SLOVENSKI STANDARD
SIST EN 50381:2005+AC:2005

01-december-2005

Premični prezračevani prostori z notranjim virom sproščanja ali brez njega + Popravek AC

Transportable ventilated rooms with or without an internal source of release

Transportable ventilierte Räume mit oder ohne innere Freisetzungsstelle

Caissons ventilés transportables avec ou sans source de dégagement interne

Ta slovenski standard je istoveten z: **EN 50381:2004**

ICS:

29.260.20	Električni aparati za eksplozivna ozračja	Electrical apparatus for explosive atmospheres

SIST EN 50381:2005+AC:2005 **en**

EUROPEAN STANDARD **EN 50381**

NORME EUROPÉENNE

EUROPÄISCHE NORM August 2004

ICS 29.260.20

Incorporates Corrigendum December 2005

English version

Transportable ventilated rooms with or without an internal source of release

Caissons ventilés transportables avec ou sans source de dégagement interne

Transportable ventilierte Räume mit oder ohne innere Freisetzungsstelle

This European Standard was approved by CENELEC on 2004-03-01. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 50381:2004 E

Foreword

This European Standard was prepared by WG 31-73, of SC 31-7, Pressurization and other techniques, of the Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmospheres.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50381 on 2004-03-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2005-03-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2007-03-01

This standard covers the essential requirements for pressurized rooms without an internal source of release and the additional requirements when an internal source of release is present.

This European Standard was prepared under mandate BC/CEN/CLC/08-92 given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of the EC Directive 94/9/EC. See Annex ZZ.

This European Standard is to be read in conjunction with EN 50014, Electrical apparatus for potentially explosive atmospheres – General requirements, or where appropriate, with EN 50021, Electrical apparatus for potentially explosive atmospheres – Type of protection “n”. This European Standard should not be considered in conjunction with any editions of these standards and their amendments published before 1997.

The contents of the corrigendum of December 2005 have been included in this copy.

Contents

Introduction

This is a new European Standard for transportable pressurized rooms with and without an internal source of release but is confined to those rooms which are transportable and should not apply to rooms constructed on site and not intended for resale.

Pressurized rooms are locations intended for human occupation under normal operational circumstances. In such circumstances it is important to distinguish between pressurization, which may use air or inert gas and be applied to apparatus not required to support life, from ventilation. Ventilation in the context of this standard, taken together with other safety measures, ensures a safe (and breathable) atmosphere within the pressurized room.

This text is based upon the scope of EN 61285, IEC/TR 61831, IEC 60079-13 and IEC 60079-16 and the essential safety requirements of Directive 94/9/EC.

1 Scope

1.1 This European Standard contains the specific requirements for the construction and testing of transportable ventilated rooms (TVR's), such as skid mounted analyser houses with type of protection 'v' intended for use in potentially explosive atmospheres. Transportable in this sense means manufactured in one location (the manufacturer's premises) for trade and transportation to another location (the user's premises) for installation and use. This European Standard supplements European Standard EN 50014 or where appropriate EN 50021, the requirements of which apply to electrical apparatus with type of protection 'v' except as modified within this standard. This standard does not contain the requirements for equipment group II, category 1 or equipment group I, category M1. This standard does not contain the requirements for equipment group I, category M2 where there exists a potential source of release. This standard does not contain the requirements for group II where there exists a potential hazard from combustible dusts.

NOTE It is not the intention of this European Standard to cover stationary analyzer houses according to EN 61285.

1.2 This European Standard includes the requirements for the construction of the TVR and its associated components including, the inlet and outlet apertures for the ventilation gas supply and for the safety provisions and devices necessary for the type of protection 'v'.

1.3 This European Standard specifies the requirements for TVR's with or without an internal source of release of potentially flammable or toxic, gas, liquid or vapour (for example analyzers placed within the TVR).

1.4 Due to the safety factors incorporated in the type of protection, the uncertainty of measurement inherent in good quality, regularly calibrated measurement equipment is considered to have no significant detrimental effect and need not be taken into account when making the measurements necessary to verify compliance of the apparatus with the requirements of this standard.

