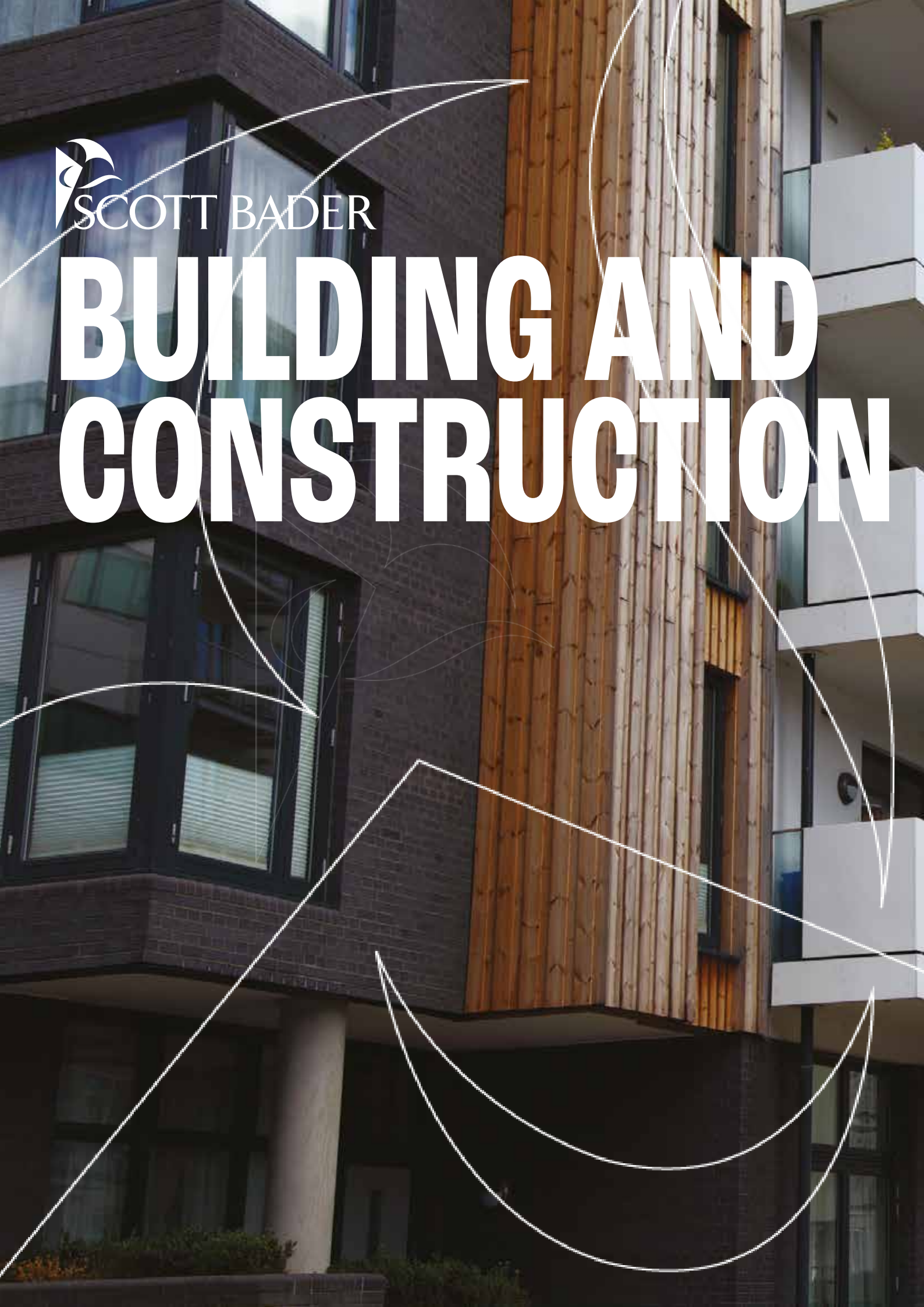


SCOTT BADER

BUILDING AND CONSTRUCTION

FIRE, SMOKE AND TOXIC FUME SYSTEMS (FST)

Our diverse range of products is specifically designed to offer complete systems that meet European and Global FST standards and performance ratings.
Our FST products are used in many industries including Rail, Building and construction and Marine. Scott Bader aims to provide excellent technical support, expertise and advice to support our products.

