COUNCIL DIRECTIVE

of 17 September 1984

on the approximation of the laws of the Member States relating to seamless, unalloyed aluminium and aluminium alloy gas cylinders

(84/526/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas in the Member States the construction and inspection of gas cylinders are subject to mandatory provisions which differ from one Member State to another and consequently hinder trade in such cylinders; whereas it is therefore necessary to approximate these provisions;

Whereas Council Directive 76/767/EEC of 27 July 1976 on the approximation of the laws of the Member States relating to common provisions for pressure vessels and methods of inspecting them (4), as amended by the Act of Accession of 1979, lays down in particular the EEC pattern approval and verification procedures for these vessels; whereas, in accordance with that Directive, it is necessary to lay down the technical requirements to be complied with by EEC-type seamless, unalloyed aluminium and aluminium alloy gas cylinders with a capacity of 0,5 to 150 litres in order to be imported, marketed and used without restraint after undergoing the inspections and having affixed to them marks and signs laid down,

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. This Directive shall apply to seamless, unalloyed aluminium and aluminium alloy gas cylinders, formed from a single piece, capable of being refilled and transported, with a capacity of between 0,5 and 150 litres inclusive and designed to contain compressed, liquefied or dissolved gases. These gas cylinders are hereinafter referred to as 'cylinders'.

2. This Directive shall not apply to:

— cylinders manufactured from an aluminium alloy with a guaranteed minimum tensile strength greater than 500 N/mm²,

— cylinders to which metal is added when the base is being sealed.

Article 2

For the purpose of this Directive, 'EEC-type cylinder' shall mean any cylinder designed and manufactured in such a way that it satisfies the requirements of this Directive and of Directive 76/767/EEC.

Article 3

No Member State may, on grounds relating to the construction or inspection of a cylinder within the meaning of Directive 76/767/EEC and this Directive, refuse, prohibit or restrict the placing on the market and putting into service of an EEC-type cylinder.

Article 4

All EEC-type cylinders shall be subject to EEC pattern approval.

All EEC-type cylinders shall be subject to EEC verification with the exception of cylinders with a hydraulic test pressure of 120 bars or less and a capacity of not more than one litre.

Article 5

Any amendments necessary to adapt sections 2.1.5, 2.4, 3.1.0, 3.4, 3.5, 3.6, 3.7, 4, 5 and 6 of Annex I and the other Annexes to this Directive to technical progress

(1) OJ No C 104, 13. 9. 1974, p. 75.
(2) OJ No C 5, 8. 1. 1975, p. 52.
(3) OJ No C 62, 15. 3. 1975, p. 32.
(4) OJ No L 262, 27. 9. 1976, p. 153.

shall be adopted in accordance with the procedure laid down in Article 20 of Directive 76/767/EEC.

Article 6

The procedure laid down in Article 17 of Directive 76/767/EEC shall apply to section 2.3 of Annex I to this Directive.

Article 7

1. Member States shall bring into force the laws, regulations and administrative provisions needed in order to comply with this Directive within 18 months following its notification (1) and shall forthwith inform the Commission thereof.

2. Member States shall ensure that the texts of the provisions of national law which they adopt in the field covered by this Directive are communicated to the Commission.

Article 8

This Directive is addressed to the Member States.

Done at Brussels, 17 September 1984.

For the Council

The President

P. BARRY

(1) This Directive was notified to the Member States on 26 September 1984.

ANNEX I

1. TERMS AND SYMBOLS USED IN THIS ANNEX

1.1. YIELD STRESS

For the purposes of this Directive, the yield stress values used in calculations of the pressure parts shall be as follows:

— for aluminium alloys, the 0,2 % proof stress $R_{p\,0,2}$, i.e. the value of the stress which gives rise to a non-proportional elongation equal to 0,2 % of the gauge length of the test-piece,

— for unalloyed aluminium in the unhardened state, the 1 % proof stress.

1.2. For the purposes of this Directive, 'bursting pressure' means the pressure at plastic instability, i.e. the maximum pressure obtained during a pressure bursting test.

1.3. The symbols used in this Annex have the following meanings:

P_h = hydraulic test pressure, in bars;

P_r = cylinder busting pressure measured during the bursting test, in bars;

P_{rt} = calculated minimum theoretical bursting pressure, in bars;

R_e = minimum value of the yield stress guaranteed by the cylinder manufacturer, in N/mm^2;

R_m = minimum value of the tensile strength guaranteed by the cylinder manufacturer, in N/mm^2;

a = calculated minimum thickness of the wall of the cylindrical part of the cylinder, in mm;

D = nominal external diameter of the cylinder, in mm;

R_{mt} = actual tensile strength, in N/mm^2;

d = mandrel diameter for bend tests, in mm.

2. TECHNICAL REQUIREMENTS

2.1. MATERIALS USED, HEAT AND MECHANICAL TREATMENT

2.1.1. An aluminium alloy or unalloyed aluminium shall be defined according to its method of manufacture, its nominal chemical composition and the heat treatment undergone by the cylinder, the latter's resistance to corrosion and its mechanical properties. The manufacturer shall give the corresponding information, taking account of the requirements listed below. Any change in such information shall be deemed to correspond to a change in the type of material for the purposes of EEC pattern approval.