2 Normative references

The following referenced documents are indispensable for the application 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 954-1	Safety of machinery - Safety related parts of control systems
EN 50014	Electrical apparatus for potentially explosive atmospheres – General requirements
EN 50015	Electrical apparatus for potentially explosive atmospheres – Oil immersion 'o'
EN 50016	Electrical apparatus for potentially explosive atmospheres – Pressurized apparatus 'p'
EN 50017	Electrical apparatus for potentially explosive atmospheres – Powder filling 'q'
EN 50018	Electrical apparatus for potentially explosive atmospheres – Flame proof enclosures 'd'
EN 50019	Electrical apparatus for potentially explosive atmospheres – Increased safety 'e'
EN 50020	Electrical apparatus for potentially explosive atmospheres – Intrinsic safety 'i'

EN 50021		Electrical apparatus for potentially explosive atmospheres – Type of protection ‘n’
EN 50028		Electrical apparatus for potentially explosive atmospheres – Encapsulation 'm'
EN 50039		Electrical apparatus for potentially explosive atmospheres – Intrinsically safe electrical systems ‘i’
EN 60034-5		Rotating electrical machines -- Part 5: Degrees of protection provided bythe integral design of rotating electrical machines (IP code) – Classification (IEC 60034-5)
EN 60079-10	1996	Electrical apparatus for explosive gas atmospheres – Part 10: Classification of hazardous areas (IEC 60079-10:1995)
EN 60079-15	2003	Electrical apparatus for explosive gas atmospheres – Part 15: Type of protection “n” (IEC 60079-15:2001, modified)
EN 60529		Degrees of protection provided by enclosures (IP Code) (IEC 60529)
EN 61285		Industrial-process control – Safety of analyser houses (IEC 61285)
EN 61779-1		Electrical apparatus for the detection and measurement of flammable gases – Part 1: General requirements and test methods (IEC 61779-1:1998, modified)
EN 61779-2		Electrical apparatus for the detection and measurement of combustible gases – Part 2: Performance requirements for Group I apparatus indicating a volume fraction up to 5 % methane in air (IEC 61779-2:1998, modified)
EN 61779-3		Electrical apparatus for the detection and measurement of flammable gases – Part 3: Performance requirements for Group I apparatus indicating a volume fraction up to 100 % methane in air (IEC 61779-3:1998, modified)
EN 61779-4		Electrical apparatus for the detection and measurement of combustible gases – Part 4: Performance requirements for Group II apparatus indicating a volume fraction up to 100 % lower explosive limit (IEC 61779-4:1998, modified)
EN 61779-5		Electrical apparatus for the detection and measurement of combustible gases – Part 5: Performance requirements for Group II apparatus indicating a volume fraction up to 100 % gas (IEC 61779-5:1998, modified)

3 Definitions

For the purpose of this standard, the following definitions apply:

3.1
purging

– the operation of passing a specified quantity of air through the TVR, or apparatus as defined in Annex A, and its associated ducts, so that any explosive gas or vapour is reduced to a safe concentration; or

– the operation of passing a quantity of inert gas through apparatus as defined in Annex B, and its associated ducts, so that any oxygen, as a component of air that may be present is reduced to a safe concentration

NOTE Purging may also be used for other purposes such as:
– to ensure that the air quality of the atmosphere within the TVR is acceptable; or
– to ensure that any toxic gas or vapour that may be present is reduced to a safe concentration; or
– to account for the potential depletion of oxygen, accumulation of carbon dioxide or potential release of any asphyxiant gas.

These and other like issues are the responsibility of the user and the test house is not required to verify compliance.

3.2
internal source of flammable release
a point or location from which a flammable substance in the form of a flammable gas or vapour or liquid may be released into the TVR such that an explosive gas atmosphere could be formed

3.3
ignition capable apparatus
apparatus which in normal or abnormal operation constitutes a source of ignition for a specified explosive atmosphere by being capable of producing sparks or generating ignition capable hot surfaces. Apparatus which meets the requirements of one or more of the types of protection listed in EN 50014 for the specified atmosphere is considered not ignition capable

3.4
non-incendive apparatus
apparatus which in normal operation does not produce sparks or generate hot surfaces capable of igniting a specified explosive atmosphere. Apparatus which meets the requirements of one or more of the types of protection in EN 50021 or EN 60079-15 and/or by the methods outlined in Annex A or Annex B is considered non-incendive

3.5
limited toxic release
a release of toxic gas, vapour or liquid, the maximum flow rate of which can be predicted by the use of limiting devices and/or by calculation

NOTE This standard does not specify the necessary safety criteria for dealing with toxic release. Some guidance is given in EN 61285.

