SLOVENSKI STANDARD
SIST EN 1915-2:2002+A1:2009

01-junij-2009

Podporna oprema na tleh za letalski promet - Splošne zahteve - 2. del: Zahteve za stabilnost in vzdržljivost, izračuni in preskusni postopki

Aircraft ground support equipment - General requirements - Part 2: Stability and strength requirements, calculations and test methods

Luftfahrt-Bodengeräte - Allgemeine Anforderungen - Teil 2: Standsicherheits- und Festigkeitsanforderungen, Berechnungen und Prüfverfahren

Matériel au sol pour aéronefs - Exigences générales - Partie 2: Prescriptions de stabilité et de résistance mécanique, calculs et méthodes d'essai

Ta slovenski standard je istoveten z: **EN 1915-2:2001+A1:2009**

ICS:

49.100	Oprema za servis in vzdrževanje na tleh	Ground service and maintenance equipment

SIST EN 1915-2:2002+A1:2009 **en,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1915-2:2001+A1

March 2009

ICS 49.100

Supersedes EN 1915-2:2001

English Version

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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 CEN Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 1915-2:2001+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of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document includes Amendment 1, approved by CEN on 2009-02-15.

This document supersedes EN 1915-2:2001.

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] 〈A1〉.

This European Standard 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).

[A1] For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. 〈A1〉

EN 1915 - Aircraft ground support equipment - General requirements consists of:

Part 1: Basic safety requirements

Part 2: Stability and strength requirements, calculations and test methods

Part 3: Vibration measurement methods

Part 4: Noise measurement methods.

A further European Standard (EN 12312) in several parts covering specific requirements for different aircraft ground support equipment is in preparation.

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: Oxygen/Nitrogen units
Part 19: Aircraft jacks, axle jacks and hydraulic tail stanchions
Part 20: Ground power equipment.

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

The abbreviation GSE means a complete item of aircraft ground support equipment in the context of this European Standard.

When compiling this European Standard it was assumed that:

— components without specific requirements are:

a) designed in accordance with the usual engineering practices, welding and calculation codes including all failure modes;

b) made of materials with adequate strength and of suitable quality;

c) made of materials free of defects;

— components are kept in good repair and working order, so that the required characteristics remain despite wear;

— by design of the load bearing elements, a safe operation of the machine is assured for loading ranges from zero to 100 % of the rated possibilities and during tests;

— a negotiation took place between the user and the manufacturer concerning particular conditons for the use and places of use of the GSE;

— the place of operation allows a safe use of GSE.

The extent to which hazards are covered is indicated in the scope of this European Standard.

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

This European Standard is a Type C standard as defined in ▌A1⟩ EN ISO 12100 ⟨A1▌.

1 Scope

This Part of EN 1915 specifies the conditions to be taken into consideration when calculating the strength and the stability of GSE according to ▌A1⟩ EN 1915-1 ⟨A1▌ and the EN 12312 series under intended use conditions. It also specifies general test methods.

NOTE The methods given in this standard demonstrate one way of achieving an acceptable safety level. Methods that produce comparable results may be used.

This Part of EN 1915 does not establish additional requirements for the following:

— operation elsewhere than in an airport environment;

— operation in severe conditions, e.g. ambient temperature below -20 °C or over 50 °C, tropical or saturated salty atmospheric environment;

— hazards caused by wind velocity in excess of the figures given in this European Standard;

— earthquake, flood, landslide, lightning and more generally any natural catastrophe.

This Part of EN 1915 is not applicable to GSE which are manufactured before the date of publication by CEN of this Standard.

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

A1 EN 1915-3, *Aircraft ground support equipment - General requirements - Part 3: Vibration measurement methods and reduction*

EN 1915-4, *Aircraft ground support equipment - General requirements - Part 4: Noise measurement methods and reduction*

EN 12312 (all parts), *Aircraft ground support equipment - Specific requirements* A1

A1 *deleted text* A1

A1 EN ISO 3834-1, *Quality requirements for fusion welding of metallic materials - Part 1: Criteria for the selection of the appropriate level of quality requirements (ISO 3834-1:2005)*

EN ISO 3834-2, *Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements (ISO 3834-2:2005)*

EN ISO 3834-3, *Quality requirements for fusion welding of metallic materials - Part 3: Standard quality requirements (ISO 3834-3:2005)*

EN ISO 3834-4, *Quality requirements for fusion welding of metallic materials - Part 4: Elementary quality requirements (ISO 3834-4:2005)*

EN ISO 5817, *Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817:2003, corrected version:2005, including Technical Corrigendum 1:2006)*

EN ISO 12100-1:2003, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles (ISO 12100-2:2003)*

ISO 2408, *Steel wire ropes for general purposes - Minimum requirements* A1

ISO 8625-1:1993, *Aerospace – Fluid systems – Vocabulary – Part 1: General terms and definitions relating to pressure*