CONTENTS

SCOTT BADER
*Making a **positive** difference*

A global manufacturer of adhesives, resins and gelcoats.

Established 1921

Employee-owned since 1951

18 global offices

800 colleagues

1 joint venture

7 worldwide manufacturing sites

BBVA Headquarters
Built using Crestapol® 1212 resulting in energy savings.

BUILDING AND CONSTRUCTION FST PRODUCT TABLE

Crestafire®
FST Performance Products

	Application	Resin Type	CAN ACHIEVE							
			EU	UK		FR		ES	US	
FST Resins			EN 13501-1	BS476-6	BS476-7	NF F 16-101	NFP 92-501	M Test	ASTM E84	UL94
Crestapol® 1212/ATH	HL and RTM	Urethane acrylate	B, s1, d0							
Crestapol® 1213A*	HL and RTM	Urethane acrylate	B, s1, d0 (expected to achieve)							
Crystic 1355PA	HL	Ortho		Class 0	Class 1					
Crystic PD9359PA	RTM	Ortho		Class 0	Class 1					
FST Resin and Gelcoat system										
Crestapol® 1212/ATH +GC 72PA	HL and RTM	Urethane acrylate				F1	M1	M1		
Crestapol® 1212/ATH +GC 70PA	HL and RTM	Urethane acrylate	B, s2, d0							
Crestapol® 1212/ATH +GC 76PA	HL and RTM	Urethane acrylate	B, s2, d0							
Crestapol® 1212/ATH +GC LS97PA	HL and RTM	Urethane acrylate	C, s2, d0							
Crestapol® 1212/ATH +GC 967	HL and RTM	Urethane acrylate	B, s1, d0							
Crestapol® 1216/ATH +GC 76PA	HL	Urethane acrylate							Class 1	
Crystic 1355PA +GC 65PA	HL	Ortho								V-0
Crystic 1355PA +GC 72PA	HL	Ortho			Class 1					
Crystic 26026 +GC 72PA	HL	Ortho				F2	M2			
Crystic FR1166PAK +GC 72PA	HL and contact moulding	Ortho / DCPD				F1	M2			
Crystic 5046PA +GC 72PA	HL and S	Ortho				F2	M1			
Crystic U 1131TPA +GC 72PA	HL and S	Ortho				F1	M2			

For the full range of systems, please ask a Scott Bader representative for assistance.

Crestapol's FST performance is achieved by the addition of aluminium trihydrate (ATH). Due to the inherently low viscosity of Crestapol® Resins up to 200 phr of ATH can be incorporated to achieve a range of stringent fire, smoke and toxic fume standards (details can be found on page 7).

FST performance will also be dependent on glass content and profile thickness. Please contact Scott Bader Technical Services Dept. for advice on ATH loadings for specific applications.

BUILDING AND CONSTRUCTION RESINS AND COMPOUNDS

All our FST resins offer excellent FST performance that are specifically designed to meet European and Global FST standards and performance ratings. For certification please see our composite systems table on page 3.

