



Practical Advice on Dealing with the Issues From Glass in School Buildings

What are the problems?



Too Hot?



Simple Solutions

.....to being too hot!

Standard double glazed windows allow almost 80% of the sun's heat to enter the building.

Typical 'Sunny' Summer Day in the UK produces 500+ watts of energy per square metre at the windows.

In real terms you have the equivalent heat source of a 2 bar electric fire for every square metre of glass facing the sun.

High ambient temperatures in the centre of the classroom mean extremely uncomfortable conditions close to the window!

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What does this mean to you?

Double pane clear



Too Hot?



Simple Solutions

Performance results	Existing Glazing:	With Window Film:
	6mm Double clear	Sentinel Plus Silver 20 OSW
Visible light		
Transmittance %	80	15
Reflectance exterior %	15	62
Reflectance interior %	15	55
Glare reduction %		82
Solar energy		
Transmittance %	68	10
Absorptance %	19	28
Reflectance %	13	62
Solar heat gain coefficient (G-value)	.74	.14
Light to solar heat gain ratio (VLT/SHGC)	1.08	1.05
Total solar energy rejected %	26	86
Total solar energy rejected % @60°	21	84
Solar heat gain reduction %		81
Thermal energy		
Emissivity	.84	.76
Winter U-factor (W/m ² °C)	2.8	2.8
Winter heat loss reduction %		0
Ultraviolet light		
Blocked @ 300 to 380 nm %	57	>99

Too Hot?

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How can this be controlled?

Window film used ▶ **Sentinel Plus Silver 20 OSW**



Too Cold?

Simple Solutions

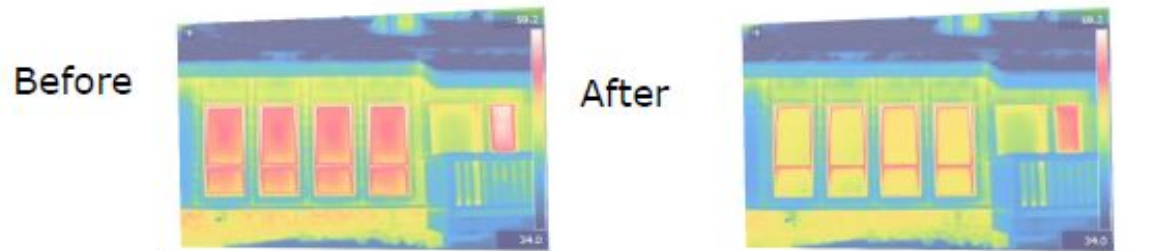
.....to being too cold!

Standard double glazed window can allow almost 80% of the internal heat to leave the building.

Typical Winter Days in the UK produces a 20+° temperature gradient from inside to out.

The coldest parts of a room are normally close to the windows.

Increased heating rarely solves the comfort issue



Too Cold?

Simple Solutions

Performance results	Existing Glazing:	With Window Film:
	6mm Double clear	Ecolux 70
Visible light		
Transmittance %	80	61
Reflectance exterior %	15	18
Reflectance interior %	15	7
Glare reduction %		24
Solar energy		
Transmittance %	68	37
Absorptance %	19	40
Reflectance %	13	23
Solar heat gain coefficient (G-value)	.74	.51
Light to solar heat gain ratio (VT/SHGC)	1.08	1.20
Total solar energy rejected %	26	49
Total solar energy rejected % @50°	21	58
Solar heat gain reduction %		32
Thermal energy		
Emissivity	.84	.09
Winter U-factor (W/m²°C)	2.8	2.1
Winter heat loss reduction %		25
Ultraviolet light		
Blocked @ 300 to 380 nm %	57	>99

Winter	Single Pane		Double Pane		Low E Glass
	Clear	Ecolux 70	Clear	Ecolux 70	
Inner glass	-9 C	-13 C	7 C	0 C F	11 C
Emissivity	0.84	0.09	0.84	0.09	0.84
Feels like (at 3 ft)	17 C	21 C	19 C	21 C	20 C

Too bright



Glass can be dangerous!