3 Terms and definitions

For the purposes of this Part of EN 1915 the terms and definitions of [A1] EN ISO 12100-1:2003 and EN ISO 12100-2:2003 [A1] and EN 1915-1:2001 apply. Additional terms and definitions are:

3.1
component mass
mass of that part of the GSE, for which the strength is to be calculated

3.2
rated load
maximum mass (including persons) a GSE or a part of it is intended to carry

3.3
local loads
loads derived from the rated load for the calculation of the strength of particular parts of the GSE

3.4
snow load
maximum mass of snow or ice the GSE is intended to carry

3.5
static test load
test load or combination of test, used to simulate operational loading

3.6
dynamic forces
forces resulting from acceleration of a mass (e.g. acceleration forces, retardation forces, centrifugal forces)

3.7
secondary dynamic forces
forces caused by the movement of persons. These forces act horizontally at the centre of gravity of the body of a person. The centre of gravity of persons is assumed to be 1,1 m above the standing area

3.8
retardation forces
forces on particular parts of GSE caused by the maximum deceleration of the GSE. These forces act at the centre of gravity of the particular part in the direction of motion

3.9
spring reaction force
force in the suspension under the condition of loading

3.10
wind load
force acting on a GSE or part of it due to wind pressure. This force acts horizontally at the geometric centre of the body of the GSE

3.11
tipping edge
those part(s) of the GSE in contact with the ground, located farthest out on the most heavily loaded side

3.12
tipping moment
total of the products of those forces which tend to tip the GSE, and their distance normal to the tipping edge

3.13
bursting pressure
pressure at which a component bursts or shows excessive leakage due to structural failure [ISO 8625-1 : 1993]

3.14
maximum working pressure
highest pressure at which the system is to operate

4 List of hazards

〈A1〉 Complementary to the hazards dealt with in the other parts of EN 1915 and in the different parts of EN 12312 this part of EN 1915 deals with the following hazards: 〈A1〉

— mass and velocity (kinetic energy of elements in controlled or uncontrolled motion);

— inadequacy of mechanical strength;

— break-up during operation;

— loss of stability / tipping of GSE.

5 〈A1〉 Safety requirements and/or protective measures 〈A1〉

5.1 General

〈A1〉 GSE shall comply with the safety requirements and/or protective measures of this clause, with the requirements of EN 1915-1, EN 1915-3 and EN 1915-4 as relevant, as well as with the requirements of the relevant part of EN 12312. In addition, the machine shall be designed according to the principles of EN ISO 12100 for relevant but not significant hazards, which are not dealt with by this document. 〈A1〉

NOTE Where a standard automotive chassis is used, the manufacturer of the GSE should pay attention to and appropriate gross mass rating for the intended use.

5.2 Requirements for the strength calculation of steel constructions

5.2.1 General remarks

The method of calculation shall take into account the complexity of each individual type of GSE. The pertinence of the method of calculation shall be stated in the technical file.

Calculations shall be performed in accordance with either

— recognized engineering design methods and engineering codes;

— finite elements analysis;

— actual stress measurements

or combinations of these.

NOTE Information about load geometry is given in annex A.

The source of the design methods and engineering codes, if generally accessible, shall be stated in the case of any unusual formulae or calculation methods. Otherwise only formulae or calculation methods which can be easily verified shall be used.

The general stress analysis shall be carried out to ensure safe levels of stress in relation to the yield stress of the material used.

Safe levels of stress related to the loading conditions shall be demonstrated for all supporting structures. The principal dimensions, cross sections, materials and fastening means shall be stated.

Significant effects of elastic deflection including results of tests (see 5.4.3) shall be considered in the stress analysis.

The analysis of the load case combinations intended by the manufacturer shall be carried out to ensure that the severest individual load ratings can be identified.

Design strength shall be proven for components under compression which may be susceptible to buckling or bulging using a verifiable method.

Consideration shall be given to high dynamic forces which can be caused by the operation of a safety device for the prevention of unintentional movements if there is an escape of fluid in a piping system or a rope, chain, nut or gear fails.

The design of mechanical restraint devices shall take into account all loads and forces occurring during blocking.

Where a system has two or more lifting elements in parallel, design shall ensure the loads resulting from the failure of one element shall not have effects jeopardising safety.

NOTE For calculation purposes, this situation corresponds to an exceptional loading.

5.2.2 Loads and load combinations

5.2.2.1 The following loads or worse combinations thereof shall be taken into account:

— component mass;

— rated load;

— local loads;

— snow load;

— dynamic forces;

— secondary dynamic forces;

— wind load.

NOTE Load combinations are given in 5.4.5.

5.2.2.2 Loads shall be used in the calculation of the strength of the elements concerned at the most unfavourable positions, values and directions.

5.2.2.3 The rated load shall be stated by the manufacturer, and shall be not less than 3000 N/m². where the intended use of the GSE is to carry persons, the rated load shall be calculated on the basis of four