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**DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH AND FIRE OFFICES' COMMITTEE
JOINT FIRE RESEARCH ORGANIZATION**

PROPRIETARY FIRE RETARDANT TREATMENTS FOR COMBUSTIBLE BOARDS

Summary

Details are given of the treatments which, when applied to some common types of combustible lining materials, improve their surface spread of flame characteristics as shown by the test specified in British Standard 476 : Part 1 : 1953.

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PROPRIETARY FIRE RETARDANT TREATMENTS FOR COMBUSTIBLE BOARDS

1. Combustible boards, when used in buildings in large continuous areas such as for wall and ceiling linings; can have a marked influence on the growth of a fire. The nature of the surface of a board is one of the factors which determines how the material will contribute to a fire, since it is the surface which will be first ignited and, if conditions are favourable after ignition, flames may spread over the surface to involve other parts of the building and its contents. By means of a suitable treatment a combustible board can be rendered less ignitable and less liable to spread flame over its surface. Such treatments take the form of either the application of a surface coating, usually a paint film, or impregnation of the material with certain chemical salts.

2. In order to obtain a measure of the fire hazard of combustible boards, either in their natural state or after the application of a treatment, a laboratory test is used to determine the tendency for flames to spread over their surface. The test, entitled "The surface spread of flame test", is fully described in British Standard 476 : Part 1 : 1953. The "effective spread of flame" on the specimens is computed from the results of the test and the material is classified as having surfaces in one of the following groups:

Class 1. Surfaces of very low flame spread. Those faces on which not more than 7.5 in. effective spread of flame occurs. (For example, plasterboard, wood wool slabs and all non-combustible boards).

Class 2. Surfaces of low flame spread. Those faces on which the effective spread of flame neither exceeds 12 in. during the first $1\frac{1}{2}$ minutes nor exceeds a final value of 24 in. (For example, synthetic resin bonded paper sheets).

Class 3. Surfaces of medium flame spread. Those faces on which the effective spread of flame neither exceeds 12 in. during the first $1\frac{1}{2}$ minutes nor exceeds 33 in. after 10 minutes. (For example, timber having a density greater than about 25 lb/ft³, and hardboard).

Class 4. Surfaces of rapid flame spread. Those faces on which the effective spread of flame either exceeds 12 in. during the first $1\frac{1}{2}$ minutes or exceeds 33 in. after 10 minutes. (For example, timber having a density less than about 25 lb/ft³, and fibre insulation board).

3. The performance in the test of boards in any of the Classes 2 - 4 can be improved by means of treatment as indicated in paragraph 1. The most widely used boards for internal linings are wood-base products; the fibreboards, timber and plywood, and these are materials which, in their untreated state, present the greatest fire hazard. The following list contains details of proprietary treatments which have raised the performance of these materials to Class 1 or 2 in the test. For further information concerning a product, or for a copy of the report of test the manufacturer should be approached. It is emphasized that the specified method of application of a treatment must be followed if the classification stated is to be obtained. Both faces of a board should have the same classification when it is used as a cavity lining.

TABLE 1

Treatments achieving Class 1 in the surface spread of flame test when applied to fibre insulating board

Manufacturer	Description of treatment	Report F.R.O.S.I. No.
Albi-Willesden Ltd., 6, De-Vere Gardens, W.8.	(a) "Albi-R" fire retardant paint (14 g/ft ²) (b) "Albi-R" on acoustic tiles (50 g/ft ²) (c) "Albi-clear" No. 1 lacquer (15 g/ft ² wet weight).	231 } (a) } (b) } (c)
Anglo-American Export Co. Ltd., 60, Ebury Street, S.W.1.	"Refrac" fire retardant paint (1½ lb/yd ²)	194
Bowaters Building Boards Ltd., Bowater House, Stratton Street, W.1.	Bowaters-Lloyd Flame-retardant board treated on both faces during manufacture.	406
Celotex Ltd., North Circular Road, Stonebridge Park, N.W.10.	Celotex F.R. Insulation Board. Protection provided by a facing of asbestos paper 0.014 in. thick.	364
Duresco Products Ltd., Charlton, S.E.7.	Fire retardant paint No. H.1200 (8½ oz/yd ²)	654
Flatau, Dick & Co. Ltd., 9, Camomile Street, Bishopsgate, E.C.3.	"Huntonit" insulation board painted with a coat of "Hufo" paint (300 g/m ²).	936
Foy Morgan & Co. Ltd., 16, Eastcheap, E.C.3.	"Odenboard", insulation board painted with Albi-SKK (140 g/m ²).	996
Hicksons Timber Impregnation Co. (G.B.) Ltd., Castleford, Yorkshire.	"Pyrolith" treatment (Impregnation with 2.5 lb/ft ³ of fire retarding salts).	1132
Imperial Chemical Industries Ltd., Imperial Chemical House, S.W.1.	"Frestex" finish (9.9 lb/yd ²)	365
Insulite Products Corporation Ltd., 41, Kingsway, W.C.2.	"Check-fire" coating (18 g/ft ²) on Insulite insulating board.	778
Montgomerie Stobo & Co. Ltd., Rogart Street, Bridgeton, Glasgow.	Paint I/143 (8 ft ² /lb)	839
Thomas Parsons & Sons Ltd., Church Road, Mitcham, Surrey.	"Fyranti" Fire Resisting Paint (White) (16 oz/yd ²)	611
Pinchin Johnson & Associates Ltd., North Woolwich Road, Silvertown, E.16.	"Gaymiculite" flame resisting paint (2.6 lb/yd ²)	780

