



**SLOVENSKI STANDARD**  
**SIST EN 12312-6:2004+A1:2009**  
**01-julij-2009**

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Aircraft ground support equipment - Specific requirements - Part 6: Deicers and  
deicing/antiicing equipment

Luftfahrt-Bodengeräte - Besondere Anforderungen - Teil 6: Enteiser und Enteisungs-  
-/Vereisungsschutzgeräte

Matériel au sol pour aéronefs - Exigences particulières - Partie 6: Dégivreuses, matériels  
de dégivrage et d'antigivrage

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**ICS:**

49.100	Oprema za servis in vzdrževanje na tleh	Ground service and maintenance equipment
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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12312-6:2004+A1**

April 2009

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## Aircraft ground support equipment - Specific requirements - Part 6: Deicers and deicing/antiicing equipment

Matériel au sol pour aéronefs - Exigences particulières -  
Partie 6: Dégivreuses, matériels de dégivrage et  
d'antigivrage

Luffahrt-Bodengeräte - Besondere Anforderungen - Teil 6:  
Enteiser und Enteisungs-/Vereisungsschutzgeräte

This European Standard was approved by CEN on 24 March 2004 and includes Amendment 1 approved by CEN on 1 March 2009.

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

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**EN 12312-6:2004+A1:2009 (E)****Foreword**

This document (EN 12312-6:2004+A1:2009) has been prepared by Technical Committee CEN/TC 274 "Aircraft ground support equipment", 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of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2009-03-01.

This document supersedes EN 12312-6:2004.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

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(s).

$\boxed{A_1}$  For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.  $\boxed{A_1}$

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The Parts of EN 12312 — Aircraft ground support equipment — Specific requirements — are:

- Part 1: Passenger stairs
- Part 2: Catering vehicles
- Part 3: Conveyor belt vehicles
- Part 4: Passenger boarding bridges
- Part 5: Aircraft fuelling equipment
- Part 6: Deicers and deicing/antiicing equipment
- Part 7: Aircraft movement equipment
- Part 8: Maintenance stairs and platforms
- Part 9: Container/Pallet loaders
- Part 10: Container/Pallet transfer transporters
- Part 11: Container/Pallet dollies and loose load trailers
- Part 12: Potable water service equipment
- Part 13: Lavatory service equipment
- Part 14: Disabled/incapacitated passenger boarding equipment
- Part 15: Baggage and equipment tractors
- Part 16: Air start equipment
- Part 17: Air conditioning equipment
- Part 18: Nitrogen or Oxygen units
- Part 19: Aircraft jacks, axle jacks and hydraulic tail stanchions
- Part 20: Ground power equipment

Annex A is normative. Annexes 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, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## Introduction

This European Standard specifies health and safety requirements, as well as some functional and performance requirements, for deicers and equipment intended for deicing/antiicing of all aircraft types commonly in service in civil air transport. It contains functional and environmental aspects of deicing in the informative annexes B, C and D.

The minimum essential criteria are considered to be of primary importance in providing safe, serviceable, economical, and usable deicers and deicing/antiicing equipment. Deviation from the recommended criteria should occur only after careful consideration, extensive testing, risk assessment and thorough service evaluation have shown alternative methods or conditions to be satisfactory.

This document is a Type C standard as stated in  EN ISO 12100 .

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

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**EN 12312-6:2004+A1:2009 (E)****1 Scope**

This European Standard specifies the technical requirements to minimise the hazards listed in clause 4 which can arise during the commissioning, operation and maintenance of deicers and equipment designed exclusively for deicing and washing of aircraft with deicing/antiicing/washing liquids when carried out in accordance with the specifications given by the manufacturer or his authorised representative. It also takes into account some performance requirements recognised as essential by authorities, aircraft and GSE manufacturers as well as airlines and handling agencies.

