

Durastar DS2000

Flame Retardancy performance
according to Italian norms UNI 9174, UNI 8457, UNI 9177

Table of contents

■ Introduction

- UNI 9177: Reaction to fire – Combustible products classification
- UNI 9174: 2010, Reaction to fire of products subjected to a flame in the presence of radiant heat
- UNI 8457: 2010, Combustible products which can be hit by flames on one surface - Small flame test

■ Test Results

■ Conclusion

Introduction

- Materials used in public facilities in Italy (Sport areas, Public exhibitions areas, Hospitals...) need to be in compliance with the Ministerial Decree of 26th June 1984 and its 2001 amendment, which requires a maximum fire rating of 1 or 2 (depending on the case).
- Ministerial Decree apply to i.e. flooring, platforms, raised floors, walls, panels for internal partition walls, curtains, hanging materials, furniture, chairs...)
- Eastman copolyester **Durastar DS2000** has been selected to evaluate its compliance with Ministerial Decree in order to be promoted with added value for durable application like chairs or furniture.

National classification of reaction to fire performance in Italy

- The Ministerial Decree of 26th June 1984 and its 2001 amendment governs the classification of reaction-to-fire performance and the approval of materials for fire prevention in Italy.
- Combustible materials and products, like plastics, are tested in accordance with “**UNI 9177: Reaction to fire – Combustible products classification**” and divided into 5 categories, 1, 2, 3, 4 and 5, with 1 the best level of performance and 5 the worst.

UNI 9177: Reaction to fire – Combustible products classification

The national reaction-to-fire performance classifications for combustible materials are determined by using the results from a combination of the three tests shown below:

- UNI 9174: 2010, Reaction to fire of products subjected to a flame in the presence of radiant heat

&, either:

- UNI 8456: 2010, Combustible products which can be hit by flames on both surfaces - Small flame test

or

- UNI 8457; 2010, Combustible products which can be hit by flames on one surface - Small flame test

UNI 9177: Reaction to fire – Combustible products classification

Test methods	Ratings (Categories)						UNI 9177 class
UNI 9174 UNI 8456 or UNI 8457	I						1
UNI 9174 UNI 8456 or UNI 8457	II I			I II			2
UNI 9174 UNI 8456 or UNI 8457	III II	II III	I III	III I	II II	3	
UNI 9174 UNI 8456 or UNI 8457	IV III	III IV	III III	IV II	II IV	IV I IV	4
UNI 9174 UNI 8456 or UNI 8457	IV IV						5

Table 1 shows how the outputs from each test are combined to produce the overall national classifications.

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UNI 9174

- **The test method assesses the behavior of a material when a fire is developed in the presence of flames and radiant heating.**
- The sample is exposed to a small pilot flame and to a radiant panel supplied by a gas/air mixture and calibrated at 750°C.
- The position of the test specimen, (whose dimensions are 80 cm x 15.5 cm x its thickness) is varied to simulate its use in a real-life situation, such as, as a floor, wall or ceiling.
- In the case of materials for furniture (chairs), curtains, walls and wall covers, the specimen setting is “wall”, the position is vertical and at 45 degrees to the radiant panel. The nearest edge is 10 cm from the surface of the radiant panel and the height of the pilot flame is 80 mm.
- If the material is used as flooring, the specimen setting is “floor”, its position is horizontal and the test side is exposed. The height of the pilot flame is 120 mm.
- In the case of materials used as ceilings, the specimen setting is “ceiling”, its position is horizontal and the test side is facing down. The height of the pilot flame is 80 mm.

UNI 9174

- Parameters measured in this test are:
 - the rate of spread of flame;
 - the extent of damage;
 - the afterglow time;
 - the flaming droplets.

Every parameter is assigned a level between 1 and 3.

- The rating on which classification is based is then worked out by multiplying the different levels with various “weighting factors”: 1 or 2;

For instance, rating for wall position is:

I: 6 - 8

II: 9 - 12

III: 13 - 15

IV: 16 - 18

UNI 9174



UNI 8456-8457

- **The test methods assess the behaviour of a material at the beginning of a fire; the titles of these tests are:**
 - UNI 8456 “Combustible products which can be hit by flame on **both** surfaces - Reaction to fire by applying a small flame”
 - UNI 8457 “Combustible products which can be hit by flame on **one** surface - Reaction to fire by applying a small flame”.

