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From: Secretary-General of the European Commission,  
signed by Mr Jordi AYET PUIGARNAU, Director

date of receipt: 1 July 2015

To: Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of  
the European Union

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Subject: ANNEX to the COMMISSION DELEGATED REGULATION.../... of xxx on  
the classification of the reaction to fire performance of construction  
products pursuant to Regulation (EU) No 305/2011 of the European  
Parliament and of the Council

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Delegations will find attached document C(2015) 4394 final ANNEX 1.

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Brussels, 1.7.2015  
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ANNEX 1

**ANNEX**

**to the COMMISSION DELEGATED REGULATION.../...**

**of xxx**

**on the classification of the reaction to fire performance of construction products  
pursuant to Regulation (EU) No 305/2011 of the European Parliament and of the  
Council**

## ANNEX

### Classes of reaction to fire performance

#### 1.1. For the purposes of Tables 1 to 4 the following symbols<sup>1</sup> apply:

- (1) ' $\Delta T$ ' - temperature rise;
- (2) ' $\Delta m$ ' - mass loss;
- (3) ' $t_f$ ' - duration of flaming;
- (4) 'PCS' - gross calorific potential;
- (5) 'LFS' - lateral flame spread;
- (6) 'SMOGRA' - smoke growth rate.

#### 1.2. For the purposes of Tables 1, 2 and 3 the following symbols<sup>2</sup> apply:

- (1) 'FIGRA' - fire growth rate;
- (2) 'THR' - total heat release;
- (3) 'TSP' - total smoke production;
- (4) 'Fs' - flame spread.

#### 1.3. For the purposes of Table 4 the following symbols and test parameters apply:

- (1) ' $HRR_{sm30}$ , kW' - heat release rate averaged by a 30-s sliding average;
- (2) ' $SPR_{sm60}$ ,  $m^2/s'$ ' - smoke production rate averaged by a 60-s sliding average;
- (3)
- (4) 'Peak HRR, kW' - maximum of  $HRR_{sm30}$  between test start and end of test, excluded contribution from ignition source;
- (5) 'Peak SPR,  $m^2/s'$ ' - maximum of  $SPR_{sm60}$  between test start and end of test;

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<sup>1</sup> The characteristics are defined with respect to the appropriate test method.

<sup>2</sup> The characteristics are defined with respect to the appropriate test method.

- (6) 'THR<sub>1200</sub>, MJ' - total heat release (HRR<sub>sm30</sub>) from test start until end of test, excluded contribution from ignition source;
- (7) 'TSP<sub>1200</sub>, m<sup>2</sup>' - total smoke production (HRR<sub>sm60</sub>) from test start until end of test;
- (8) 'FIGRA, W/s' - fire growth rate index defined as the highest value of the quotient between HRR<sub>sm30</sub> excluding the contribution of ignition source and time. Threshold values HRR<sub>sm30</sub> = 3 kW and THR = 0.4 MJ;
- (9) 'FS' - flame spread (damaged length);
- (10) 'H' - flame spread.

**2. For the purposes of Tables 1 to 4 the following definitions apply:**

- (1) **'material' means** a single basic substance or uniformly dispersed mixture of substances;
- (2) **'homogeneous product' means** a product consisting of a single material, having uniform density and composition throughout the product;
- (3) **'non-homogeneous product' means** a product that does not satisfy the requirements of a homogeneous product and that is composed of one or more components, substantial and/or non-substantial;
- (4) **'substantial component' means** a material that constitutes a significant part of a non-homogeneous product; a layer with a mass per unit area  $\geq 1.0 \text{ kg/m}^2$  or a thickness  $\geq 1.0 \text{ mm}$  is considered to be a substantial component;
- (5) **'non-substantial component' means** a material that does not constitute a significant part of a non-homogeneous product; a layer with a mass per unit area  $< 1.0 \text{ kg/m}^2$  and a thickness  $< 1.0 \text{ mm}$  is considered to be a non-substantial component;
- (6) [[ **'internal non-substantial component' means** a non-substantial component that is covered on both sides by at least one substantial component;
- (7) **'external non-substantial component' means** a non-substantial component that is not covered on one side by a substantial component.

Two or more non-substantial layers that are adjacent to each other, where there are no substantial components in-between the layers, shall be considered as one non-substantial component and shall, therefore, be classified in accordance with the criteria for a layer that is a non-substantial component.

