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AMENDMENT 1
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Plastics piping systems for the supply of gaseous fuels - Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing —

Part 1: General

AMENDMENT 1

Systèmes de canalisations en matières plastiques pour la distribution de combustibles gazeux — Systèmes de canalisations en polyamide non plastifié (PA-U) avec assemblages par soudage et assemblages mécaniques —

Partie 1: Généralités

AMENDEMENT 1

Reference number
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Foreword

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Amendment 1 to ISO 16486-1:2012 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 4, *Plastics pipes and fittings for the supply of gaseous fuels*.

Plastics piping systems for the supply of gaseous fuels - Unplasticized polyamide (PA-U) piping systems with fusion jointing and mechanical jointing —

Part 1: **General**

AMENDMENT 1

Page 6, 5.2.5, Table 1

Replace the existing table with the following one:

Table 1 — Characteristics of the compound in the form of granules

Characteristic	Requirement	Test parameters		Test method
		Parameter	Value	
Density	PA-U 11 compound: (1 020 to 1 050) kg/m^3 PA-U 12 compound: (1 000 to 1 040) kg/m^3	Test temperature	23 °C	ISO 1183-1 ISO 1183-2
Viscosity number	≥ 180 ml/g	Solvent	m-Cresol	ISO 307
Water content	≤ 0,10 %			ISO 15512, Method B
Carbon black content [a]	(0,5 to 1,0) % (by mass)			ISO 6964
Pigment or carbon black dispersion	A.3			Annex A
[a] Only for black compound.				

Page 6, 5.2.5, Table 2

Replace the existing table with the following one:

Table 2 — Characteristics of compound in form of pipe/bar

Characteristic	Requirement	Test parameters		Test method
		Parameter	Value	
Chemical resistance	Change in mean hoop stress at burst between specimens tested in reagent and in the corresponding control fluid ≤ 20 % or Change in tensile strength at yield of injection moulded bar specimens tested in reagent and in the corresponding control fluid ≤ 20 %	According to Annex B		Annex B
Resistance to weathering	The weathered test pieces shall have the following characteristics:	Preconditioning (weathering): cumulative solar radiation	≥ 3,5 GJ/m^2	ISO 16871
a) Elongation at break	a) Elongation at break: ≥ 160 %	Testing speed	25 mm/min	a) ISO 6259-1, ISO 6259-3 [a] or ISO 527-1, ISO 527-2 [b]
b) Hydrostatic strength	b) No failure during the test period of any test piece	End caps Orientation Conditioning time Type of test Circumferential (hoop) stress: PA-U 11 160 and PA-U 12 160 [c] PA-U 11 180 and PA-U 12 180 [c] Test period Test temperature	Type A Free 6 h Water-in-water 10,0 MPa 11,5 MPa 165 h 80 °C	b) ISO 1167-1, ISO 1167-2

NOTE 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

[a] For test pieces taken from samples in the form of pipe.

[b] For test pieces in the form of injection moulded bar prepared according to ISO 1874-2.

[c] For material classification and designation, see 5.4.

[d] The critical pressure, p_c shall be determined for each new PA-U compound and for every pipe dimension with $d_n > 90$ mm.

[e] The temperature of cooling for the crack initiation groove shall be appropriate to produce a high speed crack or cracks emanating from the initiation. For some PA-U compounds a crack initiation groove temperature between 0 °C and −60 °C has been found to be suitable.

[f] The critical pressure, $p_{c,S4}$ shall be determined on a pipe produced from the same batch of PA-U compound and the same lot of pipes, as the pipe submitted to the full-scale test.

[g] The value of $p_{c,S4}$ determined in this test is the reference value, $p_{c,S4,REF}$, to be referred to in the requirement of the S4 test specified in ISO 16486-2[10].

Table 2 *(continued)*

Characteristic	Requirement	Test parameters		Test method
		Parameter	Value	
c) Cohesive resistance for electrofusion joint	Length of initiation rupture ≤ $L_2/3$ in brittle failure	Test temperature	23 °C	c) ISO 13954 Joint: Condition 1, ISO 16486-5, Table B.3
Resistance to rapid crack propagation (Critical pressure, p_c) [d] ($e \geq 5$ mm) (Full-scale test)	$p_c \geq 1{,}5$ MOP	Test temperature	0 °C	ISO 13478 [e]
Resistance to rapid crack propagation (critical pressure, p_c,S4) [f] (S4 test)	g	Test temperature	0 °C	ISO 13477
Longitudinal reversion	≤ 3 % pipe shall retain its original appearance	Heating fluid Test temperature Length of test piece Duration of exposure time	Air 150 °C 200 mm According to ISO 2505	ISO 2505
Resistance to slow crack growth for $e > 5$ mm (notch test)	No failure during the test period	Test temperature d_n SDR Test pressure: PA-U 11 160 and PA-U 12 160 [c] PA-U 11 180 and PA-U 12 180 [c] Test period Type of test	80 °C 110 mm or 125 mm 11 18 bar 20 bar 500 h Water-in-water	ISO 13479
Charpy impact strength	$a_{cN} \geq 10$ kJ/m^2 for PA-U 11 and PA-U 12 compounds	Test specimens Test temperature	Notched injection moulded specimens prepared according to ISO 1874-2 0 °C	ISO 179-1/1eA

NOTE 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2.

[a] For test pieces taken from samples in the form of pipe.

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[g] The value of $p_{c,S4}$ determined in this test is the reference value, $p_{c,S4,REF}$, to be referred to in the requirement of the S4 test specified in ISO 16486-2[10].

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