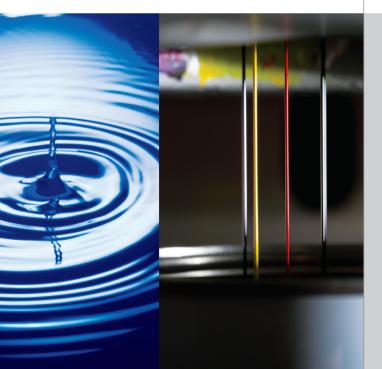


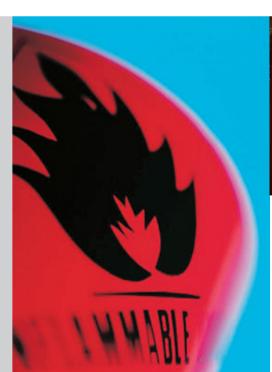
FIRE RETARDANT COATINGS





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OBJECTIVE: REDUCING FIRE PROPAGATION TIMES

After a fire starts, any reduction in the propagation of flames can be decisive in saving human lives. One of the purposes of fire retardant coatings is to reduce the rate at which the fire spreads and thereby retard it. As regards fire protection, most countries have very strict regulations concerning the performance of fire-resistant and fire-retardant coatings, especially for the treatment of bearing structures, coatings and wooden works.

Wood exhibits an important aesthetic importance and fire retardant coatings for wood should combine fire protection with excellent aesthetic results. "Safety performance and Finish performance". Customers' requirements are not only regulation-related (compliance with law), but they are also appearance/functional-related. These are two components that since the design stage have been at the basis of Sayerlack's progress towards the realisation and formulation of fire retardant coatings.

When it is mandatory to conform to fire regulations, the architect/designer or authoriser issuer of the fire certificate may calculate the fire load (quantity of flammable material per square metre and relevant calorific power) for each room, assessing the class that each construction element falls into, based on emergency exits, fire fighting systems, or internal permanent safety services.

Protection from fire: where is it required?

- Public buildings
- Offices/factories
- Clubs, bars, pubs and dance halls
- Banks
- Airports and railway stations
- Hotels and tourist facilities
- Exhibition centres, meeting and fair venues
- Shops
- Schools, colleges, universities and nursery schools
- Auditoriums, theatres, cinemas and museums
- Hospitals
- Gyms and fitness centres
- Churches
- Civil buildings



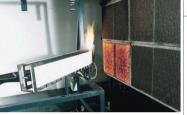
Fire reaction - Test UNI 9174



A) Test start on MDF coated with a normal polyurethane cycle.



B) Test start on MDF coated with the TB cycle.



A1) The 750 C° heat of the radiant panel sets the coating film on fire.



A2) Without protection, the flame reaches the wood.

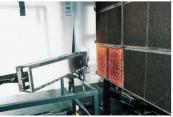


A3) The panel is 50% charred.

B1) Even if only partly damaged, the reaction that reduces the combustion speed is evident on the panel.



B2) The combustion sets off but the flame propagation speed is greatly reduced by the fire retardant coating



B3) The situation is almost unchanged, the damaged area is minimal and the flame tends to extinguish.

