



# SLOVENSKI STANDARD

## oSIST prEN 50724:2022

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### Stacionarni ultrazvočni detektorji uhajanja plina (UGLD) - Splošne zahteve in preskusne metode

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

iTeh STANDARD PREVIEW

Détecteurs ultrasoniques fixes - Règles de performance et méthodes d'essai

Ta slovenski standard je istoveten z: prEN 50724

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NORME EUROPÉENNE  
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**prEN 50724**

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ICS

English Version

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

Détecteurs ultrasoniques fixes - Règles de performance et méthodes d'essai

To be completed

This draft European Standard is submitted to CENELEC members for enquiry.  
Deadline for CENELEC: 2022-09-30.

It has been drawn up by CLC/TC 31.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CENELEC in three official versions (English, French, German).  
A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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**prEN 50724:2022 (E)****European foreword**

This document (prEN 50724:2022) has been prepared by CLC/TC 31 “Electrical apparatus for potentially explosive atmospheres”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

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## Introduction

Ultrasonic Gas Leak Detectors (UGLDs) are being increasingly appointed to fast 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 LFEL 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 (measured in Kg/s) 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.

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**prEN 50724:2022 (E)****1 Scope**

This document refers to UGLDs (ultrasonic gas leak detectors). This document is applicable to 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, methane, helium, etc.)
- 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, air temperature and humidity at day of test
- Minimum distance to solid structures (walls, etc.) at test site
- Wind velocity and direction
- 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
- Environmental limitations e.g. temperature limits on sensors
- Operational requirements such as temperature, ingress protection, hazardous area classification, 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 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, *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)*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1 Gas properties

#### 3.1.1 UGLD

Ultrasonic Gas Leak Detector

#### 3.1.2 AGLD

Acoustic Gas Leak Detector

#### 3.1.3

##### leak rate

mass flow rate from the gas leak, it is measured in Kilogram per second (kg/s)

### 3.2 Types of equipment

#### 3.2.1

##### alarm-only equipment

equipment having an alarm but not having a numeric display or other indicating device

#### 3.2.2

##### continuous duty equipment

equipment that is powered for long periods of time, but may have either continuous or intermittent sensing

#### 3.2.3

##### fixed equipment

equipment that is intended to have all parts permanently installed

#### 3.2.4

##### stand-alone leak detection equipment

fixed leak detection equipment that provides a conditioned electronic signal or output indication to a generally accepted industry standard (such as 4-20 mA), intended to be utilized with stand-alone control units, or signal processing data acquisition, central monitoring and similar systems which typically process information from various locations and sources including, but not limited to, leak detection equipment

**prEN 50724:2022 (E)****3.2.5****stand-alone control unit**

fixed leak detection control units intended to provide meter indication, alarm functions, output contacts and/or alarm signal outputs when utilized with stand-alone leak detection equipment

**3.3 Sensors****3.3.1****integral sensor**

sensor which is integral to the main body of the equipment

**3.3.2****remote sensor**

sensor which is not integral to the main body of the equipment

**3.3.3****sensor**

assembly in which the sensing element is housed and which may also contain associated circuit components

**3.4 Signals and alarms****3.4.1****Sound Pressure Level****SPL**

quantity measured in dB and defined as follows:

$$SPL = 10 * \log \left( \frac{P_{high} - P_{low}}{P_{ref}} \right)$$

where:

$P_{high}$  = high pressure of the acoustic wave

$P_{low}$  = low pressure of the acoustic wave

$P_{ref}$  = reference pressure difference

**3.4.2****reference pressure difference**

by analogy with the acoustic  $P_{ref}$  definition, fixed to 20  $\mu$ Pa as an average of the hearing threshold for a reference group of humans,  $P_{ref}$  for ultrasonic sensor is defined, by analogy, to 20  $\mu$ Pa

**3.4.3****measuring range**

measuring range that represents the interval between the lowest measured value (in dB) and the highest measured value

**3.4.4****zero dB**

measurement that corresponds to the SPL measured at the reference pressure difference

**3.4.5****alarm set point**

fixed or adjustable setting of the equipment that is intended to pre-set the level of ultrasonic sound pressure level at which the equipment will automatically initiate an indication, alarm or other output function

