



Steel Window Association

Fact Sheet

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THE STEEL WINDOW ASSOCIATION, 42 HEATH STREET, TAMWORTH, STAFFORDSHIRE, B79 7JH

Fire Safety

INTRODUCTION

Steel framed glazed windows, screens and door assemblies can be designed and installed to protect life and property in the event of fire. Combining the transparency of glass with fire safety is a challenge to the window industry that demands high standards of construction, independently tested and assessed by recognised competent authorities.

Some of the steel framing solutions developed for members by the SWA and examined by Warrington Fire Research to meet such standards are illustrated in this Fact Sheet, which summarises key features of construction, indicates a variety of appropriate glass types, and gives pointers to their scope of application. They use solid hot rolled steel profiles from the F, W20 and W40 ranges to provide fire resistant glazed windows, doors and screens which will maintain their integrity in a typical fire for 30 or 60 minutes.

The complete assessments C118328 and C118420 produced by Warrington Fire Research, plus test reports referenced therein, which support the summarised information in this Fact Sheet, are available to specifiers of named projects on a confidential basis from member companies. When detailing specific projects it is strongly recommended that specifiers and contractors consult individual specialist manufacturers and study the full test reports and assessments with them.

Some member companies also offer complementary systems which use hollow cold formed steel profiles to assure integrity, together if necessary with radiant heat insulation, for equivalent or longer periods of up to 120 minutes. Information including test reports on these proprietary cold formed precision steel tube systems (CFS in the tables below) can be obtained directly from them.

FIRE SAFETY CRITERIA

Glazing systems are tested in accordance with BS476: Part 22: 1987 "Methods for determination of the fire resistance of non-loadbearing elements of construction" and assessed with respect to their ability to satisfy the performance criteria referred to in paragraph 7.6.1: integrity and insulation.

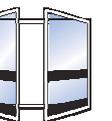
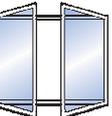
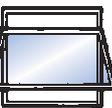
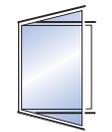
The integrity criterion is satisfied when for the required duration a test specimen neither collapses nor develops cracks or apertures through which can pass flame or hot gases.

The insulation criterion is satisfied when for the required duration the

mean temperature of the unexposed surface of a test specimen rises by no more than 140°C, or the temperature at any one point on the unexposed surface rises by no more than 180°C.

A summary of product range suitability

Criteria	Duration	Product Range	fixed lights	screen assemblies	doors & windows	double glass
Integrity only	Half-hour	F (SMW)	yes	yes	no	no
		W20	yes	yes	no	no
		W40	yes	yes	no	yes
		CFS	yes	yes	yes	yes
Integrity only	One hour	F (SMW)	yes	no	no	no
		W20	yes	no	no	no
		W20 modified	yes	yes	yes	no
		W40	yes	no	no	yes
		CFS	yes	yes	yes	yes
Integrity and Insulation	One hour Half-hour	CFS	yes	yes	yes	yes
Integrity and Insulation	One hour One hour	CFS	yes	yes	no	yes



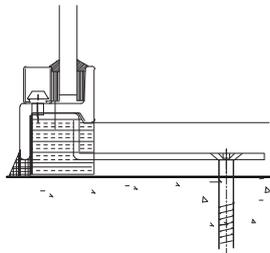
FIXED SCREEN ASSEMBLIES: 30 minutes fire resistant integrity

The classic lines of the Standard Metal Window (SMW) manufactured from F range profiles since the 1920s, and of the heavy duty purpose made window constructed with W20 profiles in production since the 1960s, are still available today - positively rustproofed by hot dip galvanizing, factory painted, and upgraded for insulating glass units. For improved thermal insulation while retaining the traditional slender appearance, the W40 range has recently been introduced. The lines of all three can be matched in fire resistant glazing required to maintain its integrity for 30 minutes.

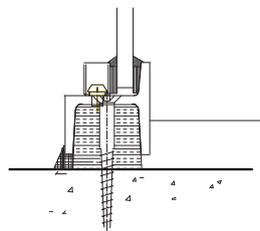
Composition: The framing is made of special hot rolled steel sections from the F, W20 or W40 ranges.