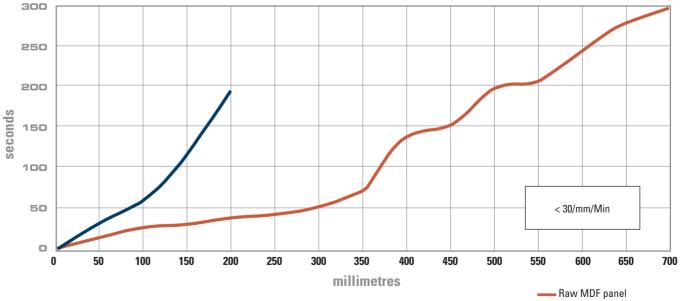
FIRE REACTION

M.D. 26/6/84 · M.D. 6/3/92 (UNI 9796) · Ministry of Internal Affairs Italy

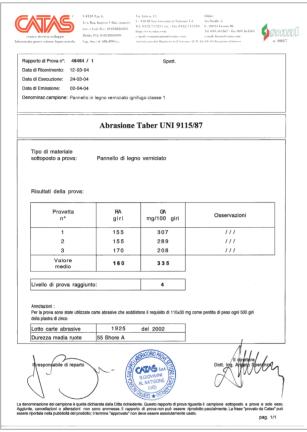
Fire reaction regulations divide coating and panelling related materials, as well as flooring, false ceiling, furnishing and seating surface materials, into several classes. Italian regulations, one of the strictest in the EU in terms of fire reaction performance, assigns six classes. They are assigned a fire reaction class, which ranges from 0 (non-flammable) to 5 (easily flammable). In the event of a fire in a closed place, temperature reaches very high values. Wooden materials start to release gases that considerably contribute to fire propagation. Class 1 is the best to protect the material involved in the fire. The Sayerlack Class 1 fire retardant systems effectively slow down fire spreading time, as they act with several mechanisms at the same time. For example, an MDF 4 mm thick panel with reaction class 4, after treatment with the Sayerlack fire retardant cycle, obtains the reaction class 1. Our certifications were awarded by the Fire Department - Central Technical Prevention and Safety Direction of Roma Capannelle.

Sayerlack's fire retardant products will be tested in the near future also in accordance to new European regulations (Euroclass), this to allow prompt introduction on the market.

Fire reaction test based on UNI 9174 Flame propagation speed



Abrasion test, TABER-UNI 9115/87



Dry heat resistance test, EN 12722/97

Temperature °C	Assessment	Remarks
55	not performed	-
70	5	Flawless
85	5	Few isolated
100	4	Light halo visible from
120	3	different directions

Wet heat resistance test, EN 12721/97 FIRA Report: TMCMF03296

Temperature °C	Assessment	Remarks
55	5	No damage
70	3	Disc just visible
85	3	Disc just visible

Surface Resistance to cold liquids, EN 12720/97 FIRA Report: TMCMF03296

Liquid	Assessment	Remarks
Ethanol 48% Tea Coffee Cold Oils (24h) Cold Fats (24h)	5 5 5 5 5 5	No damage No damage No damage No visible damage No visible damage

Resistance to Mechanical Damage BS3962 Part 6:1980 FIRA Report: TMCMF03296

Test	Assessment	Remarks
Crosscut Scrape: Surface penetration	5 5	Cuts smooth 8.7N
Scrape: Penetration to Substrate	5	20.6N

Light resistance test, UNI 9427/89

Exposure time (hours)	Grey scale evaluation	Remarks
20	5	Flawless

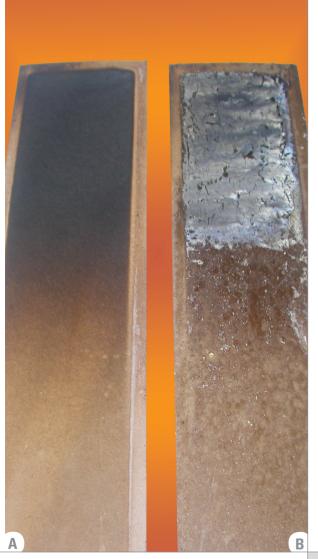
WOOD FOR STRUCTURAL USE IN BUILDING

The fire behaviour of load bearing wooden structures, which requires passive protection, is totally different from that of metal structures. In the event of fire, the temperature reached in a closed room is of several hundreds degrees. Metal, an excellent heat conductor, at temperatures over 450° C softens and loses all mechanical resistance, and virtually "collapses".

Wood, a bad conductor, does not collapse: flames and heat carbonise it's surface, which limits the propagation of combustion to the outer layers. Intumescent coatings increase such protective layer as when heated, they cause a swelling of the coating film (several centimetres) which acts as a barrier to fire.

This is why wood is increasingly used in current engineering and architectural works.





