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ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

Working Party on the Transport
of Dangerous Goods
(Sixty-sixth session,
Geneva, 3-7 May 1999)

MARGINAL 211 127

Transmitted by the Government of France

1. The WP.15 Working Party at its sixty-fourth session agreed that in principle the minimum thicknesses for shells in road transport were the consequence of the inadequacy of the present cubic formula of marginal 211 127 (3) and (4) of ADR in determining these thicknesses.

Proposal

Add the following new paragraph after marginal 211 127 (5) (b) 4:

"FOR SHELLS WITH PROTECTION IN ACCORDANCE WITH PARAGRAPHS (5) (a) AND (b), THE THICKNESSES SHALL NOT BE LESS THAN THOSE INDICATED IN THE TABLE BELOW:

STAINLESS AUSTENITIC STEELS	ALUMINIUM ALLOYS	PURE ALUMINIUM OF 99.80%	OTHER STEELS
Ø ≤ 1.80 2.5	Ø ≤ 1.80 4	Ø ≤ 1.80 6	Ø ≤ 1.80 3*
Ø > 1.80 3	Ø > 1.80 5	Ø > 1.80 8	Ø > 1.80 4*

Note: With the exception indicated in marginal 211 127 (6)."

The data for pure aluminium of 99.80% can be found in this document. In order to calculate this pure aluminium, we have taken into consideration the weldability factor which is not as good as that of aluminium alloys. According to ADR, the references concerning the use of pure aluminium, like that of marginal 211 822, do not concern the general minimum thickness but the minimum thickness to be applied for shells intended for the carriage of nitric acid (15 mm), although the resulting thickness at 10 bar would be higher than the 15 mm in question according to the ADR formula in marginal 211 127 (2).

There are also steel alloys of C-Si-Mn with molybdenum and other metals. For example, as regards the THYSSEN range, as from FG-32 (Rm 440-560. A% = 23% Rm x A = 10,120) the values obtained are slightly more favourable to mild steel FG-29 (Rm 390-510 and A = 24%), but their repercussions are not sufficient to obtain a minimum thickness value significantly different to the values which are normal for mild steel Rm x A% = 9360, since the difference: 10,120 - 9360 = 760, is negligible in terms of its influence on the result of the application of the equivalent thickness cubic formula.

ALEACION DE ALUMINIO 99,80%

ALUMAFEL

1080 A

ALPUR 80

EQUIVALENCIAS INTERNACIONALES

USA	ESPAÑA		FRANCIA	ALEMANIA	G.B.	SUECIA	SUIZA	CANADA	ITALIA
AA	DCA	UNE	AFNOR	DIN	BS	SIS	VSM	ALCAN	UNI
1080 A	ALPUR 80	L-3081 38 118	A 8	Al 99,8 3.0285	1 A	4004	41 99,8	9080	4500

COMPOSICION QUIMICA

%	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti		Otros	Al
Min									Ga + V		
Max	0,15	0,15	0,03	0,02	0,02		0,03	0,03	0,05	0,02	99,80

PROPIEDADES FISICAS

- Peso especifico kg/dm³ : 2,7
- Intervalo de fusión °C : 648-657
- Coeficiente de dilatación lineal (0 a 100 °C) - °C⁻¹ x 10⁶ : 23,6
- Modulo de elasticidad* MPa : 69.000
- Coeficiente de Poisson : 0,33
- Conductividad térmica (0 a 100 °C) - W/m °C : (O/H18) 234
- Resistividad eléctrica a 20 °C - μΩ cm. : (O/H18) 2,8
- Calor especifico (0 a 100 °C) - J/kg °C : 945
- Potencial de disolución V : - 0,85

1 Mpa = 1N/mm²

* Módulos de tracción y compresión

APTITUDES TECNOLOGICAS

- SOLDADURA
  - A la llama : MB
  - Al arco (TIG-MIG) : MB
  - Resistencia : B
  - Braseado : MB
- EMBUTICION PROFUNDA
  - Recocido : MB
  - 1/2 dura : B
  - Dura : -
- REPUJADO
  - Estado O : MB
- MAQUINABILIDAD H18
  - Fragmentación de viruta : M
  - Brillo de superficie : MB
- COMPORTAMIENTO NATURAL
  - Agentes atmosféricos : MB
  - Medio marino : MB
- ANODIZADO
  - Protección : MB
  - Decoración : MB
  - Dura : MB

TRATAMIENTOS TERMICOS

Recocido: De 30 min. a 2 horas a 325º-360º C. Enfriamiento al aire.

PROPIEDADES MECANICAS A TEMPERATURA AMBIENTE

Producto	Estado metalúrgico	Indice de resistencia	Diámetro Ø mm. Espesor e mm. Sección S mm.²	Características a la tracción Rm (MPa) Mín.	Rm (MPa) Máx.	Rp 0,2 (MPa) Mín.	A % Mín.	Radio mínimo de plegado (*) K	Dureza Brinell HB
Chapas	F	—	—	—	—	—	—	—	—
	O	—	0,35 < e < 3,2	65	95	20	35	0 e	19
	O	—	3,2 < e < 10	65	95	20	35	1 e	19
	O	—	10 < e < 80	65	95	20	32	—	19
	H14	R 10E	0,35 < e < 3,2	100	140	70	7	1 e	27
	H14	R 10E	3,2 < e < 6	100	140	70	7	1,5 e	27
	H14	R 10E	6 < e < 12	100	140	70	7	2,5 e	27
	H18	R 13	0,35 < e < 1,6	125	—	105	4	2 e	—
	H18	R 13	1,6 < e < 3,2	125	—	105	4	3 e	—
	H18	R 13	3,2 < e < 4,8	125	—	105	4	3,5 e	—
	H18	R 13	4,8 < e < 12	125	—	105	4	—	—

(*) Para el estado en frío, radio de plegado multiplicar el espesor de la chapa por el coeficiente K.

CARACTERISTICAS GENERALES Y USOS TIPICOS

- Aluminio de elevada pureza, con excelente respuesta a los tratamientos de abrillantado y resistencia a la corrosión.
- Se aplica para reflectores, embellecedores, arquitectura, láminas para condensadores, industria química y alimentación, tubos deformables y envases para productos farmaceuticos y alimenticios, aplicaciones nucleares, plaqueantes de aluminio de menor pureza o aleaciones Al-Cu. Cisternas para ácido nítrico.