- The sample is exposed to a small pilot flame that is inclined at 45 degrees:
 - UNI 8456: 40 mm high flame for 12 seconds;
 - UNI 8457: 20 mm high flame for 30 seconds.

- The position of the test specimen, whose dimensions are (34 cm by 10.4 cm by its thickness) is vertical but the pilot flame position is varied to simulate the material’s use in a real-life situation:
 - UNI 8456 (e.g. curtains) 18 mm under the lower border of the sample
 - UNI 8457 (e.g. furniture, walls, wall covers, ceilings, flooring) in front of the surface of the sample (distance around 5 mm).

UNI 8456-8457

- After the flame application time, the burner is removed and the following parameters are observed:

- The afterflame time
- The damaged length
- The afterglow time
- The flaming droplets.

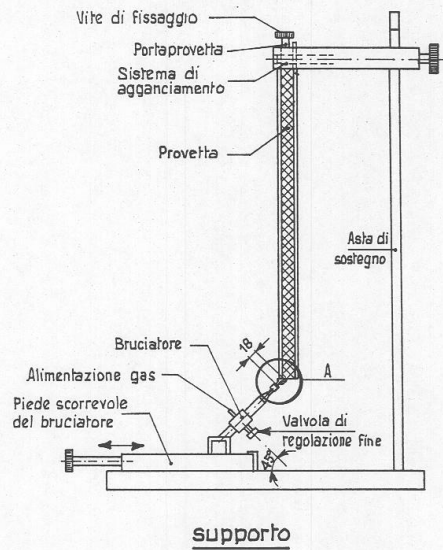
Every parameter is assigned a level between 1 and 3.

- The rating on which classification is based is then worked out by multiplying the different levels with various “weighting factors”: 1 or 2.

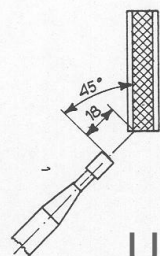
The rating is:

- **I:** 6 - 8
- **II:** 9 - 12
- **III:** 13 - 15
- **IV:** 16 - 18

UNI 8456-8457

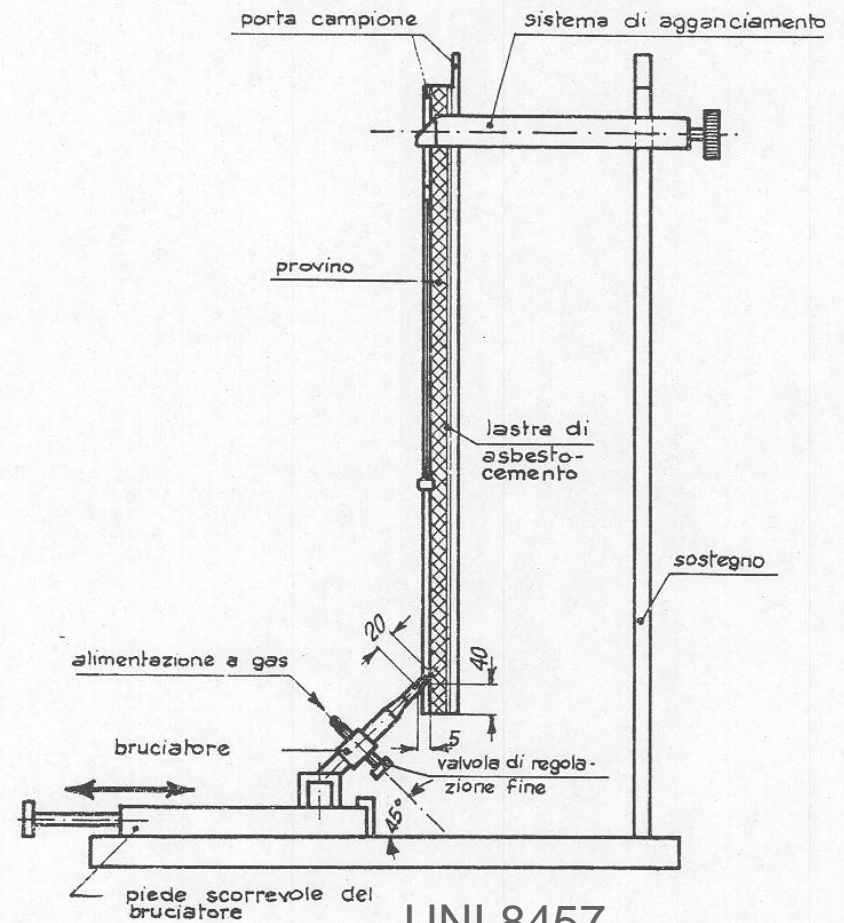
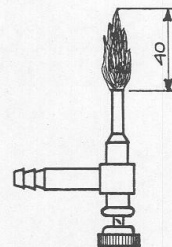


particolare A



UNI 8456

Posizione del piccolo bruciatore all'atto della regolazione della lunghezza di fiamma.