Comparison between fire retardant (A) and intumescent (B) cycle

FIRE RETARDANT SYSTEMS

	System	C ertification Achieved
TA	Clear polyurethane, 450 gr/m ²	Class 1 fire reaction according to M.D. 6/3/92 - UNI 9796 Ministerial homologation no. B01159PVI100001 of 15/11/96 Class 1: BS 476 - Part 7 – Solid Oak, birch multilayer ply and pine veneered on MDF (United Kingdom) Class 0: BS 476 - Part 6 – on Class 0 treated substrate
		UNE 23.727-90 Clasificación M1 - expediente n. 3008471 - placas de fibrocemento (España)
ТВ	White polyurethane, 450 gr/m ²	Class 1 fire reaction according to M.D. 6/3/92 - UNI 9796 Ministerial homologation no. B01159PVI100002 of 18/02/97 Class 1: BS 476 - Part 7 - Class 1 – on birch multilayer ply Class 0: BS 476 - Part 6 – on Class 0 treated substrate.
TC	Pigmented polyurethane, 450 gr/m ²	Class 1 fire reaction according to M.D. 6/3/92 - UNI 9796 Ministerial homologation no. B01159PVI100003 of 22/02/00
TD	White, waterborne, 400 gr/m ²	Class 1 fire reaction according to M.D. 6/3/92 - UNI 9796 Ministerial homologation no. BO1159PVI100004 of 05/09/00

System to obtain the class 2 fire reaction according to D.M. 26/6/84		
CABE 61	Clear polyurethane, 450 gr/m ²	Ministerial homologation no. B0502B11CD200001 of 27/04/88
Syste		ve M1 Class reaction-to-fire status h standard NF P92-501
TU 74**	Clear acrylic polyurethane sealer-topcoat.	Use 20% TH 790 hardener and add 5% of XT 500 additive. Apply 2 coats

Coating systems, during spray application can lose 20-30% of product due to "overspray". We recommend increasing the purchase quantity of the final product by the same percentage in order to ensure the substrate receives the certified quantity. Losses due to sanding can also occur; sanding should therefore always be very light.

of 120g/m².

POLYURETHANE PRODUCTS FOR INTERIORS

		TA system - Class 1 fire reaction 1 M.D. 6/3/92 & BS476 P7 - 450 gr/m ²
TU 2	22	Clear polyurethane basecoat — two 150 gr/m ² coats cured at 50% with TH 222
TZ 2	2**	Clear polyurethane topcoat – one 150 gr/m ² coat cured at 50% with TH 222

The system exhibits an excellent transparency (even at such heavy applied weights) and good scratch resistance, with the possibility of choosing between a 10 or 25 gloss mat topcoat or a 75 gloss semigloss topcoat. It can be used by spray or curtain coater for a highly professional use to meet the aesthetic and functional requirements of architects and designers.

	TB system - Class 1 fire reaction 1 M.D. 6/3/92 & BS476 P7- 450 gr/m ²
TU 22/13	White polyurethane basecoat – two 150 gr/m ² coats cured at 50% with TH 333
TZ 2225/13	Mat white polyurethane topcoat – one 150 gr/m ² coat cured at 50% with TH 333

The cycle exhibit excellent flow and covering. It features good scratch resistance and excellent finish. It's available in two versions: a 25 gloss mat topcoat or a 75 gloss semigloss topcoat.

	TC system - Class 1 fire reaction 1 M.D. 6/3/92 - 450 gr/m ²
TU 22/13	White polyurethane basecoat – two 150 gr/m ² coats cured at 50% with TH 333
TZ 22**	Clear polyurethane topcoat – one 150 gr/m ² coat cured at 50% with TH 333 + 40% max of polyurethane paste TP 4140/XX

If a pigmented finish is required featuring excellent appearance, the "**TC**" cycle (a compound of basecoat and mat or semigloss binder + pigmented pastes **TP 4140/XX** at 30%) is the most appropriate system to use: thousands of colour shades are possible with just 12 polyurethane pastes. Perfect for interior decorators and designers.