**Table 1**

**Classes of reaction to fire performance for construction products excluding floorings, linear pipe thermal insulation products, and electric cables**

<b>Class</b>	<b>Test method(s)</b>	<b>Classification criteria</b>	<b>Additional classification</b>
<b>A1</b>	EN ISO 1182 (1); <i>and</i>	$\Delta T \leq 30^{\circ}\text{C}$ ; <i>and</i> $\Delta m \leq 50\%$ ; <i>and</i> $t_f = 0$ (i.e. no sustained flaming)	
	EN ISO 1716	$\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ (1); <i>and</i> $\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ (2) (2a); <i>and</i> $\text{PCS} \leq 1.4 \text{ MJm}^{-2}$ (3); <i>and</i> $\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ (4)	
<b>A2</b>	EN ISO 1182 (1); <i>or</i>	$\Delta T \leq 50^{\circ}\text{C}$ ; <i>and</i> $\Delta m \leq 50\%$ ; <i>and</i> $t_f \leq 20\text{s}$	
	EN ISO 1716; <i>and</i>	$\text{PCS} \leq 3.0 \text{ MJkg}^{-1}$ (1); <i>and</i> $\text{PCS} \leq 4.0 \text{ MJm}^{-2}$ (2); <i>and</i> $\text{PCS} \leq 4.0 \text{ MJm}^{-2}$ (3); <i>and</i> $\text{PCS} \leq 3.0 \text{ MJkg}^{-1}$ (4)	
	EN 13823 (SBI)	$\text{FIGRA} \leq 120 \text{ W s}^{-1}$ ; <i>and</i> $\text{LFS} < \text{edge of specimen}$ ; <i>and</i> $\text{THR}_{600\text{s}} \leq 7.5 \text{ MJ}$	Smoke production(5); <i>and</i> Flaming droplets/ particles (6)
<b>B</b>	EN 13823 (SBI); <i>and</i>	$\text{FIGRA} \leq 120 \text{ W s}^{-1}$ ; <i>and</i> $\text{LFS} < \text{edge of specimen}$ ; <i>and</i> $\text{THR}_{600\text{s}} \leq 7.5 \text{ MJ}$	Smoke production(5); <i>and</i> Flaming droplets/ particles (6)
	EN ISO 11925-2(8): <i>Exposure = 30s</i>	$F_s \leq 150\text{mm}$ within 60s	
<b>C</b>	EN 13823 (SBI); <i>and</i>	$\text{FIGRA} \leq 250 \text{ W s}^{-1}$ ; <i>and</i> $\text{LFS} < \text{edge of specimen}$ ; <i>and</i> $\text{THR}_{600\text{s}} \leq 15 \text{ MJ}$	Smoke production(5); <i>and</i> Flaming droplets/ particles (6)
	EN ISO 11925-2(8): <i>Exposure = 30s</i>	$F_s \leq 150\text{mm}$ within 60s	
<b>D</b>	EN 13823 (SBI); <i>and</i>	$\text{FIGRA} \leq 750 \text{ W s}^{-1}$	Smoke production(5); <i>and</i> Flaming droplets/ particles (6)

	EN ISO 11925-2 <sup>(8)</sup> : <i>Exposure = 30s</i>	Fs ≤ 150mm within 60s	
<b>E</b>	EN ISO 11925-2 <sup>(8)</sup> : <i>Exposure = 15s</i>	Fs ≤ 150mm within 20s	Flaming droplets/ particles <sup>(7)</sup>
<b>F</b>	EN ISO 11925-2 <sup>(8)</sup> : <i>Exposure = 15s</i>	Fs > 150mm within 20s	

- (<sup>1</sup>) For homogeneous products and substantial components of non-homogeneous products.
- (<sup>2</sup>) For any external non-substantial component of non-homogeneous products.
- (<sup>2a</sup>) Alternatively, any external non-substantial component having a PCS ≤ 2.0 MJm<sup>-2</sup>, provided that the product satisfies the following criteria of EN 13823(SBI) : FIGRA ≤ 20 Ws<sup>-1</sup>; and LFS < edge of specimen; and THR<sub>600s</sub> ≤ 4.0 MJ; and s1; and d0.
- (<sup>3</sup>) For any internal non-substantial component of non-homogeneous products.
- (<sup>4</sup>) For the product as a whole.
- (<sup>5</sup>) **s1** = SMOGRA ≤ 30m<sup>2</sup>s<sup>-2</sup> and TSP<sub>600s</sub> ≤ 50m<sup>2</sup> ; **s2** = SMOGRA ≤ 180m<sup>2</sup>s<sup>-2</sup> and TSP<sub>600s</sub> ≤ 200m<sup>2</sup>;  
**s3** = not s1 or s2.
- (<sup>6</sup>) **d0** = No flaming droplets/ particles in EN 13823 (SBI) within 600s; **d1** = No flaming droplets/ particles persisting longer than 10s in EN 13823 (SBI) within 600s; **d2** = not d0 or d1; Ignition of the paper in EN ISO 11925-2 results in a d2 classification.
- (<sup>7</sup>) No ignition of the paper = no additional classification; Ignition of the paper = **d2** classification.
- (<sup>8</sup>) Under conditions of surface flame attack and, if appropriate to the intended use of the product, edge flame attack.

