

**Lihtsad leekkuumutuseteta õhu või
lämmastiku surveanumad. Osa 4:
Alumiiniumsulamist surveanumad
raudteeveeremi õhkpiduriseadmetele ja
pneumaatilistele abiseadmetele**

Simple unfired pressure vessels designed to contain air or nitrogen - Part 4: Aluminium alloy pressure vessels designed for air braking equipment and auxiliary pneumatic equipment for railway rolling stock

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 286-4:1999 sisaldab Euroopa standardi EN 286-4:1994 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 23.11.1999 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 286-4:1999 consists of the English text of the European standard EN 286-4:1994.</p> <p>This document is endorsed on 23.11.1999 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p>Käsitlusala: Käesolev standard on kohaldatav lihtsatele leekkuumutamata, raudteeveeremi õhkpiduriseadmete ja pneumaatiliste abiseadmete jaoks konstrueeritud alumiiniumsulamist survemahutitele.</p>	<p>Scope:</p>
--	----------------------

ICS 23.020.30

Võtmesõnad: alumiiniumsulamid, arvutus, balloonid, keevitusdefektid, kokkumonteerimine, konstruktsioon, mahutid, pidurid, pneumoseadmed, raudteeveerem, sertifitseerimine, survemahutid, tootmise juhtimine, vastuvõetavus

UDC 621.642.02-98-034.715:629.4-592:620.1:62-777

Descriptors: Rail vehicle, pneumatic brake, pressure vessel, aluminium vessel.

English version

**Simple unfired pressure vessels designed to contain
air or nitrogen**

**Part 4: Aluminium alloy pressure vessels designed for air braking equip-
ment and auxiliary pneumatic equipment for railway rolling stock**

Réceptifs à pression simples, non soumis à la flamme, destinés à contenir de l'air ou de l'azote. Partie 4: Réceptifs à pression en alliages d'aluminium, destinés aux équipements pneumatiques de freinage et aux équipements pneumatiques auxiliaires du matériel roulant ferroviaire

Einfache unbefeuerte Druckbehälter für Luft oder Stickstoff. Teil 4: Druckbehälter aus Aluminiumlegierungen für Druckluftbremsanlagen und pneumatische Hilfseinrichtungen in Schienenfahrzeugen

This European Standard was approved by CEN on 1994-09-09.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Contents

	Page		Page
Foreword	2	14 Delivery	43
1 Scope	3	15 Documentation to accompany the vessel	43
2 Normative references	4		
3 Symbols	5	Annex A (normative) Verification	45
4 Materials	8	Annex B (normative) Declaration of conformity – Surveillance	47
5 Design	10	Annex C (normative) Design and manu- facturing schedules	50
6 Inspection and drainage bosses	26	Annex D (normative) Type examination	52
7 Marking	28	Annex E (normative) Content of the manufacturing record	53
8 Corrosion protection	31	Annex F (informative) Assembly to the vehicles	55
9 Qualification of welding procedures	31	Annex G (informative) Service surveillance of vessels	60
10 Qualification of welders and welding operators ..	31		
11 Testing of the vessels	31		
12 Certification procedures	42		
13 Information to be supplied at the time of invitation to tender and the time of order	42		

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 54 'Unfired pressure vessels', the Secretariat of which is held by BSI.

CEN/TC 54 has decided to submit the final draft for Formal Vote. The result was positive.

This Part is one of a series of four. The other Parts cover:

design, manufacture and testing (Part 1);

pressure vessels for air braking and auxiliary systems for motor vehicles and their trailers (Part 2);

steel pressure vessels designed for air braking equipment and auxiliary pneumatic equipment for railway rolling stock (Part 3).

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by March 1995 at the latest.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom.

1 Scope

1.1 This Part of this European Standard is applicable to simple unfired aluminium alloy pressure vessels, referred to as "vessel" in this standard, designed for air braking equipment and auxiliary pneumatic equipment for railway rolling stock (see 1.6).