**NOTE** Safety of aircraft in connection with deicing/antiicing operations is not dealt with in this European Standard. Any, even minor, aircraft deicing or antiicing operation directly affects flight safety on take-off. Prevention of aeronautical accidents resulting from in-flight icing principally concerns the fluids and methods used, but it may in certain cases also concern deicing or antiicing equipment design or operation. These aeronautical aspects are not covered in this European Standard (see also Joint Aviation authorities (JAA), Joint Aviation Regulations (JAR) JAR-OPS subpart D 1.345 and any associated material).

This standard applies to:

- self-propelled deicers with fixed platform or hinged boom;
- towable deicers with fixed platform or hinged boom;
- stationary deicing/antiicing equipment (e.g. fixed boom, gantry or tower cranes equipped with aircraft deicing/antiicing fluid systems).

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This standard does not apply to:

- fixed installations, such as separate storage tanks or heating and filling stations, which are not an integrated part of the stationary deicing equipment; [SIST EN 12312-6:2004+A1:2009](https://standards.iteh.ai/catalog/standards/sist/558d7e8c-5880-4ce8-85bb-dbc44c40e41b/sist-en-12312-6-2004a1-2009)
- hydraulic control systems; <https://standards.iteh.ai/catalog/standards/sist/558d7e8c-5880-4ce8-85bb-dbc44c40e41b/sist-en-12312-6-2004a1-2009>
- pneumatic systems;
- flow generating systems as such.

This standard does not establish requirements for noise and vibration.

Noise and vibration are dealt with respectively in **A1** EN 1915-4 **A1** and **A1** EN 1915-3 **A1**.

This standard is not dealing with hazards in respect to a standard automotive chassis and the traffic on the apron.

This part of EN 12312 is not applicable to deicers and deicing/antiicing equipment which are manufactured before the date of publication by CEN of this standard.

**A1** This part of EN 12312 is intended to be used in conjunction with EN 1915-1, EN 1915-2, EN 1915-3 (for vehicles) and EN 1915-4. **A1**

**2 Normative references**

**A1** 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. **A1**

**A1** *deleted text* **A1**

EN 795:1996, *Protection against falls from a height — Anchor devices — Requirements and testing*



EN 1050:1996, *Safety of machinery — Principles for risk assessment*

☐<sup>A1</sup> *deleted text* ☐<sup>A1</sup>

EN 1915-1:2001, *Aircraft ground support equipment — General requirements — Part 1: Basic safety requirements*

EN 1915-2:2001, *Aircraft ground support equipment — General requirements — Part 2: Stability and strength requirements, calculations and test methods*

☐<sup>A1</sup> EN 1915-3, *Aircraft ground support equipment — General requirements — Part 3: Vibration measurement methods and reduction* ☐<sup>A1</sup>

☐<sup>A1</sup> EN 1915-4, *Aircraft ground support equipment — General requirements — Part 4: Noise measurement methods and reduction* ☐<sup>A1</sup>

☐<sup>A1</sup> EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)* ☐<sup>A1</sup>

☐<sup>A1</sup> EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)* ☐<sup>A1</sup>

☐<sup>A1</sup> EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)* ☐<sup>A1</sup>

☐<sup>A1</sup> ISO 4305 ☐<sup>A1</sup>, *Mobile cranes — Determination of stability*

☐<sup>A1</sup> ISO 11076:2006, *Aircraft — Ground-based de-icing/anti-icing methods with fluids* ☐<sup>A1</sup>

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### 3 Terms and definitions

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For the purposes of this European Standard, the terms and definitions given in ☐<sup>A1</sup> EN ISO 12100-1:2003 and EN ISO 12100-2:2003 ☐<sup>A1</sup>, EN 1915-1:2001 and ☐<sup>A1</sup> ISO 11076:2006 ☐<sup>A1</sup> and the following apply.