**Table 2**

**Classes of reaction to fire performance for floorings**

<b>Class</b>	<b>Test method(s)</b>	<b>Classification criteria</b>	<b>Additional classification</b>
<b>A1<sub>FL</sub></b>	EN ISO 1182 (1); <i>and</i>	$\Delta T \leq 30^{\circ}\text{C}$ ; <i>and</i> $\Delta m \leq 50\%$ ; <i>and</i> $t_f = 0$ (i.e. no sustained flaming)	
	EN ISO 1716	$\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ (1); <i>and</i> $\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ (2); <i>and</i> $\text{PCS} \leq 1.4 \text{ MJm}^{-2}$ (3); <i>and</i> $\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ (4)	
<b>A2<sub>FL</sub></b>	EN ISO 1182 (1); <i>or</i>	$\Delta T \leq 50^{\circ}\text{C}$ ; <i>and</i> $\Delta m \leq 50\%$ ; <i>and</i> $t_f \leq 20\text{s}$	
	EN ISO 1716; <i>and</i>	$\text{PCS} \leq 3.0 \text{ MJkg}^{-1}$ (1); <i>and</i> $\text{PCS} \leq 4.0 \text{ MJm}^{-2}$ (2); <i>and</i> $\text{PCS} \leq 4.0 \text{ MJm}^{-2}$ (3); <i>and</i> $\text{PCS} \leq 3.0 \text{ MJkg}^{-1}$ (4)	
	EN ISO 9239-1 (5)	Critical flux (6) $\geq 8.0 \text{ kWm}^{-2}$	
<b>B<sub>FL</sub></b>	EN ISO 9239-1 (5) <i>and</i>	Critical flux (6) $\geq 8.0 \text{ kWm}^{-2}$	Smoke production (7)
	EN ISO 11925-2(8): <i>Exposure = 15s</i>	$F_s \leq 150\text{mm}$ within 20s	
<b>C<sub>FL</sub></b>	EN ISO 9239-1 (5) <i>and</i>	Critical flux (6) $\geq 4.5 \text{ kWm}^{-2}$	Smoke production (7)
	EN ISO 11925-2(8): <i>Exposure = 15s</i>	$F_s \leq 150\text{mm}$ within 20s	
<b>D<sub>FL</sub></b>	EN ISO 9239-1 (5) <i>and</i>	Critical flux (6) $\geq 3.0 \text{ kWm}^{-2}$	Smoke production (7)
	EN ISO 11925-2(8): <i>Exposure = 15s</i>	$F_s \leq 150\text{mm}$ within 20s	
<b>E<sub>FL</sub></b>	EN ISO 11925-2(8): <i>Exposure = 15s</i>	$F_s \leq 150\text{mm}$ within 20s	
<b>F<sub>FL</sub></b>	EN ISO 11925-2(8): <i>Exposure = 15s</i>	$F_s > 150\text{mm}$ within 20s	

- (1) For homogeneous products and substantial components of non-homogeneous products.
- (2) For any external non-substantial component of non-homogeneous products.
- (3) For any internal non-substantial component of non-homogeneous products.
- (4) For the product as a whole.
- (5) Test duration = 30 minutes.
- (6) Critical flux is defined as the radiant flux at which the flame extinguishes or the radiant flux after a test period of 30 minutes, whichever is the lower (i.e. the flux corresponding with the furthest extent of spread of flame).
- (7) **s1** = Smoke  $\leq 750\% \cdot \text{min}$ ; **s2** = not s1.
- (8) Under conditions of surface flame attack and, if appropriate to the intended use of the product, edge flame attack.