2.1.2. The following are permitted for the manufacture of cylinders:

(a) all unalloyed aluminium containing at least 99,5 % aluminium;

(b) aluminium alloys with the chemical composition set out in table 1 which have undergone the heat and mechanical treatments listed in table 2;

TABLE 1

	Chemical composition in %										
	Cu	Mg	Si	Fe	Mn	Zn	Cr	Ti+Zr	Ti	Total others	Al
Alloy B											
min.	—	4,0	—	—	0,5	—	—	—	—		remain-
max.	0,10	5,1	0,5	0,5	1,0	0,2	0,25	0,20	0,10	0,15	der
Alloy C											
min.	—	0,6	0,7	—	0,4	—	—	—	—		remain-
max.	0,10	1,2	1,3	0,5	1,0	0,2	0,25	—	0,10	0,15	der

TABLE 2

	Heat and mechanical treatments
Alloy B	In order: 1. Blank inhibition treatment: — duration determined by the manufacturer, — temperature between 210 and 260 °C. 2. Extrusion with a degree of cold-working of at most 30 %. 3. Formation of head: the temperature of the metal must be no less than 300 °C at the end of the process.
Alloy C	1. Placing in solution before quenching: — duration determined by the manufacturer, — temperature in no case less than 525 °C or above 550 °C. 2. Quenching 3. Artificial ageing: — duration determined by the manufacturer, — temperature of between 140 and 190 °C.

(c) any other aluminium alloy may be used for the manufacture of cylinders provided that it first passes the corrosion-resistance tests described in Annex II.

2.1.3. The cylinder manufacturer must obtain and provide cast-analysis certificates for the material used for the manufacture of the cylinders.

2.1.4. There must be an opportunity for making independent analyses. These analyses must be carried out either on specimens taken from the semi-finished product as supplied to the cylinder manufacturer or on the finished cylinders. When it is decided to take a specimen from a cylinder, it is permissible for the specimen to be taken from one of the cylinders previously chosen for the mechanical tests specified in 3.1 or for the pressure bursting test specified in 3.2.

2.1.5. Heat and mechanical treatment of the alloys referred to in 2.1.2 (b) and (c).

2.1.5.1. The last process in the manufacture of the cylinder, apart from finish machining, shall be artificial ageing.

2.1.5.1.1. The manufacturer shall indicate the characteristics of the final treatment which he carries out, i.e.:

— nominal temperatures during solution and artificial ageing,

— nominal duration of the time effectively spent at solution and artificial ageing temperatures.

During the heat treatment the manufacturer must comply with these characteristics within the following limits:

— solution temperature: to within ± 5 °C,

— artificial ageing temperature: to within ± 5 °C,

— duration of time effectively spent: to within ± 10 %.

2.1.5.1.2. However, for solution and artificial ageing the manufacturer may indicate a range of temperatures, with the difference between the extreme values not exceeding 20 °C. For each of these extreme values, he shall indicate the nominal duration of the time effectively spent.

For each intermediate temperature the nominal duration of the time effectively spent shall be determined by linear interpolation for the duration of the placing in solution and by linear interpolation of the logarithm of the time for the duration of artificial ageing.

The manufacturer must carry out the heat treatment at a temperature included in the range indicated for a duration of time effectively spent, which shall not vary by more than 10 % from the nominal duration calculated as above.

2.1.5.1.3. The manufacturer must indicate the characteristics of the final heat treatment he has carried out, in the file submitted for the purposes of EEC verification.

2.1.5.1.4. In addition to the final heat treatment, the manufacturer must also indicate all heat treatments carried out at over 200 °C.

2.1.5.2. The manufacture of the cylinder may not include quenching and artificial ageing.

2.1.5.2.1. The manufacturer must specify the characteristics of the last heat treatment he has carried out at a temperature exceeding 200 °C, taking account of differences, if necessary, between different parts of the cylinder.

He must also specify any forming operation (e.g. extrusion, drawing or head formation) in the course of which the temperature of the metal does not exceed 200 °C and which is not followed by heat treatment at a temperature higher than that value, as well as the position of the section of the formed body which has undergone most cold-working and the corresponding degree of cold-working.

For the purposes of applying this provision, 'degree of cold-working' is defined as the ratio $\frac{S - s}{s}$, S being the initial section and s the final section.

The manufacturer must comply with these characteristics of the heat treatment and forming within the following limits:

— duration of the heat treatment to within ± 10 % and temperature to within ± 5 °C,

— degree of cold-working of the section which has undergone most cold-working to within ± 6 % if the diameter of the cylinder is equal to or less than 100 mm and to within ± 3 % if the diameter is more than 100 mm.

2.1.5.2.2. However, for the heat treatment the manufacturer may indicate a range of temperatures, with the difference between the extreme values not exceeding 20 °C. For each of these extreme values he shall indicate the nominal duration of the time effectively spent. For each intermediate temperature the nominal duration of the time effectively spent shall be determined by linear interpolation. The manufacturer must carry out the heat treatment at a temperature included in the range indicated for a duration of time effectively spent which shall not vary by more than 10 % from the nominal duration calculated as above.