#### 3.1

##### **deicing/antiicing equipment**

piece of equipment, mobile or stationary, used for performing deicing/antiicing/washing operations on aircraft on the ground

#### 3.2

##### **deicer**

entire mobile unit, including the chassis and any structures mounted thereon

#### 3.3

##### **self-propelled deicer**

deicer able to move by an own power source and to operate without a constant connection to external energy or fluid supply

#### 3.4

##### **towable deicer**

deicer not able to move by an own power source

#### 3.5

##### **stationary deicing/antiicing equipment**

permanently installed equipment, e.g. gantry, fixed boom or other crane types

#### 3.6

##### **boom**

moveable hinged beam attached to the integral frame carrier to support the lifting/work platform

**EN 12312-6:2004+A1:2009 (E)****3.7****chassis cabin**

driver's cabin mounted on the chassis of a self-propelled deicer

**3.8****operator's cabin**

boom mounted, enclosed lifting/work platform

**3.9****basket**

boom mounted, open lifting/work platform

**3.10****harness anchorage point**

point for attaching the operator's safety harness

**3.11****deicing pad**

dedicated area on an airport specially designed for deicing

**4 List of significant hazards**

The list of hazards (see annex A) is based on EN 1050:1996 and contains the hazards and hazardous situations, as far as they are dealt with in this European Standard, identified by risk assessment as significant for deicers and deicing equipment and which require action to eliminate or reduce risks.

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**5 Safety requirements and/or measures**

SIST EN 12312-6:2004+A1:2009

**5.1 General requirements**

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**5.1.1**  $\text{A1}$  Deicers and deicing/antiicing equipment shall conform to the relevant requirements of EN 1915-1, EN 1915-2, EN 1915-3 and EN 1915-4 unless otherwise specified in this standard.  $\text{A1}$  They shall also conform to the specific requirements of this standard.

**5.1.2** The operating conditions shall be given by the manufacturer. Deicers shall be designed to operate safely in a continuous relative humidity of 94 %.

Materials and devices used shall take into account the environmental conditions intended to be encountered by deicing equipment, e.g. with respect to temperature, sun, precipitation and freezing effects.

NOTE The operating conditions and the materials chosen are depending on the airport of use (see clause 0 of EN 1915-1:2001 — negotiation).

**5.1.3** The design of deicers and deicing/antiicing equipment shall take into account the operational conditions for deicing/antiicing as given in  $\text{A1}$  ISO 11076  $\text{A1}$ .

**5.2 Spray system**

**5.2.1** The control of hand held spray guns shall be of the hold-to-run type.

**5.2.2** Fixed spray guns of deicers shall be prevented from spraying directly towards the operator's position, e.g. by means of a positive fit.

**5.2.3** In case of spray gun failure it shall be possible to stop the fluid flow by means of an additional shut-off valve.

### 5.3 Stability and strength

**5.3.1** Calculation of stability and strength shall be carried out according to [EN 1915-2](#). Deicing equipment shall be stable under all working conditions.

Any life limited components shall be calculated for a foreseeable lifetime of 10 000 hours of operating taking into account foreseeable wear and corrosion.

**5.3.2** Deviating from 5.2.2.3 of EN 1915-2:2001 the maximum number of persons in the cabin/basket shall be two. The maximum rated load shall be 205 kg.

**5.3.3** Where intended operation includes deicing/antiicing with aircraft engines running, the additional forces shall be taken into account.

**5.3.4** Spraying forces are considered as being dynamic forces (see 5.2.2.4 of EN 1915-2:2001).

**5.3.5** Special attention shall be given to the calculation of telescopic boom joints.

**5.3.6** The design of deicers shall not need stabilizers to ensure stability.

Where chassis spring locks or torsion bars are used, they shall automatically be engaged when the cabin/basket is moved out of the base position.

**5.3.7** Where open baskets are used, the nozzle and hose(s) shall be considered as structural parts for calculation purposes.

**5.3.8** For fatigue stress analysis, the factor for the intended load spectrum shall not be less than one and the amount of load cycles never less than  $2 \times 10^4$  (see also 5.2.6 of EN 1915-2:2001).

**5.3.9** The maximum overturning and corresponding stabilizing moments shall be calculated about the most unfavourable tipping lines and with empty tanks.

Tipping lines shall be determined as shown in [ISO 4305](#).

NOTE For solid and foam-filled tyres the tipping lines may be taken at 1/4 of the tyre ground contact width from the outside of the ground contact width.