**Table 3**

**Classes of reaction to fire performance for linear pipe insulation products**

Class	Test method(s)	Classification criteria	Additional classification
<b>A1<sub>L</sub></b>	EN ISO 1182 <sup>(1)</sup> ;  <i>And</i>	$T \leq 30^{\circ}\text{C}$ ; <i>and</i>  $m \leq 50\%$ ; <i>and</i>  $t_f = 0$ (i.e. no sustained flaming)	
	EN ISO 1716	$\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ <sup>(1)</sup> ; <i>and</i>  $\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ <sup>(2)</sup> ; <i>and</i>  $\text{PCS} \leq 1.4 \text{ MJm}^{-2}$ <sup>(3)</sup> ; <i>and</i>  $\text{PCS} \leq 2.0 \text{ MJkg}^{-1}$ <sup>(4)</sup>	
<b>A2<sub>L</sub></b>	EN ISO 1182 <sup>(1)</sup> ;  <i>Or</i>	$T \leq 50^{\circ}\text{C}$ ; <i>and</i>  $m \leq 50\%$ ; <i>and</i> $t_f \leq 20\text{s}$	
	EN ISO 1716;  <i>And</i>	$\text{PCS} \leq 3.0 \text{ MJkg}^{-1}$ <sup>(1)</sup> ; <i>and</i>  $\text{PCS} \leq 4.0 \text{ MJm}^{-2}$ <sup>(2)</sup> ; <i>and</i>  $\text{PCS} \leq 4.0 \text{ MJm}^{-2}$ <sup>(3)</sup> ; <i>and</i>  $\text{PCS} \leq 3.0 \text{ MJkg}^{-1}$ <sup>(4)</sup>	
	EN 13823 (SBI)	$\text{FIGRA} \leq 270 \text{ W s}^{-1}$ ; <i>and</i>  $\text{LFS} < \text{edge of specimen}$ ; <i>and</i>  $\text{THR}_{600\text{s}} \leq 7.5 \text{ MJ}$	
<b>B<sub>L</sub></b>	EN 13823 (SBI);  <i>And</i>	$\text{FIGRA} \leq 270 \text{ W s}^{-1}$ ; <i>and</i>  $\text{LFS} < \text{edge of specimen}$ ; <i>and</i>  $\text{THR}_{600\text{s}} \leq 7.5 \text{ MJ}$	Smoke production <sup>(5)</sup> ; <i>and</i>  Flaming droplets/ particles <sup>(6)</sup>
	EN ISO 11925-2 <sup>(8)</sup> ;  <i>Exposure = 30s</i>	$F_s \leq 150\text{mm}$ within 60s	
<b>C<sub>L</sub></b>	EN 13823 (SBI);  <i>And</i>	$\text{FIGRA} \leq 460 \text{ W s}^{-1}$ ; <i>and</i>  $\text{LFS} < \text{edge of specimen}$ ; <i>and</i>  $\text{THR}_{600\text{s}} \leq 15 \text{ MJ}$	Smoke production <sup>(5)</sup> ; <i>and</i>  Flaming droplets/ particles <sup>(6)</sup>

	EN ISO 11925-2 <sup>(8)</sup> : <i>Exposure = 30s</i>	Fs ≤ 150mm within 60s	
<b>D<sub>L</sub></b>	EN 13823 (SBI); <i>And</i>	FIGRA ≤ 2100 Ws <sup>-1</sup> THR <sub>600s</sub> ≤ 100 MJ	Smoke production <sup>(5)</sup> ; <i>and</i> Flaming droplets/ particles <sup>(6)</sup>
	EN ISO 11925-2 <sup>(8)</sup> : <i>Exposure = 30s</i>	Fs ≤ 150mm within 60s	
<b>E<sub>L</sub></b>	EN ISO 11925-2 <sup>(8)</sup> : <i>Exposure = 15s</i>	Fs ≤ 150mm within 20s	Flaming droplets/ particles <sup>(7)</sup>
<b>F<sub>L</sub></b>	EN ISO 11925-2 <sup>(8)</sup> : <i>Exposure = 15s</i>	Fs > 150mm within 20s	

<sup>(1)</sup> For homogeneous products and substantial components of non-homogeneous products.

<sup>(2)</sup> For any external non-substantial component of non-homogeneous products.

<sup>(3)</sup> For any internal non-substantial component of non-homogeneous products.

<sup>(4)</sup> For the product as a whole.

<sup>(5)</sup> **s1** = SMOGRA ≤ 105 m<sup>2</sup>s<sup>-2</sup> and TSP<sub>600s</sub> ≤ 250 m<sup>2</sup>; **s2** = SMOGRA ≤ 580 m<sup>2</sup>s<sup>-2</sup> and TSP<sub>600s</sub> ≤ 1600 m<sup>2</sup>; **s3** = not s1 or s2.

<sup>(6)</sup> **d0** = No flaming droplets/ particles in EN13823 (SBI) within 600s; **d1** = No flaming droplets/ particles persisting longer than 10s in EN13823 (SBI) within 600s; **d2** = not d0 or d1; Ignition of the paper in EN ISO 11925-2 results in a d2 classification.