Crystic® 370
- Pre-accelerated, filled, polyester resin
- Rapidly wets out reinforcement
- Pultrusion

Crystic® FR1166 PAK
- Pre-accelerated, filled Ortho unsaturated polyester resin
- White version available with the same performance
- Low styrene content
- Halogen and heavy metal free
- Spray and hand lay-up process

Crystic® 1355PA
- Pre-accelerated, filled polyester resin
- Rapidly wets out reinforcement
- Hand lay-up

Crystic® 5046PA
- Pre-accelerated, filled, Ortho unsaturated polyester resin
- Hand lay-up and injection processing

Crystic® PD9359PA
- Pre-accelerated, filled, polyester resin
- RTM

Crystic® U 1131TPA
- Pre-accelerated, filled, Ortho unsaturated polyester resin
- Halogen and heavy metal free
- Low styrene content
- Spray and hand lay-up

Crystic® 26026
- Pre-filled, Ortho unsaturated polyester resin
- Non-accelerated, low styrene content
- Zero chlorine and zero nitrogen
- Spray and hand lay-up process

FIREGUARD

New technology FST Gelcoats and Topcoats protecting composites from fire.

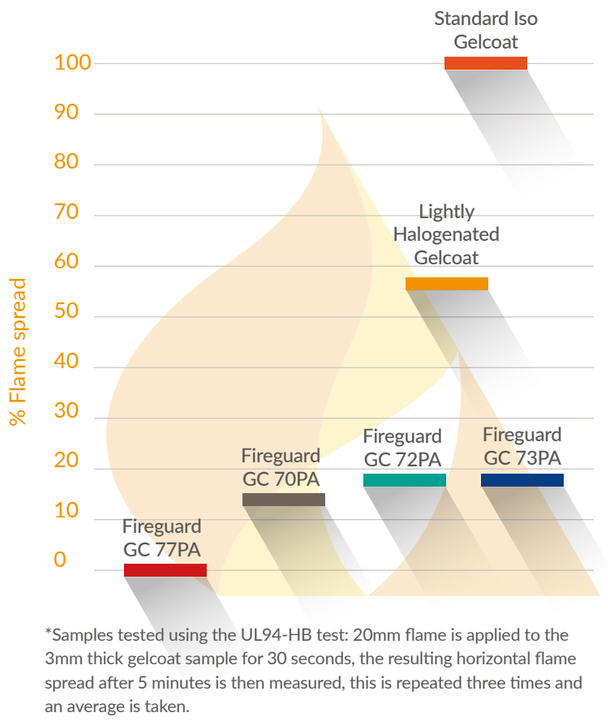
Fireguard Gelcoat 70PA
- Very low smoke and very low surface spread of flame
- Halogen free
- Spray gelcoat

Fireguard Gelcoat 72PA
- Low smoke and surface spread of flame
- Halogen free
- Spray gelcoat

Fireguard Gelcoat 73PA
- Low smoke and low surface spread of flame
- Halogen free
- Brush gelcoat

Fireguard Gelcoat 77PA
- Highest level of FST performance in Fireguard range
- New FST Intumescent technology based system
- Allows for design of lighter weight FST composite parts
- Developed to achieve European harmonised fire specifications
- Spray gelcoat

Spread of flame on a horizontal burn test after 5 minutes*



*Samples tested using the UL94-HB test: 20mm flame is applied to the 3mm thick gelcoat sample for 30 seconds, the resulting horizontal flame spread after 5 minutes is then measured, this is repeated three times and an average is taken.

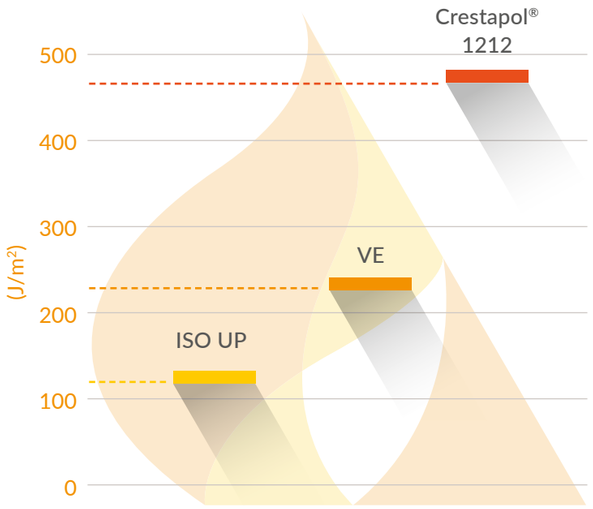
Crestapol®
Urethane Acrylate Technology

Crestapol's FST performance is achieved by the addition of aluminium trihydrate (ATH). Due to the inherent low viscosity of Crestapol® resins up to 200 phr of ATH can be incorporated to achieve a range of stringent fire, smoke and toxic fume standards.