**5.3.10** In addition to the verification of stability and strength in accordance with [EN 1915-2](#) the following tests shall be done:

- vehicle driving over a test fixture at maximum allowable speed (6 km/h) in forward and reverse directions. The wheels driving over test fixture shall be the ones giving highest stresses in boom structure. The test fixture shall be a device used to simulate obstacles that may be encountered on an airport ramp (e.g. wheel chocks, storm drains, fuel pit lids, snow and ice ruts, etc.). The test fixture shall be made out of wood or any other similar material measuring 100 mm (4 in) high, 150 mm (6 in) wide and 600 mm (24 in) long. The top corners shall be symmetrically cut at 45° angles along the longitudinal length of the member providing a top flat surface measuring 50 mm (2 in) in width. The test fixture shall be secured in such a manner that prevents sliding or overturning as the vehicle is driven over it during dynamic load testing.
- vehicle driving at maximum allowable speed (6 km/h) in forward and reverse directions and suddenly applying brakes to simulate emergency (panic) stops.

Both tests shall incorporate boom orientation and fluid tank level which generate maximum stress on the structural boom components. The basket/enclosed cabin shall be loaded at maximum rated capacity. In addition to these loads the windload shall be incorporated by calculation afterwards. During the tests the stress levels shall be measured using strain gauge or equivalent measurement techniques. How and where to mount the strain gauges shall be done in accordance with relevant industry practices.

NOTE Relevant recommendations for the mounting of strain gauges can be found e.g. in IIW (International Institute of weldings) publications (see Bibliography).

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The design verification shall be done comparing measured stresses (with incorporated wind loads) and yield strength of the material in question. To pass the tests the minimum acceptable safety factors are as stated in Table 1 in EN 1915-2:2001.

**5.4 Safeguards and safety devices**

**5.4.1** Operator's seats shall be provided with 3 point type inertial reel seat belts as used on standard automotive vehicles.

**5.4.2** Harness anchorage points for each person in accordance with EN 795:1996 Class A shall be provided at baskets.

**5.5 Emergency systems**

**5.5.1** Deicers shall be fitted with:

- an emergency lowering control at ground level or at an accessible position (see 5.13 of EN 1915-1:2001 for access). The design and position of this control shall ensure visibility on the movement of the cabin/basket. This control device shall override the control devices for lifting and lowering;
- an emergency control system in the cabin/basket to move the boom in case of primary power loss;
- an emergency valve at the base lifting cylinder. Provision shall be made for safe access, e.g. portable ladder, and for use of personal protective equipment against falling.

**5.5.2** <sup>A1</sup> Emergency stops shall meet the requirements in EN ISO 13850:2008 category 0 (see 4.1.4 of EN ISO 13850:2008). <sup>A1</sup> At least one shall be provided in the cabin/basket on deicers. Additional emergency stops shall be installed on the outer contour reachable from ground level, e.g. on each longitudinal side.

**5.5.3** Emergency stops on deicers shall:

- stop and hold all boom and cabin/basket movements;
- shut down the fluid pump and heater;
- apply parking brakes.

Emergency stops on deicers shall not:

- impede the emergency lowering function;
- stop the function of communication systems;
- switch off working lights;
- shut down fire extinguisher systems, where applicable.

**5.5.4** Emergency stops on stationary systems shall be installed at operator's position(s) as well as on the structure and reachable from ground level, e.g. on each travelling gear or fundament.

**5.5.5** On stationary deicing/antiicing equipment emergency stops shall stop all motions, the fluid supply and the spraying system.

**5.5.6** To prevent overheating and overpressure, the fluid heater shall be equipped with safety devices. As a minimum, two independent overheat thermo-switches and two relief valves able to conduct the amount of fluid or steam generated by the heater shall be installed.

**5.5.7** The deicing/antiicing equipment shall be furthermore provided with devices to shut down automatically fluid pumping and heating systems when a hazardous condition, e.g. overheating, overpressure, arises while these systems are operating. These devices, when actuated, shall allow a deicer to be driven away from the aircraft.