TABLE 1 - continued

Treatments achieving Class 1 in the surface spread of flame test when applied to fibre insulating board

Manufacturer	Description of treatment	Report F.R.O.S.I.No.
Porcella Products Ltd., 83, Headstone Road, Harrow, Middlesex.	"Porcella Fireproof Paint" (15.3 yd ² /gallon)	252
Pyrok Ltd., Trading Estate, Slough, Bucks.	"Pyrok" (6 ³ / ₄ lb/yd ²)	120
S. O. Rudkin & Co., Plantation House, Mincing Lane, E.C.3.	Acoustic fibre insulating board treated with "Quitfire" flame retardant solution (0.82 oz/ft ²)	727
ditto	"Quitfire" impregnated board	374
Sadolin & Holmblad Ltd., Paint & Varnish Works, Copenhagen, S.Denmark.	Fire protecting paint No. 31 (14 g/ft ²)	714
South American Minerals & Products Co. Ltd., 26/7, Cowcross Street, E.C.1.	"Exolit" Firestop (200 g/m ²)	886
ditto	"Exolit" Firestop (0.80 oz/ft ²) overpainted with Riogloss chlorinated rubber paint (0.11 oz/ft ²)	1051
ditto	"Exolit" Firestop (450 g/m ²) on acoustic boards	887
Stanley Smith & Co. Ltd., Warple Road, Isleworth, Middlesex.	"Ignicide" treated partition board.	186
Timber Fireproofing Co.Ltd., 13a, Old Burlington Street, W. 1.	Oxylene Boram surface fire retardant (30yd ² /gal)	749
ditto	Oxylene Boram surface fire retardant (30 yd ² /gal), overpainted with flat oil paint (9.5 oz/yd ²)	753
ditto	Oxylene Boram surface fire retardant (30 yd ² /gal), overpainted with P.V.A. emulsion paint (11.6oz/yd ²)	755
ditto	Oxylene Boram surface fire retardant (96 ft ² /gal) applied to acoustic tiles.	866
Turner King & Sheppard Ltd., 82 Victoria Street, S.W.1.	T.K.S. Firecheck paint (15 yd ² /gal)	154

TABLE 2

Treatments achieving Class 2 in the surface spread of flame test when applied to fibre insulating board

