus for potentially explosive atmospheres".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-08-07
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2026-08-07

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Introduction

Ultrasonic Gas Leak Detectors (UGLDs) are being increasingly appointed to quickly detect gas leaks from pressurized systems to complement the use of point or line of sight detectors. The UGLD detects the acoustic emission generated by the leak, which propagates omni-directionally at the speed of sound. The leak can be detected at some distance without the gas itself needing to reach the position of the sensor. The main reason for implementing UGLDs is to improve the response time to detect dangerous gas leaks and to improve the gas leak detection coverage with the addition of a complementary detection method that is not affected by air flow.

In general terms, an UGLD functions by detecting the ultrasonic noise generated by gas escapes from a high-pressure area to a low-pressure area through a small aperture (leak). In practice the technique is of value for detecting leaks from tank/pipelines, etc running at pressures greater than 2 bar. The intensity of this airborne ultrasound generated by a gas leak is due to a number of factors including but not limited to gas type, gas pressure, leak size and gas temperature.

An UGLD does not detect specific gas types, measure percentage LFL or ppm concentration level, but instead responds to the specific ultrasonic sound generated by a pressurized gas leak. The reliable range coverage of an UGLD is mainly determined by the leak rate of the gas leak, the atmospheric transmission of the ultrasound, and the potential acoustic background noise that can interfere with the UGLD. The leak rate is mainly determined by gas pressure and leak size, but molecular weight and gas temperature also plays a role. The leak rate determines how fast a potentially dangerous gas cloud will be generated. In addition, physical obstructions between the location of the leak, and the UGLD will also have an influence on the detection range of the detector.

1 Scope

This document refers to UGLDs (ultrasonic gas leak detectors) that work in a frequency beyond the audible range. This document is applicable to fixed ultrasonic gas leak detection equipment intended to provide an indication, alarm or other output function for the purpose of initiating automatic or manual protective action(s).

This document specifies general requirements for design, testing and performance, and describes test methods that apply to UGLD. The following items are considered in this document:

- Leak rates to be used to verify the detection range of UGLD,
- Test gas to be used (nitrogen or compressed air),
- Nozzle shape and size used at all tests leak rate tests,
- Gas pressure used at all leak rate tests,
- Time duration of each leak rate test,
- Test leak nozzle height from solid ground,
- Test leak nozzle angling relative to test UGLD,
- UGLD angle relative to the leak (field of coverage of the UGLD),
- Wind speed and direction, air temperature and humidity at day of test,
- Minimum distance to solid structures (walls, etc.) at test site,
- Installation height relative to the ground,
- Texture of solid ground between leak and UGLD,
- Background noise sources, known to interfere with UGLDs,
- Specification of detection radius in 3 dimensions,
- Operational requirements such as temperature, vibration, etc.

This document is also applicable when an equipment manufacturer makes any claims regarding any special features of construction or superior performance that exceed the minimum requirements of this document. This document prescribes that all such claims are verified, and that the test procedures are extended or supplemented, where necessary, to verify the claimed performance. The additional tests are agreed between the manufacturer and test laboratory and identified and described in the test report.

This document does not apply to portable gas detectors using ultrasonic measurements nor to gas detectors using non-ultrasonic measurements to detect a gas leak.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN IEC 61326-1, *Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements*

EN 50271:2018, *Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen - Requirements and tests for apparatus using software and/or digital technologies*

IEC 60068-2-6, *Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)*