<sup>(7)</sup> No ignition of the paper = no additional classification; Ignition of the paper = **d2** classification.

<sup>(8)</sup> Under conditions of surface flame attack and, if appropriate to the intended use of the product, edge flame attack.

**Table 4**  
**Classes of reaction to fire performance for electric cables**

Class	Test method(s)	Classification criteria	Additional classification
<b>A<sub>ca</sub></b>	EN ISO 1716	$PCS \leq 2,0 \text{ MJ/kg}$ (1)	
<b>B1<sub>ca</sub></b>	EN 50399 (30 kW flame source)	$FS \leq 1.75 \text{ m}$ <i>and</i> $THR_{1200s} \leq 10 \text{ MJ}$ <i>and</i> $\text{Peak HRR} \leq 20 \text{ kW}$ <i>and</i> $FIGRA \leq 120 \text{ W s}^{-1}$	Smoke production (2, 5) and Flaming droplets/particles (3) and Acidity (pH and conductivity) (4)
	EN 60332-1-2	$H \leq 425 \text{ mm}$	
<b>B2<sub>ca</sub></b>	EN 50399 (20.5 kW flame source)	$FS \leq 1.5 \text{ m}$ ; <i>and</i> $THR_{1200s} \leq 15 \text{ MJ}$ ; <i>and</i> $\text{Peak HRR} \leq 30 \text{ kW}$ ; <i>and</i> $FIGRA \leq 150 \text{ W s}^{-1}$	Smoke production (2, 6) and Flaming droplets/particles (3) and Acidity (pH and conductivity) (4)
	EN 60332-1-2	$H \leq 425 \text{ mm}$	
<b>C<sub>ca</sub></b>	EN 50399 (20.5 kW flame source)	$FS \leq 2.0 \text{ m}$ ; <i>and</i> $THR_{1200s} \leq 30 \text{ MJ}$ ; <i>and</i> $\text{Peak HRR} \leq 60 \text{ kW}$ ; <i>and</i> $FIGRA \leq 300 \text{ W s}^{-1}$	Smoke production (2, 6) and Flaming droplets/particles (3) and Acidity (pH and conductivity) (4)
	EN 60332-1-2	$H \leq 425 \text{ mm}$	
<b>D<sub>ca</sub></b>	EN 50399 (20.5 kW flame source)	$THR_{1200s} \leq 70 \text{ MJ}$ ; <i>and</i> $\text{Peak HRR} \leq 400 \text{ kW}$ ; <i>and</i> $FIGRA \leq 1300 \text{ W s}^{-1}$	Smoke production (2, 6) and Flaming droplets/particles (3) and Acidity (pH and conductivity) (4)
	EN 60332-1-2	$H \leq 425 \text{ mm}$	
<b>E<sub>ca</sub></b>	EN 60332-1-2	$H \leq 425 \text{ mm}$	
<b>F<sub>ca</sub></b>	EN 60332-1-2	$H > 425 \text{ mm}$	

(1) For the product as a whole, excluding metallic materials, and for any external component (i.e. sheath) of the product.

(2)  $s1 = TSP_{1200} \leq 50 \text{ m}^2$  *and*  $\text{Peak SPR} \leq 0.25 \text{ m}^2/\text{s}$

**s1a** = **s1** and transmittance in accordance with EN 61034-2  $\geq 80\%$

**s1b** = **s1** and transmittance in accordance with EN 61034-2  $\geq 60\% < 80\%$

**s2** =  $TSP_{1200} \leq 400 \text{ m}^2$  *and*  $\text{Peak SPR} \leq 1.5 \text{ m}^2/\text{s}$

**s3** = not s1 or s2

(3) **d0** = No flaming droplets/particles within 1200 s; **d1** = No flaming droplets/particles persisting longer than 10 s within 1200 s; **d2** = not **d0** or **d1**.

(4) EN 60754-2: **a1** = conductivity  $< 2.5 \text{ }\mu\text{S/mm}$  *and*  $\text{pH} > 4.3$ ; **a2** = conductivity  $< 10 \text{ }\mu\text{S/mm}$  *and*  $\text{pH} > 4.3$ ; **a3** = not **a1** or **a2**.

(5) The smoke class declared for class B1<sub>ca</sub> cables must originate from the EN 50399 test (30 kW flame source).

(6) The smoke class declared for class B2<sub>ca</sub>, C<sub>ca</sub>, D<sub>ca</sub> cables must originate from the EN 50399 test (20.5 kW flame

source).