Fire performance will also be dependent on glass content and profile thickness. Please contact Scott Bader Technical Services Dept. for advice on ATH loadings for specific applications.

LIQUID PROPERTIES		
PROPERTY	UNIT OF MEASUREMENT	CRESTAPOL® 1212
Appearance	-	Clear yellowish brown
Viscosity @ 25°C 4500 sec^{-1}	Poise	0.7
Density @ 25°C	gcm^{-3}	1.07
Volatile content	%	49
Stability in the dark @ 20°C	Months	9

Crestapol® 1212 fracture toughness



Crestapol® 1211A

- Compounded version of Crestapol® 1212
- Pre-accelerated and pre-filled with ATH
- Closed mould applications
- Liquid cure system
- Designed to be used with Fireguard GC 78PA for lighter weight FST composite parts

Crestapol® 1212

- Urethane Acrylate based
- Thermosetting resin
- Very low viscosity
- Flexibility to adjust ATH and accelerator levels
- Pultrusion and close moulding applications

Crestapol® 1213A

- Compounded version of Crestapol® 1212
- Pre-accelerated and pre-filled with ATH
- Hand lamination and close moulding applications

Crestapol® 1214

- Urethane Acrylate based
- Comparable FST performance of Crestapol® 1212
- Low profile technology for aesthetically demanding applications
- Pultrusion grade only

Crestapol® 1216

- Urethane Acrylate based
- Thermosetting resin
- Very low viscosity
- Resin fully air cures
- Hand lamination and compression moulding

FST PERFORMANCE IN PULTRUSION

- **High reactivity**
  Offering the potential for high line speeds compared to other typical thermosetting resins.
- **Mechanical performance**
  The inherent "toughness" of the cured resin matrix results in profiles exhibiting excellent mechanical performance despite the presence of high levels of filler.
- **Pigmentable**
  1212 is pigmentable and fully compatible with polyester pigment pastes.

FIRE REQUIREMENT	MINIMUM ATH LOADING (parts per thousand)	CRESTAPOL® 1212 RESULTS
French NFP 92-501	170	M1
French NFP 16-101	170	F0
UNE 23721 : 1990 UNE 23727 : 1990	170	M1
DIN 5510	100	S4/SR2/ST2
ASTM 162	100	Is = 10 (limit <35) Meets Federal Railroad Admin for surface flammability
ASTM 662	100	Ds (max) = 119 Dm (1.5) = 1 Dm (4) = 4
ASTM E84	165	Smoke index 110, Flame index 15
ISO 5658	170	HL2
ISO 5659-2	170	HL2
ISO 5660-1 and 2	170	HL2

PULTRUSION GUIDELINES TYPICAL FORMULATION	
Crestapol® 1212 and 1214	100 pbw
ATH	100 - 200 pbw
BYK W996#	3 - 6 pbw
TBPB*	1 pbw
TBP**	0.5 pbw
(Dispersed in solvent)	1.0 pbw
PAT 654 (internal release agent)†	1 - 3 pbw
Pigment (if required)	2 - 5 pbw
Die temperature: (First section unheated to prevent gellation at die entrance)	140°
Start up approx	0.2 metre/minute

Registered trademark of BYK-Chemie GmbH
* Tert-Butyl peroxybenzoate
** Di (4-tert-butylcyclohexyl) peroxydicarbonate
† PAT 654 is produced by CRC Limited

Find your local Scott Bader office

SCOTT BADER
*Making a **positive** difference*

INVESTORS IN PEOPLE®
We invest in people Gold

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