Manufacturer	Description of treatment	Report F.R.O.S.I. No.
Lewis Berger (Great Britain) Ltd., Berkeley Square, W.1.	Fire retardant paint Ref. No. B.7886 ($\frac{1}{6}$ pint/yd ²).	30
C & T Painters Ltd., Mordaunt Road, Harlesden, N.W.10.	"Harlite" process (British Patent No. 629773) on an oil paint binder. Total application weight ($3\frac{1}{2}$ lb/yd ²)	121
Coatstone Manufacturing Co., Granville House, Arundel Street, W.C.2.	"Coatstone" liquid stone ($14\frac{1}{2}$ oz primer and 3 lb Coatstone per square yard)	31
Craig & Rose Ltd., 172 Leith Walk, Leith, Edinburgh, 6.	"Superose" flat oil D.P. paint on O.W. primer (6.2 oz/yd ² primer: 5.3 oz/yd ² paint)	132
Denton & Jutsum Ltd., Bow Common, E.3.	"Phoenix" fire retardant paint on "Phoenix" white fire retardant primer ($\frac{1}{2}$ lb/yd ² primer: $\frac{3}{8}$ lb/yd ² paint)	46
Hempel's Marine Paints Co. Ltd., 38/39 Bruton Street, W.1.	"Anti-flamm" fire retardant primer and finishing paint ($1\frac{1}{4}$ lb/yd ²)	203
Imperial Chemical Industries Ltd., Imperial Chemical House, S.W.1.	Frestex (3.1 lb/yd ²)	420
George Lillington & Co. Ltd., 5/7 London Bridge Street, S.E.1.	Paintcrete Cement Paint (1 lb/yd ²)	239
Pearl Varnish Co. Ltd., Treforest Trading Estate, Pontypridd, Glamorgan.	Seculate Anti-condensation Compound (1.45 yd ² /lb)	476
Permacec Paint Co. Ltd., Keelands House, 644, Oxford Road, Reading, Berks.	Permacec (Anti-con) paint on Permacec water-proof paint ($\frac{3}{8}$ lb/yd ² waterproof: $\frac{3}{8}$ lb/yd ² Anti-con)	130
Plywood & Timber Products Agencies Ltd., Gallardo House, Arthur Street, E.C.4.	Treated Ahlstrom insulating board	245
Timber Fireproofing Co. Ltd., 13a, Old Burlington Street, W.1.	Oxylene Boram surface fire retardant at 30 yd ² /gal overpainted with gloss oil paint (7.9 oz/yd ²)	754
Zist Ltd., Ormond Mews, Guilford Street, W.C.1.	Impregnation with monammonium phosphate compound (salt retention 12 per cent)	1053

TABLE 5

Treatments achieving Class 1 in the surface spread of flame test when applied to timber and plywood

Manufacturer	Description of Treatment	Report F.R.O.S.I. No.
Albi-Willesden Ltd., 6 De Vere Gardens, W.8.	"Albi-R" fire retardant paint on plywood (23 g/ft ²)	231
Anglo-American Export Co. Ltd., 60 Ebury Street, S.W.1.	"Refrac" fire retardant paint on Douglas fir plywood (1 ³ / ₄ lb/yd ²)	194
Celcure & Chemical Co. Ltd., 300 Bearsden Road, Glasgow, W. 3.	Softwood impregnated with Celcure F(3) (Salt retention 2.49 lb/ft ³)	1033
Hangers Paints Ltd., Stoneferry Works, Hull.	Dinaphon V.103 (7 lb/yd ²) on plywood	952
Hickson's Impregnation (G.B.) Co. Ltd., Castleford, Yorks.	"Pyrolith" (impregnation) treatment of Baltic redwood (2.4 lb/ft ³)	386
Dr. P. R. Masek (Research Laboratories) 14 Randolph Road, London, W. 9.	Selanol W (26 g/ft ²) on softwood.	852
North British Chemical Co. Ltd., Droylsden, Manchester.	"Norbitol" fire retarding paint No. 3458 in two coats (total 18 oz/yd ²) over one coat of lead primer on softwood.	927
Sherwoods Paints Ltd., Barking, Essex.	White fire retardant paint ref. P.L. 5069 (1.75 lb/yd ²) on plywood.	684
South American Minerals & Products Co. Ltd., 26/7 Cowcross St., E.C.1.	"Exolit" Firestop (300 g/m ²) on softwood	971
Stanley Smith & Co. Ltd., Warple Road, Isleworth, Middlesex.	"Ignicide" plywood (impregnation)	229
Timber Fireproofing Co. Ltd., 13a Old Burlington Street, London, W. 1.	Lead primer (3.3 oz/yd ²), and Oxylene Boram surface fire retardant (20 yd ² /gal)	751
Turner King & Sheppard Ltd., 82 Victoria Street, S.W.1.	T.K.S. Fire Check paint on plywood (20 yd ² /gal)	105
Zist Ltd., Ormond Mews, Guilford Street, W.C.1.	Plywood impregnated with monammonium phosphate compound (salt retention 12 per cent)	1006

TABLE 3

Treatments achieving Class 1 in the surface spread of flame test when applied to hardboard

Manufacturer	Description of treatment	Report F.R.O.S.I.No.
Albi-Willesden Ltd., 6 De Vere Gardens, W. 8.	Albi-R fire retardant paint (18 yd ² /gallon)	231
Stanley Smith & Co., Warples Road, Isleworth, Middlesex.	Ignicide hardboard. (Impregnation)	399
South American Minerals & Products Co. Ltd., 26/7 Cowcross Street, E.C.1.	"Exolit" Firestop (300 g/m ²)	884

