EUROCLASS FIRE REACTION CLASSIFICATION: FLAT / LINEAR APPLICATION

When to use the subscript "L" in the Euroclass Fire Reaction Classification

Trocellen **TC CLASS / TC CLASS ALU / TC CLASS ALU.S/TC CLASS G-PRO** product range, mainly used for thermal insulation and anti-condensation behaviour of HVAC pipes/ducts, has been **CE marked** according to the European standard **PEF - EN 14313**.

The Fire Reaction Classification of our products is:

- ***TC CLASS***
  - Thicknesses 3-12 mm → *B-s2,d0 – B_L-s1,d0*
- ***TC CLASS ALU***
  - Thicknesses 3-14 mm → *B-s2,d0 – B_L-s1,d0*
  - Thicknesses 15-25 mm → *C-s2,d0 – B_L-s1,d0*
- ***TC CLASS ALU.S***
  - Thicknesses 3-16 mm → *B-s2,d0 – B_L-s1,d0*
- ***TC CLASS G-PRO***
  - Thicknesses 3-40 mm → *B-s1,d0 – B_L-s1,d0*

It can be noted that, with the same thickness, the same product has **TWO** different Fire Reaction Classifications, one of which is characterized by the subscript "**L**".
This subscript indicates "**linear**" and, according to the EN 13501-1 standard, can be applied if the insulating material is used over **circular ducts with an external diameter of less than 300mm**.

> **3.1.10**
> **Linear pipe thermal insulation product**
> Length of insulation product designed to fit around pipes, with a maximum outer insulation diameter of 300 mm.

Fig. 1. Definition of "L" according to EN 13501-1.

It can be deduced that, in case of application on circular ducts whose **external diameter is greater than 300mm**, the classification without "L" is used.

What to do in case of pipes with a rectangular/square section?

In addition to the case described above, the EN 13501-1 standard establishes to use the classification without subscript "L" when the insulating product is applied on pipes/ducts with **flat surfaces** (rectangular/square sections included).

> Pipe-insulation and insulation of cylindrical ducts with an outer insulation diameter larger than 300 mm and insulation product intended to be used on flat surfaces shall be tested as prescribed in Table 1.

Fig. 2. Definition of "Flat Surface" according to EN 13501-1

Please, note that there is no reference to ducts/pipes dimensions in case of shapes other than circular ones; therefore a pipe/duct with a **rectangular/square section** will **always** be classified without subscript "L".

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Why two different values for the same thickness?

By observing classifications of the products **TC CLASS / TC CLASS ALU / TC CLASS ALU.S**, it is possible to note how the insulating material of a certain thickness is part of, at the same time, two different classifications, one relating to flat surfaces and one relating to linear applications (with subscript "L").
More precisely, for TC CLASS / TC CLASS ALU (thicknesses 3-14mm) / TC CLASS ALU.S the difference lies in the **smoke emission** (s1 vs. s2), while for TC CLASS ALU (thicknesses 15-25mm) there is also a variation from class "C" to "B".

This is simply due to a **different setting of the parameter values** that determines the Fire Reaction Classification of a product according to EN 13501-1.
The certification test, in fact, is the **same for both configurations** (flat/linear), but the different thresholds between the ***flat*** classification and the ***linear*** one may determine a different final result according to Euroclass regulation.

Table 1 — Classes of reaction to fire performance for construction products excluding floorings and linear pipe thermal insulation products

Class	Test method(s)	Classification criteria	Additional classification
B	EN 13823 and	$FIGRA_{0,2\,MJ} \leq 120$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 7,5$ MJ	Smoke production [f] and Flaming droplets/particles [g]
	EN ISO 11925-2 [i]: Exposure = 30 s	$F_s \leq 150$ mm within 60 s	
C	EN 13823 and	$FIGRA_{0,4\,MJ} \leq 250$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 15$ MJ	Smoke production [f] and Flaming droplets/particles [g]
	EN ISO 11925-2 [i]: Exposure = 30 s	$F_s \leq 150$mm within 60 s	

Fig. 3. Extract of Table 1 inserted in the EN 13501-1 standard. Values have to be applied in case of flat or linear applications with d>300m.

Table 3 — Classes of reaction to fire performance for linear pipe thermal insulation products

B_L	EN 13823 and	$FIGRA_{0,2\,MJ} \leq 270$ W/s and $LFS <$ edge of specimen and $THR_{600s} \leq 7,5$ MJ	Smoke production [e] and Flaming droplets/particles [f]
	EN ISO 11925-2 [b]: Exposure = 30 s	Fs ≤ 150 mm within 60 s	

Fig. 4. Extract of Table 1 inserted in the EN 13501-1 standard. Values have to be applied in case of linear applications with d<300m.

The corresponding classification will therefore be used after identifying the right configuration for the desired application.

ESEMPIO: TC CLASS ALU 16 mm.

Figra certified value: *270 < x < 120*

Following Table 1 (flat/linear application with d>300mm): Class B if FIGRA < 120 W/s, Class C if FIGRA < 250 W/s.
Following Table 3 (linear application with d<300mm): Class B_L if FIGRA <270 W/s.

Therefore, this product is class C or B_L depending on the application.

APPENDIX

Euroclass flat / linear Fire Reaction classification summary table

	Flat Appl.	Linear Appl.
	Circular section with d>300mm or rectangular/square section	*Circular section with d<300 mm*
TC CLASS (3-12 mm) **TC CLASS ALU (3-14 mm)** **TC CLASS ALU.S (3-16 mm)**	B-s2,d0	BL-s1,d0
TC CLASS ALU (15-25 mm)	C-s2,d0	BL-s1,d0
TC CLASS G-PRO (3-40 mm)	B-s1,d0	BL-s1,d0

Normative References

- UNI EN 14313:2013 - Thermal insulation products for building equipment and industrial installations - Factory made polyethylene foam (PEF) products - Specification
- UNI EN 13501-1:2019 - Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
- The CE marking of TC CLASS products is carried out by an accredited body LAPI S.p.A. N ° 0987 (https://www.lapi-spa.it/).