

SVENSK STANDARD

SS-EN 45545-7:2013



Fastställt/Approved: 2013-03-10
Publicerad/Published: 2013-03-13
Utgåva/Edition: 1
Språk/Language: engelska/English
ICS: 13.220.20; 45.060.01

Järnvägar – Järnvägsfordons brandsäkerhet – Del 7: Brandsäkerhetskrav för installationer med lättantändlig vätska och gas

Railway applications – Fire protection on railway vehicles – Part 7: Fire safety requirements for flammable liquid and flammable gas installations

This preview is downloaded from www.sis.se. Buy the entire standard via <https://www.sis.se/std-89333>

Standarder får världen att fungera

SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.

Delta och påverka

Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

Ta del av det färdiga arbetet

Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standardpaket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

Utveckla din kompetens och lyckas bättre i ditt arbete

Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på www.sis.se eller ta kontakt med oss på tel 08-555 523 00.



Standards make the world go round

SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.

Take part and have influence

As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

Get to know the finished work

We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

Increase understanding and improve perception

With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

If you want to know more about SIS, or how standards can streamline your organisation, please visit www.sis.se or contact us on phone +46 (0)8-555 523 00



Europastandarden EN 45545-7:2013 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 45545-7:2013.

Denna standard ersätter SIS-CEN/TS 45545-7:2009, utgåva 1.

The European Standard EN 45545-7:2013 has the status of a Swedish Standard. This document contains the official version of EN 45545-7:2013.

This standard supersedes the Swedish Standard SIS-CEN/TS 45545-7:2009, edition 1.

© Copyright/Upphovsrätten till denna produkt tillhör SIS, Swedish Standards Institute, Stockholm, Sverige. Användningen av denna produkt regleras av slutanvändarlicensen som återfinns i denna produkt, se standardens sista sidor.

© Copyright SIS, Swedish Standards Institute, Stockholm, Sweden. All rights reserved. The use of this product is governed by the end-user licence for this product. You will find the licence in the end of this document.

Uppllysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna uppllysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Järnvägar, SIS/TK 254.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD

EN 45545-7

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2013

ICS 45.060.01; 13.220.20

Supersedes CEN/TS 45545-7:2009

English Version

Railway applications - Fire protection on railway vehicles - Part 7: Fire safety requirements for flammable liquid and flammable gas installations

Applications ferroviaires - Protection contre les incendies dans les véhicules ferroviaires - Partie 7: Exigences de sécurité incendie relatives aux installations de liquides inflammables et de gaz inflammables

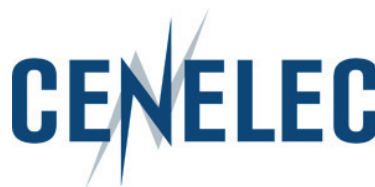
Bahnanwendungen - Brandschutz in Schienenfahrzeugen - Teil 7: Brandschutzanforderungen an Anlagen für brennbare Flüssigkeiten und Gase

This European Standard was approved by CEN on 7 December 2012.

CEN and 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 CEN-CENELEC Management Centre or to any CEN and 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 CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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



**CEN-CENELEC Management Centre:
Avenue Marnix 17, B-1000 Brussels**

Contents	Page
Foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 General system requirements	5
5 Flammable liquids and gas tanks	6
5.1 General.....	6
5.2 Tanks for flammable liquids	6
5.3 Portable liquefied petroleum gas installation for catering purposes.....	7
6 Pipe work and associated fittings.....	8
6.1 Requirements for the pipe work containing flammable liquids.....	8
6.2 Flexible connections	8
6.3 Gas distribution system requirements.....	8
6.4 Ventilation devices for tanks for flammable liquids.....	9
7 Combustion engines, heaters and auxiliary equipment.....	9
7.1 General.....	9
7.2 Engines located inside railway vehicles	9
7.3 Heating equipment.....	10
7.4 Exhaust system.....	10
8 Liquefied petroleum gas installations	10
8.1 General.....	10
8.2 Installation	10
8.3 Operation instructions	10
9 Evaluation of conformity.....	11
Annex A (normative) Signs	12
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC	13
Bibliography.....	16

Foreword

This document (EN 45545-7:2013) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, 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 September 2013, and conflicting national standards shall be withdrawn at the latest by March 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 45545-7:2009.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

This series of European standards *Railway applications — Fire protection on railway vehicles* consists of:

- Part 1: General;
- Part 2: Requirements for fire behaviour of materials and components;
- Part 3: Fire resistance requirements for fire barriers;
- Part 4: Fire safety requirements for railway rolling stock design;
- Part 5: Fire safety requirements for electrical equipment including that of trolley buses, track guided buses and magnetic levitation vehicles;
- Part 6: Fire control and management systems;
- Part 7: Fire safety requirements for flammable liquid and flammable gas installations.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

EN 45545-7 has been developed from existing fire safety regulations for railway vehicles from the International Union of Railways (UIC) and different European countries.

In using the Operation and Design Categories defined in EN 45545-1, the requirements laid down in this part take into account the current operating conditions for European public rail transport.

1 Scope

This part of EN 45545 specifies requirements for flammable liquids and liquefied petroleum gas installations, e. g. for traction, auxiliary power units, heating or cooking, to cover the objectives defined in EN 45545-1. This part is not applicable to technical liquids themselves, e. g. hydraulic liquid and transformer oil, except where guidance is given as to dealing with spillages, leakage and spray generation.

The measures and requirements specified in this European Standard aim to protect passengers and staff in railway vehicles by preventing a fire from occurring and spreading by leakage of flammable liquids or gases.