TABLE 4

Treatments achieving Class 2 in the surface spread of flame test when applied to hardboard

Manufacturer	Description of treatment	Report F.R.O.S.I.No.
Airscrew & Jicwood Ltd., Weybridge, Surrey.	"Hardec" (finish of synthetic resin impreg- nated paper)	583
Montgomerie Stobo & Co. Ltd., Rogart Street, Bridgeton, Glasgow.	Paint L/143 (8 ft ² /lb)	838
P.I.M. Board Co. Ltd., Sunbury-on-Thames, Surrey.	Sundeala medium hardboard, flameproofed with fire retardant salts incorpor- ated during manufacture. (Net salt retention 15 per cent)	746
The Timber Fireproofing Co. Ltd., 13a, Old Burlington Street, W. 1.	Impregnation by Oxylene process. (Salt retention 5 lb/ft ³)	334
Zist Ltd., Ormond Mews, Guilford Street, W. C. 1.	Impregnation with monoammo- nium phosphate compound (salt retention 12 per cent)	1052

TABLE 6

Treatments achieving Class 2 in the surface spread of flame test when applied to timber and plywood

Manufacturer	Description of treatment	Report F.R.O.S.I. No.
Anglo-American Export Co. Ltd., 60, Ebury Street, S.W.1.	"Refrac" fire retardant paint on gaboon plywood (1 lb/yd ²)	194
Coatstone Manufacturing Co., Granville House, Arundel Street, W.C.2.	"Coatstone" liquid stone on plywood (Douglas fir 12 oz/yd ² primer 3 lb 7 oz/yd ² paint; gaboon 5 oz/yd ² primer 2 lb 1 oz/yd ² paint)	31
Craig & Rose Ltd., Leith Walk, Leith, Edinburgh, 6.	"Superose" flat oil D.P. paint on plywood. (Douglas fir 8 yd ² /lb primer, 3 ¹ / ₃ yd ² /lb paint; Gaboon 8 yd ² /lb primer 2 ¹ / ₂ yd ² /lb paint)	132
Denton & Jutsum Ltd., Bow Common, E.3.	"Phoenix" fire retardant paint on plywood (Douglas fir primer 1/4 lb/yd ² , paint 3/8 lb/yd ² , gaboon primer 1/5 lb/yd ² , paint 3/8 lb/yd ²)	46
Duresco Products Ltd., Charlton, S.E.7.	"Duresco" water type paint on plywood (1 ¹ / ₂ yd ² /lb)	159
F.R. Paints Mfg. Co. Ltd., 42, Upper Richmond Road West, London, S.W.14.	F.R.I. Paint in three coats, (total on plywood 14 ft ² /lb)	919
Hadfields (Merton) Ltd., Mitcham, Surrey.	F.R. Paint Grey A.S. 1245 on plywood (1 ¹ / ₃ lb/yd ²) F.R. Paint White A.S. 1246 on plywood (1 ¹ / ₃ lb/yd ²)	618 619
Dr. Kurt Herberts & Co., (22a) Wuppertal-Barmen, Christbusch, Germany.	DKH Fire protective paint A-C-nit L. (223 g/yd ²) on plywood	635
Hickson's Impregnation (G.B.) Co. Ltd., Castleford, Yorks.	"Pyrolith" (impregnation) treatment of Douglas fir (2.1 lb/ft ³) and poplar (2.6 lb/ft ³)	386
Montgomerie Stobo & Co. Ltd., Rogart Street, Bridgeton, Glasgow.	Paint L/143 (8 ft ² /lb)	837
North British Chemical Co. Ltd., Droylesden, Manchester.	Fire retarding paint No. 3458 (8 oz/yd ²)	764
Palorit Ltd., River Road, Barking, Essex.	"Palorit" fire resisting paint on plywood (Douglas fir 12/3 yd ² /lb, gaboon 2 yd ² /lb)	77
Sissons Brothers & Co. Ltd., Bankside, Hull.	Fire retardant paint Ref. Lab G.193 (2.4 yd ² /lb) on softwood	730
Timber Fireproofing Co. Ltd., 13a, Old Burlington Street, London, W.1.	Oxylene Boram, transparent, (16 yd ² /gal)	868