3.6
limiting value
the limiting value is the lowest concentration value of the lower explosive limit (LEL) of each component involved, taking account of the most onerous conditions of concentration that may occur from every potential source of release within the TVR

3.7
protective gas
– air used for purging and maintaining a pressure differential and, if required, dilution within the TVR or an enclosure meeting the requirements of Annex A; or
– an inert gas used for maintaining a pressure differential within an enclosure meeting the requirements of Annex B

3.8
ventilation
the maintenance of a pressure differential between the external atmosphere and that within the TVR with continuous flow of the protective gas. The purpose is to dilute any potential limited release to a safe level within the TVR. This concept is only applicable to type of protection v2, v3 and v4

NOTE The term 'ventilation' is used in this text as a means of explosion protection. It is recognised that ventilation may also be used to ensure adequate air quality for personnel and also to maintain a specific temperature regime within the TVR; these latter requirements are out with the scope of this document.

3.9
Leakage Compensation of a Breathable Atmosphere (LCBA)
the maintenance of a pressure differential between the external atmosphere and that within the TVR with a supply of air which, after purging, when the outlet apertures are closed, is sufficient to maintain the required positive pressure differential whilst compensating for any loss due to leakage and maintaining an internal atmosphere of breathable quality. This concept is only applicable to type of protection vM2

NOTE Additional measures, such as the use of oxygen deficiency detectors may be required to ensure an equable environment within the TVR. Such measures are not within the scope of this standard.

3.10
containment system
those parts of the apparatus associated with the TVR containing the flammable gas, vapour or liquid that may constitute an internal source of release

NOTE The containment system may extend out with the enclosure walls of the TVR.

3.11
dilution
the continuous supply of a protective gas, after purging, at such a rate that the concentration of a flammable mixture inside the TVR is maintained at a value below the explosive limits except in a dilution area

NOTE For safety reasons dilution to a level lower than the LEL may be required if associated with the potential release there is an additional toxic or asphyxiant risk. Further guidance can be found in EN 61285.

3.12
dilution area

an area in the vicinity of a source of release where it cannot be demonstrated that, the concentration of flammable gas or vapour is diluted to a safe concentration

NOTE A dilution area may be extended to include locations where it is not necessary for the test house to carry out assessments, for example where no apparatus is located.

3.13
limited release
a release of flammable gas or vapour the maximum flow rate of which, can be predicted by the use of limiting devices and/or by calculation

3.14
unlimited release
a release of flammable gas or vapour the maximum flow rate of which cannot be predicted arising from the release of a flammable liquid

3.15
Lower Explosive Limit (LEL)
the volume ratio of flammable gas or vapour in air below which an explosive gas atmosphere will not be formed

3.16
Upper Explosive Limit (UEL)
volume ratio of flammable gas or vapour in air above which an explosive gas atmosphere will not be formed

3.17
volume ratio (v/v)
ratio of the volume of a component to the volume of the gas mixture under specified conditions of temperature and pressure

3.18
type of protection v
a type of protection intended to reduce the risk of explosion to an appropriate level by the prevention of the formation of an explosive atmosphere in the vicinity of a source of ignition

3.18.1
type of protection vM2
suitable for use in underground parts of mines and to those parts of surface installations of such mines, liable to be endangered by firedamp and/or combustible dust. Type of protection vM2 ensures the requisite level of protection, even in the event of frequently occurring disturbances or equipment faults which normally have to be taken into account by maintaining a positive pressure differential between the atmosphere within the TVR and that external

3.18.2
type of protection v2
suitable for areas in which explosive atmospheres caused by gases, vapours or mists are likely to occur Type of protection v2 ensures the requisite level of protection, even in the event of frequently occurring disturbances or equipment faults which normally have to be taken into account by maintaining a positive pressure differential between the atmosphere within the TVR and that external, and where appropriate adequate ventilation