Dimension mm	F	W20	W40
Face width - perimeter	32	22 or 35	30 or 45
- glazing bar	28	28	33 or 45
- coupling	70	50 or 76	66
Profile depth front to back	25	32	40
Maximum glass thickness	6	12	20
Glass edge cover	8	8	12

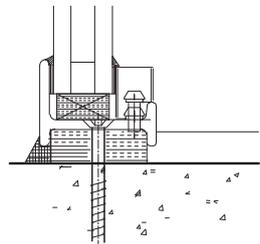
F range



W20



W40



Manufacture: Corner joints are mitre cut and welded, after holes for fixing and glazing have been pierced in the bars. Tee glazing bars are tenon riveted and/or welded into the frames, and may have a maximum span of 1.0m. Composite windows can be assembled by connecting windows with mullions and transoms, up to a maximum height of 3.0m and a maximum mullion spacing of 1.5m.

Finish: Frames are first positively rustproofed by hot dip galvanizing to BS EN ISO 1461, then finished with a stoved polyester colour coating to BS 6497. Glazing beads of galvanised steel are likewise finished with a stoved polyester coating which can be of a matching or contrasting colour.

Fixing: Countersunk steel screws N°12 diameter in plastic fixing plugs at no more than 150mm from corners and 450mm centres (250mm for 60 minutes integrity) secure the frame to a structural surround, either directly through the frame or via 25mm wide by 2mm thick steel fixing lugs. The surround, of brick, block, concrete, masonry, steelwork or other material, must have stability and integrity in fire greater than that of the glazed screen.

Glazing: Fire resisting glass, positioned on non-combustible setting blocks, eg mineral fibreboard, is retained by cold formed 0.6mm steel channel bead snapped over steel mushroom headed studs screwed into the frame rebate at no more than 75mm from corners and 300mm centres. This bead sandwiches the glass between ceramic or mineral fibre tape, to be capped by a silicone sealant. Suitable glass includes 6mm wired Pyroshield and Pyroshield Safety, 6mm borosilicate Pyran, 5mm ceramic Firelite, and 6mm modified toughened Pyrocet, Pyroswiss or Tempaflam.

The modified toughened glasses must be bonded to the glazing rebates with Autostic adhesive, reinforced in the case of Pyroswiss with stainless steel mesh.

Where thermal insulation in external façades is required in addition to fire resistance, the W40 range can accommodate special 20mm thick insulating glass units made up of 6mm toughened glass, a steel spacer and 6mm Pyroshield, Pyran or Vetroflam fire resisting glass.

Glass size limitations see back page

FIXED LIGHTS: 60 minutes fire resistant integrity

The same F range, W20 and W40 constructions can maintain integrity for 60 minutes as single pane fixed frames, glazed with a restricted range of glass types, subject to glass size limitations, provided their perimeter is secured with more closely positioned fixings at no more than 250mm centres.

GLAZED SCREEN AND DOOR ASSEMBLY: 60 minutes fire resistant integrity

Where full height glazed screens and doors are required to maintain their integrity in fire for at least one hour, a modified W20 construction is available, developed jointly for the benefit of all Association members.

Authority: A fixed screen prototype 3.0m x 2.6m divided into 6 panes, glazed with Pilkington "Pyroshield" polished wired glass, has been tested to BS 476: Part 22: 1987 and maintained its integrity for 77 minutes. A further test, discontinued after 75 minutes, has confirmed the performance of an enhanced version, incorporating a single leaf door 2133mm high by 1000mm wide, and Pilkington "Pyrostop" fire insulating laminated glass, which was assessed by Warrington Fire Research as satisfying the integrity requirement for one hour, and insulation for 14 minutes.

Application: This system is suitable wherever a specifier wishes to combine one hour fire safety with maximum daylight and vision. Its weather and corrosion resistant properties make it suitable for external fenestration as well as internal screens, particularly to complement other adjacent hot rolled steel windows and doors which do not have to be fire rated.



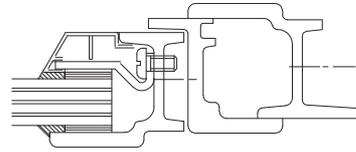
Unexposed face after 35 minutes of testing

Composition: The framing is made of special hot rolled steel sections from the W20 range, combined with 2.5mm thick steel angle glass clamps concealed by extruded aluminium clip on beading.

Modified W20 dimensions mm	Fixed frame	Doorset
Face width - perimeter	43 or 56	86 or 99
- coupling	92	135 (to side or fan light)
Profile perimeter depth (front to back)	32	32
Max glass thickness	15	15
Glass edge cover	20	20
Glass edge clearance	13	13

Manufacture: Corner joints are mitre cut and welded, after holes for fixing and glazing have been pierced in the bars. Door leaves have glazing frames screwed into them

Modified W20



and 200mm high double skin galvanised pressed steel panels filled with mineral fibre insulation inserted at head, sill and lock rail. Glass clamp angles of 2.5mm thick galvanized sheet steel are cut to length, perforated and pressed into shape. Composite screens can be assembled by connecting fixed lights and doorsets with mullions and transoms, up to a maximum height of 2.6m and a maximum mullion spacing of 1.5m.