1.2 The vessels to this standard are:

- a) made from a single shell;
- b) made from aluminium alloy;
- c) fabricated by welding;
- d) used at a maximum working pressure of 10 bar;
- e) the product of the maximum working pressure (in bar) and the volume (in litre):

$$50 \text{ bar litres} < PV \leq 10\,000 \text{ bar litres};$$

f) made of a cylindrical part of circular cross-section called the shell with two outwardly dished torispherical ends, that is two dished ends with the same axis of rotation. This standard therefore does not apply to vessels with one or two flat ends or those made up of several compartments;

g) calculated with a design pressure P (see 5.1.4.2);

h) designed for a working temperature of between $-50\text{ }^{\circ}\text{C}$ and $+100\text{ }^{\circ}\text{C}$ [$+65\text{ }^{\circ}\text{C}$ for certain grades of aluminium alloy (see 4.1.1)];

j) fastened to the vehicles by straps;

1.3 In normal service, a momentary overpressure of 1 bar of the maximum working pressure is permitted (10 % of PS).

1.4 This Part of this European Standard applies to the vessel proper, from the inlet connection to the outlet connection and to all other connections and fittings belonging to the vessel.

1.5 This Part of this European Standard gives the requirements to be met for the calculation, design, fabrication, inspection during fabrication and certification of the vessel, and fittings for assembly to the vehicle.

These requirements cannot be written in sufficient detail to ensure good workmanship or proper construction. Each manufacturer is therefore responsible for taking every necessary step to make sure that the quality of workmanship and construction is such as to ensure compliance with good engineering practice.

This Part of this standard gives:

- a) in annex F, recommendations for assembly to the vehicles;
- b) in annex G, recommendations for the service surveillance of vessels.

1.6 The requirements of this Part of this European Standard apply to vessels designed to be fitted to rail vehicles used on the main national networks, urban networks, underground railways, trams, private networks (regional railways, company railways, ...).

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.

- EN 287-2 Approval testing of welders - fusion welding -
Part 2: Aluminium and aluminium alloys
- EN 288-1 Specification and approval of welding procedures for metallic materials -
Part 1: General rules for fusion welding
- EN 288-2 Specification and approval of welding procedures for metallic materials -
Part 2: Welding procedure specification for arc welding
- EN 288-4 Specification and approval of welding procedures for metallic materials -
Part 4: Welding procedure tests for the arc welding of aluminium and its alloy
- EN 10025 Hot rolled products of non-alloy structural steels - Technical delivery conditions
- EN 26520 Classification of imperfections in metallic fusion welds, with explanations
- ISO 209-1 Wrought aluminium and aluminium alloys - Chemical composition and forms of product -
Part 1: Chemical composition
- ISO 209-2 Wrought aluminium and aluminium alloys - Chemical composition and forms of product -
Part 2: Forms of products

- ISO 228-1 Pipe threads where pressure-tight joints are not made on the threads -
Part 1: Designation, dimensions and tolerances
- ISO 261 ISO general purpose metric screw threads - General plan
- ISO 1101 Technical drawings - Geometrical tolerancing - Tolerancing of form, orientation, location and run-out - Generalities, definitions, symbols, indications on drawings
- ISO 2081 Metallic coatings - Electroplated coating of zinc on iron or steel
- ISO 2107 Aluminium, magnesium and their alloys - Temper designations
- ISO 2437 Recommendation practice for the X-ray inspection of fusion welded butt joints for aluminium and its alloys and magnesium and its alloys 5 to 50 mm thick
- ISO 4520 Chromate conversion coatings on electroplates zinc and cadmium coatings
- ISO 6361-2 Wrought aluminium and aluminium alloy sheet, strip and plates
Part 2: Mechanical properties
- ISO 6362-2 Wrought aluminium and alloy extruded rods/bars, tubes and profiles
Part 2: Mechanical properties

3 Symbols

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

A	Elongation at rupture	%
A_{fb}	Cross sectional area effective as compensation, of the boss	mm ²
A_{fp}	Cross sectional area effective as compensation, of the reinforcing plate	mm ²
A_{fs}	Cross sectional area effective as compensation, of the shell	mm ²
A_p	Area of the pressurized zone	mm ²
c	Absolute value of the minus rolling tolerance for sheets as quoted in the standard	mm
D_o	Outside diameter of the shell of the vessel	mm
d_{ib}	Internal diameter of the boss	mm