### 3.4.6

#### **fault signal**

audible, visible or other type of output, different from the alarm signal, permitting, directly or indirectly, a warning or indication that the equipment is not working satisfactorily

### 3.4.7

#### **latching alarm**

alarm that, once activated, requires deliberate action to be deactivated

### 3.4.8

#### **repeatability**

repeatability across type is closeness of agreement between the results of measurements of the same value of the same quantity, carried out by the same method and conditions, on the same UGLD instrument type

### 3.4.9

#### **drift**

variation in the equipment indication with time, at any fixed ultrasound level under constant ambient conditions

### 3.4.10

#### **final indication**

indication given by the equipment after stabilisation

Note 1 to entry: The stabilisation time shall be stated.

### 3.4.11

#### **stabilisation**

state when three successive readings of an equipment, taken at 5 s intervals, indicate no changes greater than  $\pm 1$  % of the measuring range

### 3.4.12

#### **time to alarm**

time interval, with the equipment in a warmed-up condition, between the time when an instantaneous release is produced in the equipment surrounding and the time when the alarm is triggered

## 4 General requirements

### 4.1 Introduction

The equipment shall comply with the requirements of this document.

Electrical assemblies and components shall comply with the construction and test requirements of 4.2, where applicable. In addition, parts of the UGLD intended for use in potentially explosive atmospheres are expected to employ materials and comply with the construction and explosion protection as specified in the appropriate regulations for explosion protection.

### 4.2 Design

#### 4.2.1 General

The equipment shall be constructed in such a manner that regular functional checks can be easily undertaken by the user and that it can be equipped with suitable devices for application of a sound source (field test kit).

Any malfunction of outputs from the detection equipment not relevant to safety or health shall not adversely affect the functions of the equipment related to safety.

EXAMPLE Equipment with 4-20mA and Highway Addressable Remote Transducer (HART) Protocol communication where only the 4-20 mA communication is defined in the instruction manual as related to safety. The loss of HART communication is not related to safety.

**prEN 50724:2022 (E)****4.2.2 Indication methods and devices****4.2.2.1 General**

Readily distinguishable indications shall be provided to show the instrument status, e.g. that the equipment is energised, operational, in alarm or in a special state (e.g. fault or warning or inhibited).

It is permitted for the equipment output signals to indicate instrument status (e.g. energised, in alarm and special state conditions) on the receiving control unit.

If the equipment has more than one leak detection scale, the range selected shall be clearly identified.

**4.2.2.2 Display and other devices for indication of measured values**

For equipment with a display to indicate the ultrasound measurement level all methods of indication of the measured ultrasound pressure level value shall present the same value within the resolution of each indicator.

Any over-range measurements shall be clearly indicated.

For alarm-only equipment or equipment where the resolution of the read-out device is inadequate to demonstrate compliance with this document, the manufacturer shall identify suitable methods for connecting indicating or recording devices for the purpose of testing the compliance of the equipment with this document. The indication on the read-out device of the equipment shall not contradict the results obtained by the indicating or recording devices.

**4.2.2.3 Indicator light**

If only one indicator light is provided for signalling alarms, special states and other indications, it shall be coloured red. If separate indicator lights are used or if a multi-coloured indicator light is provided, the colours shall be used in the following order of priority ((a) being highest priority):

- a) alarms indicating the presence of ultrasonic noise level beyond an alarm set point shall be coloured RED;
- b) equipment fault or warning special state indicators shall be coloured YELLOW;
- c) power supply indicators shall be coloured GREEN.

If a multi-coloured indicator light is provided, the equipment shall provide an additional indication by means other than colour.

If there is more than one indicator light of the same colour with different functions, the lights shall be labelled to show their functions. Text, marks, and icons on a screen display describing the indicator lights are permissible in place of printed labels.

**4.2.3 Alarm signal****4.2.3.1 Alarm settings**

The audible and visual alarm settings for the equipment shall not be ambiguous. If the equipment has more than one measuring range, the equipment shall not automatically change any existing alarm setting when changing the measuring range.

**4.2.3.2 Alarm output functions**

Alarm set points shall not be adjustable outside the measuring range.

Alarms shall be latching as a factory default setting and require a deliberate manual action to reset.

Alarms shall remain in operation while the alarm condition is still present. An audible alarm may be silenced if this audible alarm is not the only alarm.