UNI 8457

Durastar DS2000 test results

UNI 9174:2010

	Rate of spread of flame weighting factor 2		Extent of damage weighting factor 2		Afterglow time weighting factor 1		Flaming drop. weighting factor 1		Total rating	
	mm/min.	Level	mm	Level	Sec.	Level	No	Level	T. Level	Category
3 mm	0	1	<100	1	0	1	No	1	6	I
4 mm	0	1	<100	1	0	1	No	1	6	I
6 mm	0	1	100	1	0	1	No	1	6	I

UNI 8457:2010

	Afterflame time weighting factor 2		Damaged length weighting factor 2		Afterglow time weighting factor 1		Flaming drop. weighting factor 1		Total rating	
	sec.	Level	mm	Level	Sec.	Level	No	Level	T. Level	Category
3 mm	0	1	55	1	0	1	No	1	6	I
4 mm	0	1	55	1	0	1	No	1	6	I
6 mm	0	1	50	1	0	1	No	1	6	I

Durastar DS2000

CLASSIFICATION OF REACTION-TO-FIRE PERFORMANCE

Material	Thickness	UNI 8457:2010 Class	UNI 9174:2010 Class	UNI 9177:2008 Class
Durastar DS2000	3mm	1	1	1
Durastar DS2000	4mm	1	1	1
Durastar DS2000	6mm	1	1	1

Conclusion

- PCTA Durastar DS2000 and related grades (DS2010, DS2110) are suitable for «UNI 9174:2010, Class 1», «UNI 8457:2010, Class 1» and, consequently, «UNI 9177:2008 Class 1» classification and therefore can be advised for furniture in compliance with Ministerial Decree of 26th June 1984 and its 2001 amendment.
- The present data have to be used as general guidance. The Reaction-to-fire Classification has to be assessed on the actual end article, therefore, it is manufacturer's responsibility to provide a representative sample to a certified lab for evaluation.

Back up

Harmonization and equivalence of reaction- to-fire performance in Europe

Table 1 Equivalence in reaction-to-fire performance classification in Europe³

Euroclass In accordance with EN 13501-1 + A1: 2009	UK (England and Wales) In accordance with Approved Document B of the Building Regulations	Germany In accordance with Bauregellisten, 26 th March 2012	France In accordance with Arrête du 21 Novembre 2002	Sweden In accordance with Regelssamling for byggande, BBR: 2012 and EN 13501-1	Italy In accordance with Decreto del Ministero dell'interno 15 Marzo 2005	Netherlands In accordance with Bouwbesluit, 2012
A1	Non-combustible	A1	Non-combustible	A1 (Non-combustible prior to 1 st Jan 2012)	Class 0	Non-combustible
A2	Material of limited combustibility	A2	M0 or M1	A2 (Material of limited combustibility prior to 1 st Jan 2012)	Class 1 or Class 2	
B	Class 0⁴	B1	M1	B (Class 1 surface lining prior to 1 st Jan 2012)	Class 1 or Class 2	Class 1 or Class 2
C	Class 1⁵	B1	M2	C (Class 2 surface lining prior to 1 st Jan 2012)	Class 2 or Class 3	Class 3
D	Class 3	B2	M3	D (Class 1 surface lining prior to 1 st Jan 2012)	Class 3	Class 4
E		B2	M4	E		
F		B3		F		

³ It is important to note that the national classifications for reaction-to-fire do not automatically equate with European reaction-to-fire classifications or with each other. This is because the methodologies and measurements used in the national tests differ from those employed in the tests associated with harmonised European tests. Products cannot assume a European class for reaction-to-fire performance unless they have been tested using a European testing standard.

⁴ Class 0 products are: a) Composed throughout of materials of limited combustibility or b) Products with Class 1 performance for surface spread of flame when tested in accordance with BS 476-7 which, when tested in accordance with BS 476-6, also have a fire propagation index (I) of not more than 12 and a sub-index (ii) of not more than 6

⁵ Class 1 or Class 3 is achieved when a material or product meets specific criteria for lateral spread of flame in accordance with BS 476-7.