Base colours of the TP 4140/XX series polyurethane pastes



8



N.B.: neutral binders of the "TC" cycle are available at 10 and 25 gloss (mat) and 75 gloss (semigloss) but with the addition of some types of polyurethane pastes, the gloss level may slightly change. * Black A5 does not have high opacity and should only be used for stain recipes, or mixed with other bases. If you need a lacquered black, use paste

TP 4140/57.

CABE 61 system - Class 2 fire reaction 1 M.D. 26/06/84 · 450 gr/m ²	
TU 280	Clear polyurethane basecoat – two 150 gr/m ² coats cured at 50% with TH 755
TZ 3325	Mat polyurethane topcoat – one 150 gr/m ² coat cured at 50 % with TH 755

The system, applied on beech multilayer ply for wall panels, is comparable to an normal polyurethane finishes, both for ease of application and for the final result; in fact, the finish features excellent smoothness and transparency. Drying times are similar to a normal polyurethane without whitening problems.

WATERBORNE COATINGS FOR INTERIORS

TD system - Class 1 fire reaction 1 M.D. 6/3/92 - 400 gr/m²

AF 22/13

Mat white waterborne topcoat – two 200 gr/m² coats (including 20% of tap water)

The "**TD**" waterborne system meets the requirements of exhibition stand organisers that need a quick and easy to apply product. With only two coats, for 400 gr/m^2 total (330 gr/m^2 + water) you can obtain a Class 1 fire reaction coating. As it is free from solvents, the product can be used for applications and/or retouches in places (such as fairs, museums, tunnels) where flammable coatings cannot be used. Also with the "TD" cycle you can obtain stains by adding 3% of XA 2006 series waterborne paste to the AF 22/13 white product. Below are the mixtures obtained.



Mixtures with waterborne pastes, XA 2006/XX series



N. B.: the white topcoat of the "TD" cycle is only available in the 5 gloss version (matt) but, if some kinds of water-based pastes are added, it can slightly change.



Procedure to issue the Statement of Conformity (Certificate of Supply)