Finish: Frames are first positively rustproofed by hot dip galvanizing to BS EN ISO 1461, then finished with a stoved polyester colour coating to BS 6497. Glass clamp cover beads of extruded aluminium are likewise finished with a stoved polyester coating which can be of a matching or contrasting colour.

Fittings: Door leaves are hung on galvanised steel butt hinges and fitted with a CERTIFIRE approved surface mounted overhead door closer and interlinked multi-point exit device including all steel components and reinforced bolt guides.

Fixing: Countersunk steel screws N°12 diameter in plastic fixing plugs at no more than 150mm from corners and 450mm centres secure the frame to a structural surround, either directly through the frame or via 25mm wide by 2mm thick steel fixing lugs. Couplings are bolted together with 6mm diameter steel machine screws and nuts at similar centres. All joints in external fenestration are made watertight with acrylic or silicone sealant. The surround, of brick, block, concrete, masonry, steelwork or other material, must have stability and integrity in fire greater than that of the glazed screen.

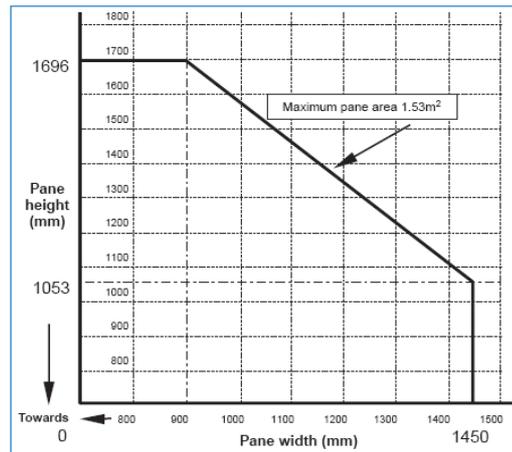
Glazing: Fire resisting glass, positioned on hardwood or non-combustible fibreboard setting blocks, is retained by steel glass clamps screwed into the frame rebate at no more than 75mm from corners and 300mm centres. This bead sandwiches the glass between ceramic or mineral fibre tape, to be capped by a silicone sealant. Suitable glass includes 6mm wired Pyroshield and Pyroshield Safety, 6mm borosilicate Pyran, 5mm ceramic Firelite, 6mm modified toughened Pyroacet, Pyroswiss or Tempaflam, and laminated intumescent interlayered glass such as 13mm Pyrodur, 14mm Pyrobel or 15mm Pyrostop.

The modified toughened glasses require a reduced edge cover of 11mm +/- 1mm and must be bonded to the glazing rebates with Autostic adhesive, reinforced in the case of Pyroswiss with stainless steel mesh.

GLASS SIZE LIMITATIONS

Based on test experience, glass pane sizes are subject to the following limitations:

- maximum pane area is 1.53m²,
- maximum pane height is 1696mm when the width does not exceed 900mm,
- maximum pane width is 1450mm when the height does not exceed 1053mm,
- at the most favourable aspect ratio of 1 : 1 the maximum height and width is 1237mm,
- no limitation is imposed on the aspect ratio providing the area is not exceeded.



FIRE RESISTANT GLASS TYPE SUITABILITY

Product name	Thickness mm	Supplier	Suitability				Integrity mins
			F	W20 std	W20 mod	W40	
Firelite	5	Southern Ceramic	■	■	■	■	60
Fivestar	5	Vetrotech	■	■		■	30
Fireswiss	6	CGI	■	■		■	30
Pyran S	6	Schott	■	■	■	■	60
Pyran+toughened igu	20	Schott				■	30
Pyrobel	14	Securiglass			■		60
Pyrocet	6	Securiglass	■	■	■	■	60
Pyroguard	7	CGI		■		■	30
Pyroguard+toughened igu	20	CGI				■	30
Pyrodur	13	Pilkington			■		60
Pyroshield	6	Pilkington	■	■	■	■	60
Pyroshield+toughened igu	20	Pilkington				■	30
Pyrostop	15	Pilkington			■		60
Pyroswiss	6	Vetrotech	■	■		■	30
Pyroswiss Plus	6	Vetrotech	■	■	■	■	60
Pyroswiss Extra	6	Vetrotech	■	■	■	■	60
Pyroswiss Extra	8	Vetrotech	■	■	■	■	60
Tempaflam	6	A C Yule	■	■	■	■	60
Vetroflam+toughened igu	20	Vetrotech				■	60