It is not within the scope of this European Standard to describe measures for flammable gases, other than liquefied petroleum gases (LPGs).

It is not within the scope of this European Standard to describe measures that ensure the preservation of the railway vehicles in the event of a fire.

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 10204, *Metallic products — Types of inspection documents*

EN 15227, *Railway applications — Crashworthiness requirements for railway vehicle bodies*

EN 45545-1:2013, *Railway applications — Fire protection of railway vehicles — Part 1: General*

EN 45545-6, *Railway applications — Fire protection of railway vehicles — Part 6: Fire control and management systems*

EN 50153, *Railway applications — Rolling stock — Protective provisions relating to electrical hazards*

ISO 11014, *Safety data sheet for chemical products — Content and order of sections*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 45545-1:2013 apply.

4 General system requirements

There shall be a design assessment, and the following factors shall be considered:

- possible sources and paths of leakage, and for LPG installations, there shall be means of detecting any leakage;
- flammability characteristics of flammable liquids and gases including the effects of any combustible or absorbing materials;
- possible ignition sources, including electrical faults, overheating of equipment, and malfunctioning of protective devices;

SS-EN 45545-7:2013 (E)

— means available for detecting, controlling or extinguishing a fire, such as stopping the flow of flammable liquids, shutting down equipment, fire resisting containment, or the use of extinguishing media.

The design of flammable liquid, gas and LPG installations shall take into account relevant design load cases for static and dynamic conditions.

Flammable liquid spray or any flammable atmosphere shall be prevented from coming into contact with potential ignition sources, e. g. hot surfaces or high power electrical switch gear.

Leakage of fuel and oil shall be minimized under normal operation conditions.

In each area where a flammable liquid or a flammable gas might escape, there shall be means to reduce:

- a) the probability of ignition; and
- b) the consequences if ignition does occur.

Some materials that have a fire prevention function may be operating at an elevated temperature as a result of being near equipment operating at high temperatures (e. g. exhaust pipe insulation). In such cases, degradation of the material could impair its ability to perform its function, and its propensity to ignite may be increased. Care shall be taken to ensure that such materials will not degrade in this manner.

Metal containers and pipes fixed permanently on railway vehicles or stored movable containers shall be electrically bonded to the rail via the vehicle structure in accordance with EN 50153.

For each metal used for flammable liquid or flammable gas installations, certified material test reports or test certificates according to EN 10204 shall be submitted.

When selecting materials used in the vicinity of equipment which may generate flammable liquids or gases, care shall be taken to ensure that the material surface cannot absorb these species.

5 Flammable liquids and gas tanks

5.1 General

Tanks shall be built, located or protected so that they or their piping cannot be punctured or fractured by debris thrown up from the track.

Tanks shall not be installed in:

- energy absorption zones;
- passenger areas;
- luggage compartments;
- driver's cabs.

For tanks that are divided internally by partition walls, the complete tank shall fulfil these requirements.

5.2 Tanks for flammable liquids

Tanks constructed to the following requirements are deemed to satisfy the minimum impact performance. If other materials are used, equivalent safety shall be demonstrated.

The thickness of walls shall have a minimum according to Table 1.

Table 1 — Minimum thickness of walls

Volume	Steel	Aluminium
$\leq 2\,000\text{ dm}^3$	2,0 mm	3,0 mm
$> 2\,000\text{ dm}^3$	3,0 mm	4,0 mm

Tanks for flammable liquid shall be located and designed so that no ignition can occur at normal temperatures.

The design of flammable liquid tanks shall ensure, as far as reasonably practicable, that during filling or draining or in the event of leakage from a tank or its pipe work, flammable liquids cannot:

- come into contact with rotating machinery which might result in a spray;
- be drawn into any device in suction e. g. ventilators and coolers;
- come into contact with hot components, or electrical devices which may produce an electrical spark;
- penetrate into layers of thermal or acoustic insulation material.

Tanks for flammable liquids shall not be filled more than 90 % of their nominal volume. Filling limit indicators shall be provided.

The output from a limit indicator device shall be easy to read from the filling position.

To avoid confusion, the kind of appropriate flammable liquid shall be clearly labelled at or adjacent to the filling pipe of the tank. The labelling of the flammable liquid shall be given textual in accordance to safety data sheets according to ISO 11014.

In the vicinity of the filling pipe the following danger signs shall be displayed:

- danger sign P02 "No naked flames, no smoking" in accordance with Directive 92/58/EEC (see Figure A.1);
- danger sign W01 "Warning of flammable liquids" in accordance with Directive 92/58/EEC (see Figure A.2).

Design of the filler pipes or other openings shall ensure that flammable liquid shall not escape during normal operating conditions, taking into account any system movement as a result of suspension movements.

5.3 Portable liquefied petroleum gas installation for catering purposes

The LPG cylinders and the equipment to which they are connected shall be situated in the same railway vehicle. The coupling of LPG installations between several railway vehicles is prohibited.

LPG cylinders shall be located in cylinder cabinets made from sheet metal.

LPG cylinders shall be arranged upright inside a cylinder cabinet and secured in order to satisfy the crash worthiness scenarios defined in EN 15227.

For catering areas, two cylinder cabinets are allowed per vehicle, each cylinder cabinet shall contain not more than two LPG cylinders with a maximum capacity of 14 kg each. When a railway vehicle is equipped with two cylinder cabinets, there shall be a gap of at least 8 m between the cylinder cabinets and they shall be on opposite sides of the railway vehicle.