3.18.3
type of protection v3
suitable for areas in which explosive atmospheres caused by gases, vapours or mists are unlikely to occur or if they do occur, are likely to do so infrequently and for a short period only. Type of protection v3 ensures the requisite level of protection during normal operation by maintaining a positive pressure differential between the atmosphere within the TVR and that external, and where appropriate adequate ventilation

3.18.4
type of protection v4

suitable for areas normally considered safe but in which a risk of an explosive atmosphere caused by gases, vapours or mists might occur due to the operation of equipment within the TVR and if they do occur, are likely to do so infrequently and for a short period only. Type of protection v4 ensures the requisite level of protection during normal operation by maintaining a negative pressure differential between the atmosphere within the TVR and that external, and where appropriate adequate ventilation

4 Construction requirements for TVR's and ducting

4.1 General

The size of the TVR depends on the number, size and access requirements of the equipment to be housed. Except for type of protection vM2 the absolute minimum unobstructed headroom shall be 2,0 m. Suspended ceilings, cable trenches and other dead air spaces shall be avoided.

NOTE 1 NOTE 1 An additional allowance of 30 % should be made for the addition of further equipment. Recommended minimum dimensions are 2,5 m length and width and 2,3 m headroom.

NOTE 2 NOTE 2 If the electrical apparatus has to withstand particularly adverse service conditions (e.g. rough handling, humidity, effects of ambient temperature variations, effects of chemical agents, corrosion) these should be specified by the user to the manufacturer and are not the responsibility of the testing house.

4.2 Degree of ingress protection

The TVR, including any apertures for moving parts but excluding apertures for the inlet and outlet of the protective gas, shall have a degree of protection in accordance with at least IP40 of EN 60529.

In the case of equipment group I, type of protection vM2 the TVR shall have a degree of protection in accordance with at least IP44 of EN 60529.

4.3 Design and construction

The exterior of the TVR shall be designed and constructed to minimize the accumulation of dust and provide easy facility for cleaning, for example by the use of a pitched roof with extended eaves and the fitment of external pitched canopies.

4.4 Mechanical strength

The TVR, ducts, if any, and their connecting parts shall withstand a pressure equal to 1,5 times the maximum pressure differential specified by the manufacturer for normal service with a minimum of 200 Pa (2 mbar). In the case of type of protection v2 and v3 all outlets shall be closed and in the case of v4 all inlets shall be closed.

If a pressure differential can occur in service that can cause a deformation of the TVR, ducts, if any, or connecting parts, a safety device shall be fitted by the manufacturer to limit the maximum pressure differential to a level below that which could adversely affect the type of protection.

4.5 Penetrations

Penetrations shall be via devices such as bulkhead panels and gland plates with appropriate bulkhead fittings and/or glands or [1)] fire wall transit and shall maintain the required degree of ingress protection.

4.6 Floor drains

Where there is a source of internal release of liquid cleaning facilities such as a slight slope and drain to a common collecting point, shall be provided.

Where a floor drain is installed it shall, except for type of protection vM2, be free draining to the outside. Provision shall be made to prevent exchange of the atmosphere between the interior and exterior of the TVR.

4.7 Floors

Floors shall be non-slip. Non-slip finishes shall be resistant to any material likely to come into contact with the floor. Floors shall be non porous and impervious to hydrocarbon vapours. The test house is not required to verify compliance.

NOTE It is the user's responsibility to ensure that measures shall be taken to prevent ingress of extraneous liquids for example by raising the floor above ground and/or providing a step or ramp at the door entrance. Where the TVR is intended to be positioned on a concrete plinth this should be impervious to hydrocarbons and raised at least 0,1 m above the surrounding area.

4.8 Doors

A minimum of one door shall be provided. All doors shall open outwards. Except for vM2, doors shall be fitted with an automatic self closing mechanism to close and latch (regardless of the extent to which the door was initially open) even against the maximum overpressure specified in normal service.

4.8.1 Door(s) shall be fitted with lock(s) to control unauthorized access. Door(s) shall be capable of being opened from within, even when locked (for example by the use of a panic bar).

4.8.2 Doors shall be fitted with a position switch to operate when the door is closed.

---

1) See Annex J of IEC/TR 61831.