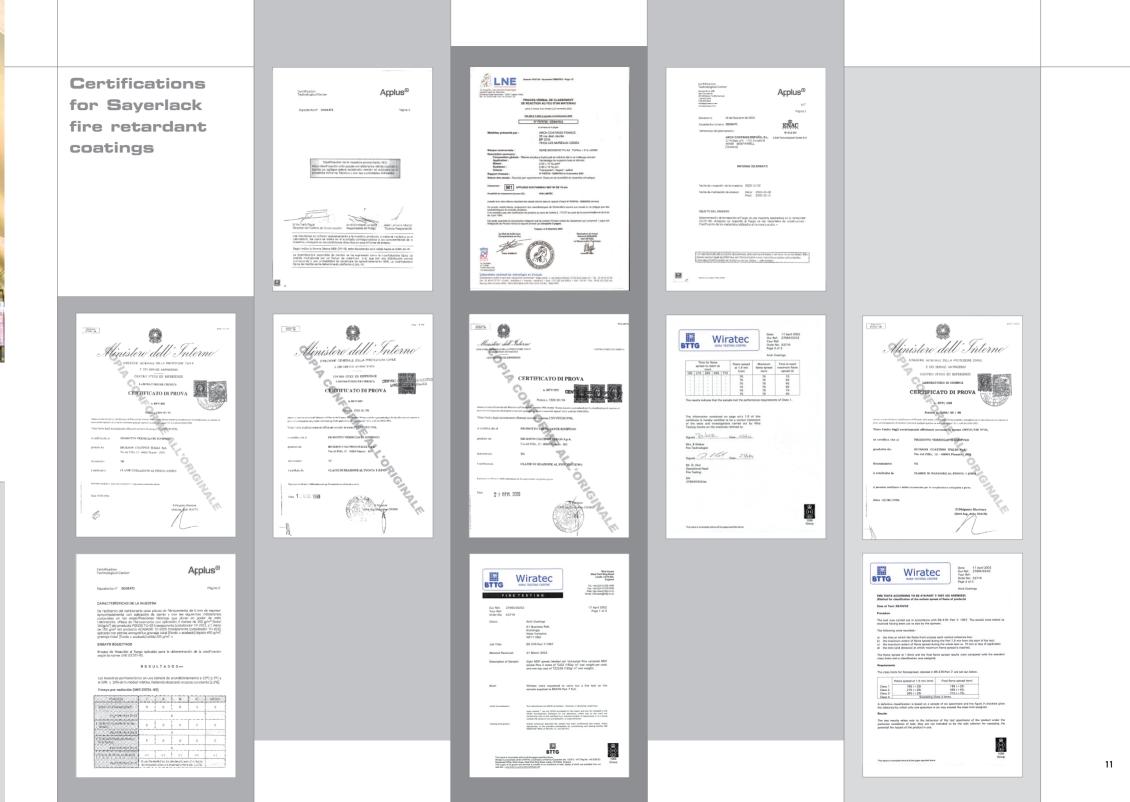


At the end of the work, the painter must fill in a pre-printed form (**Statement of application** – provided by Sayerlack when the order is placed). The form is used to state the use of the homologated basic weight for the specific fire retardant cycle. The filled in form shall be faxed to Sayerlack, which shall issue a **Statement of Conformity**, valid for **5 years. This process may vary slightly depending on the EU member state the product is in use.**

N.B. Fire services or interested authorities, in certain EU member states may ask for an update even if the certificate has not expired, if the item is damaged or chipped. We can only issue certificates for the square metres corresponding to the homologation: the owner (with the old but still valid certification) shall have to prove to any inspectors that the new certificate is for maintenance only.

After several objections by the manufacturers of homologated coatings, a second edition of the UNI 9796 standard was issued in January 1998. Compared to the previous edition, an ageing cycle has been added subject to a series of tests, so when a standard is mentioned, the most recent edition is the valid one. With this amendment, the 5 year expiry has been eliminated.

For those who have never performed these works we suggest that you always ask for the room specifications with the Fire services specification, so as to prevent any unpleasant situations.



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Sherwin-Williams Italy S.r.l. Export Department

Via del Fiffo 12 - 40065 Pianoro (B0) - Italy tel. +39 051 770511 - fax +39 051 770528 export@sayerlack.it - www.sayerlack.com **Technical Service** tel. +39 051 770770 - fax+39 051 770521 customerservice@sayerlack.com

Sayerlack is a brand of SHERWIN-WILLIAMS

Sherwin-Williams UK Coatings Ltd.

A1 Business Park - Knottingley West Yorkshire - WF11 OBU - England tel. +44 (O) 1977 673363 - fax +44 (O) 1977 673521 ukinfo@sherwin.com - www.sayerlack.co.uk **Technical Service** tel. +39 O51 770770 - fax+39 O51 770521 customerservice@sayerlack.com

Sherwin-Williams Ireland Ltd.

53 Robinhood Industrial Estate Dublin 22 – Ireland tel. +353 1460 1445 – fax +353 1460 1449 irlinfo@sherwin.com – www.sayerlack.co.uk **Technical Service** tel. +39 051 770770 - fax+39 051 770521 customerservice@sayerlack.com

SAYERLACK, a brand of Sherwin-Williams

101 West Prospect Avenue - 920 Midland Cleveland, 0H 44115 - USA tel. +1 800 524 5979 - fax +1 216 566 1293 info@sayerlack.com - www.sayerlack.com **Technical Service** tel. +39 051 770770 - fax+39 051 770521 customerservice@sayerlack.com

Sayerlack Singapore Pte. Ltd. 8. Admiralty Street

8, Admiralty Street. #07-08 Admirax, Singapore 757438 tel. +65 6763 7789 - fax +65 6763 0252 infoasia@sayerlack.com - www.sayerlack.com Technical Service tel. +39 051 770770 - fax +39 051 770521 customerservice@sayerlack.com