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Specifikacije za avtomatske kazalnike nivoja vsebine v rezervoarjih

Specification for the performance of automatic tank contents gauges

Anforderungen an automatische Tankinhaltsmessgeräte

Spécification de performance des dispositifs mesureurs automatiques de niveau de réservoir

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Specification for the performance of automatic tank contents gauges

Spécification de performance des jauges automatiques de niveau de réservoir

Anforderungen an automatische Tankinhaltsmessgeräte

This European Standard was approved by CEN on 29 May 2002.

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document EN 13352:2002 has been prepared by Technical Committee CEN/TC 221 "Shop fabricated metallic tanks and equipment for storage tanks and for service stations", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2003, and conflicting national standards shall be withdrawn at the latest by February 2003.

Annexes A, B, C, D and E are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

The principal function of a tank gauge is to measure the level of liquid contained in a storage tank without the need to access the tank and take manual dip readings. The gauge measures liquid parameters, which can include height, mass, temperature, density and pressure. These are then used to determine the tank's contents. Other methods of establishing tank contents, e.g. direct volume measurement, are not addressed in this standard.

The increasing need for continuous inventory control for security, effective site operation and environmental protection has made the use of tank gauges a practical solution for any tank installation. In addition, in the case of volatile products, the advent of vapour emission control makes access to the tank for dipping purposes increasingly difficult.

Automatic tank gauging systems are devices which can interface with other measuring equipment and can be capable of providing one or more of the following functions:

Basic gauging

Where the gauge is used solely to confirm that there is available room to accept delivery of a quantity of product into the tank or where the gauge is used solely to measure the liquid contents of the tank.

Inventory control

Where the tank contents information is used for stock accounting purposes. This can be transferred manually or, where the gauge forms part of an integrated system, automatically.

Automatic reconciliation

Where the tank contents information is used together with measured additions to and depletions from the storage tanks contents in a defined time period to identify possible discrepancies.

1 Scope

This European Standard specifies the minimum performance requirements for various classes of automatic tank contents gauges which are limited to static tanks of shop fabricated manufacture both metallic and non metallic, underground and above ground which do not exceed 100 000 l in capacity or 5 m in height.

It is applicable to gauges for fuels (products) which are flammable, having a flash point up to but not exceeding 100 °C, stored at premises (e.g. filling stations) at which fuel is dispensed for use in vehicles and other forms of transportation. This European Standard applies to gauges suitable for use at ambient temperatures and subject to normal operational pressure variations.

Liquefied gases are not covered by this standard.

This European Standard relates to the measurement of product level, measurement of product temperature and detection of the presence of free water.

The gauges covered by this standard are not intended for use in meeting legal metrology requirements.

EN 13352:2002 (E)**2 Normative references**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO/IEC 17025:2000, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999)*.

CEC Legislative Fuels, *Co-ordinating European Council (CEC) for the Development of Performance Tests for Transportation Fuels, Lubricants and Other Fuels*.

3 Terms and definitions

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

3.1**automatic tank contents gauge (ATCG)**

device capable, as a minimum, of providing a measurement of the level of liquid contained in a storage tank without the need for manual access into the tank

3.2**available room**

product quantity which can safely be delivered into the tank without running the risk of exceeding the maximum safe filling capacity

3.3**gauge sensor**

device which measures one or more of product level, temperature and free water presence

3.4**gauging system**

combined system of gauge sensor(s) and associated indicator device(s)

3.5**indicator device**

device which receives and displays the output signals from the gauge sensor(s). It may process that data and display, print or transmit information as required

3.6**maximum permissible error (MPE)**

extreme values of an error permitted by specifications, regulations etc. for a given measuring instrument

3.7**measuring range**

distance between the upper and lower limits of measurement over which the performance requirements are satisfied

3.8**readability**

property of a measuring instrument where the indicating device is constructed in such a way that its indication may be read without ambiguity

3.9**reference level measurement device (RLMD)**

certified level measurement device used for verification of the ATCG's performance

3.10**reference temperature measurement device (RTMD)**

certified temperature measurement device used for verification of the ATCG's performance

3.11**repeatability**

ability of a measuring instrument to provide closely similar indications for repeated applications of the same measurand under the same conditions of measurement (ISO-Publication)

NOTE 1 These conditions include:

- reduction to a minimum of the variations due to the observer
- the same measurement procedure
- the same observer
- the same measuring equipment, used under the same conditions
- the same location
- repetition over a short period of time.

NOTE 2 Repeatability can be expressed quantitatively in terms of the dispersion characteristics of the indications.

3.12**resolution**

smallest difference between indications of a displaying device that can be meaningfully distinguished (ISO-Publication)

NOTE 1 For a digital displaying device, this is the change in the indication when the least significant digit changes by one step.

NOTE 2 This concept applies also to a recording device.

4 General requirements**4.1 Temperature ranges**

The components of an automatic tank contents gauge shall be designed for operation under atmospheric conditions and rated subdivided into the temperature categories according to Table 1.

Table 1 — Temperature category

Temperature category	Temperature range
O	-25 °C to +55 °C
P	-5 °C to +50 °C
U	-5 °C to +30 °C
I	+5 °C to +35 °C

EN 13352:2002 (E)**4.2 Variations in the properties of stored products**

The performance requirements for ATCGs according to 5.1 and 5.2 shall be satisfied when using one or more of the following test liquids:

- Type 1 (Diesel equivalent): CEC Legislative Fuel no. RF-03-A-84
- Type 2 (Petrol equivalent): CEC Legislative Fuel no. RF-08-A-85
- Type 3 (M85 Petrol equivalent): 85 % methanol and 15 % CEC Legislative Fuel no. RF-08-A-85

NOTE The above test liquids are standard fuels having defined ranges of variations in their physical properties.

4.3 Humidity

For all classes of gauging system, the performance shall be unaffected by humidity, i. e. the gauge sensors shall operate in conditions of 95 % non-condensing humidity.

5 Performance requirements**5.1 Level measurement**

Gauging systems shall be classified as one of three classes, A, B or C, satisfying the performance requirements for level measurement according to Table 2 over their entire measuring range:

Table 2 — Level measurement performance requirements

Class	Maximum permissible error	Repeatability
A	± 1 mm	0,5 mm
B	± 2 mm	1 mm
C	± 1 % of measuring range	0,5 % of measuring range

For gauging systems intended for use in aboveground tanks, these requirements shall be for temperature category O according to 4.1 and in conditions of 95 % non-condensing humidity according to 4.3.

For gauging systems intended for use in underground tanks, these requirements shall be for temperature category U according to 4.1 and in conditions of 95 % non-condensing humidity according to 4.3.

The method of type testing for level measurement is given in clause 9.

5.2 Temperature measurement

Where average product temperature measurement is provided, the performance requirements for temperature measurement according to Table 3 shall be satisfied:

Table 3 — Temperature measurement performance requirements

Class	Maximum permissible error (°C)
A	± 0,8
B	± 2,0
C	Not prescribed

For gauging systems intended for use in aboveground tanks, these requirements shall be for temperature category O according to 4.1.

For gauging systems intended for use in underground tanks, these requirements shall be satisfied for temperature category U according to 4.1.

The method of type testing for temperature measurement is given in clause 9.

5.3 Water detection

Where water detection is provided, this facility shall:

5.3.1 detect a minimum free water level of 30 mm above the bottom of the tank

5.3.2 indicate the presence of free water within 1 min of the free water reaching the level specified in 5.3.1 (response time)

5.3.3 cease to indicate the presence of free water within 5 min of the free water dropping below the level specified in 5.3.1 (recovery time)

5.3.4 activate an alarm within 1 min on detecting the presence of free water at a pre-set level

For gauging systems intended for use in aboveground tanks, these requirements shall be satisfied for temperature category O according to 4.1.

For gauging systems intended for use in underground tanks, these requirements shall be satisfied for temperature category U according to 4.1.

The method of type testing for free water detection is given in clause 10.

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5.4 Essential information

The information available for display, printing or transmission by the indicator device shall include:

- a) the identification of the tank (for multiple tank systems);
- b) product identification (for multiple tank systems);
- c) the level and/or volume of product in the tank and/or available room with an indicated resolution according to Table 4 below;
- d) the date and time of the reading (if printed);
- e) indication of water present (if water detection fitted);
- f) high water alarm (if water detection fitted);
- g) sensor disconnection indication;
- h) visual indication of power on.

Table 4 — Required resolution for level and volume indication

Class	Level resolution	Volume resolution
A	0,1 mm	1 Litre
B	0,2 mm	1 Litre
C	0,1 %	0,1 %

The correct provision of essential information shall be verified through the type approval test procedure described in clause 8.

NOTE 1 With a multiple tank system, a single indicator device for the gauge sensors can be provided in which case it should be capable of being switched between tanks or should switch automatically between tanks and should then indicate clearly to which tank the information shown refers.

NOTE 2 To achieve accurate volume measurement, an accurate tank capacity table is required. Suggested methods for generating tank capacity tables are referenced in annex B (informative).

5.5 Indicator device

The level and, where provided, temperature measurements shall be stable to within the corresponding MPE for the class of measurement performance (A, B or C) over a range of environmental temperature for the indicator device. The manufacturer shall specify this range either as category O or category I, according to 4.1.

5.6 Manufacturers instructions

Instructions shall be provided by the manufacturer for the safe installation, operation and maintenance of the automatic tank gauging system.

NOTE See annex C (informative) for further information.

5.7 Classification and designation

5.7.1 Gauge sensors shall be designated according to the following classifications as established by the relevant test methods:

- a) measurement performance (class A, B or C in accordance with Table 2 and Table 3);
- b) test liquids in which this class of performance is achieved (type 1, 2 and/or 3 according to 4.2);
- c) the temperature range over which this class of performance is achieved (category O, P or U according to 4.1);
- d) water detection performance (W represents compliance according to 5.3).

These classifications shall be designated each by a single letter or numeral according to the following syntax:

a)	b)	c)	d)
{A}	{[1] [2] [3]}	{O}	
{B}		{P}	[W]
{C}		{U}	

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Items bracketed { } are required. One option from each classification shall be given.
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Items bracketed [] are optional.

For example, a sensor achieving class of performance B, over the temperature range of category U, in test liquids type 2 and type 3 and capable of water detection would be designated B23UW.

These designations shall not be affixed other than to sensors within the range of smallest and largest tank sizes for which approval has been obtained.

5.7.2 Indicator devices (where separate from the sensor) shall be designated according to the following classifications as established by the relevant test methods:

- e) measurement performance (class A, B or C in accordance with Table 2 and Table 3)
- f) the temperature range over which this class of performance is achieved (category O or I according to 4.1)

These classifications shall be designated each by a single letter according to the following syntax:

e)	f)
{A}	{O}
{B}	{I}
{C}	

Items bracketed { } are required. One option from each classification shall be given.