What makes a window (Glazing)

Glass Types

- Clear
- Tinted
- Reflective
- Low-e

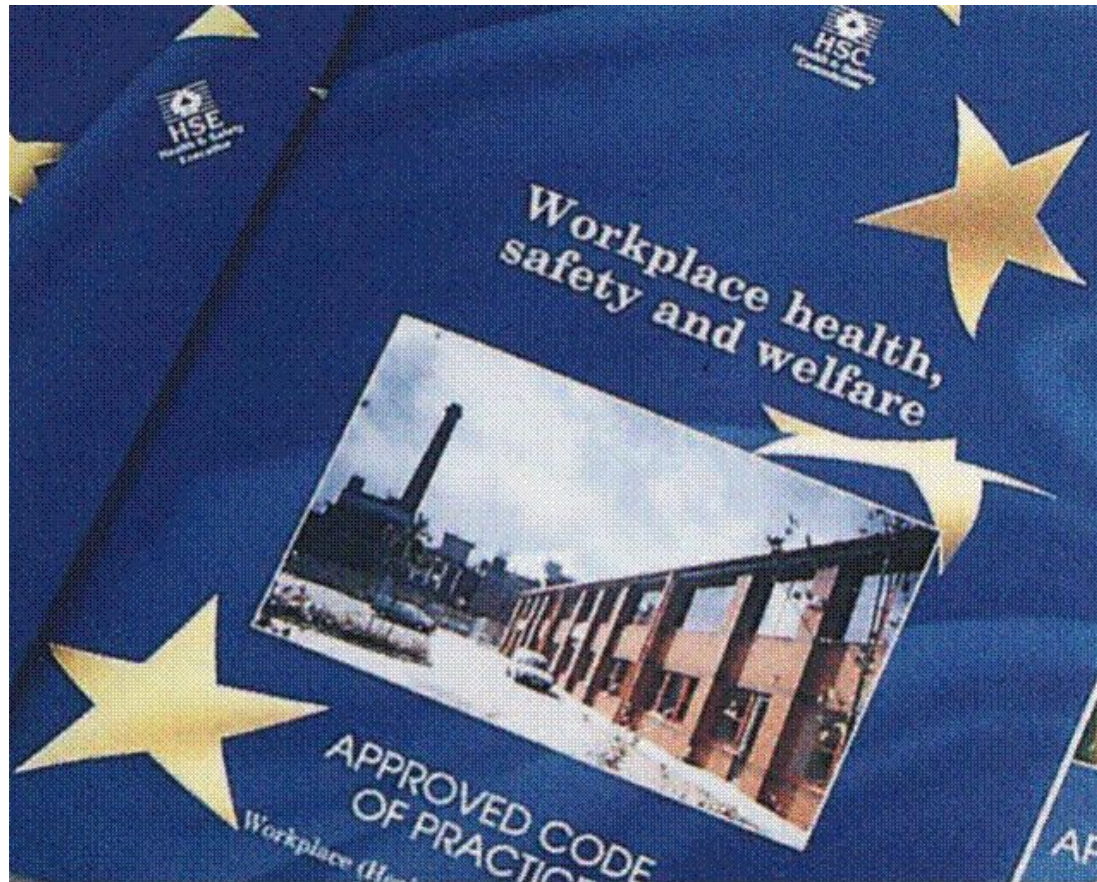
Glass Strength

- Annealed
- Heat-Treated
(Heat-Strengthened)
- Tempered

Window Constructions

- Single Pane
 - Single Laminated
 - Single Low-e
 - Double Pane
 - Double Laminated
 - Double Low-e
 - Triple Pane
 - Endless Possibilities....
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The Workplace (Health Safety and Welfare) Regulations 1992



Regulation 14

Every window or other transparent or translucent surface in a wall or partition and every transparent or translucent surface in a door or gate shall, where necessary for reasons of health and safety:

be of safety material or be protected against breakage of the transparent or translucent material and...

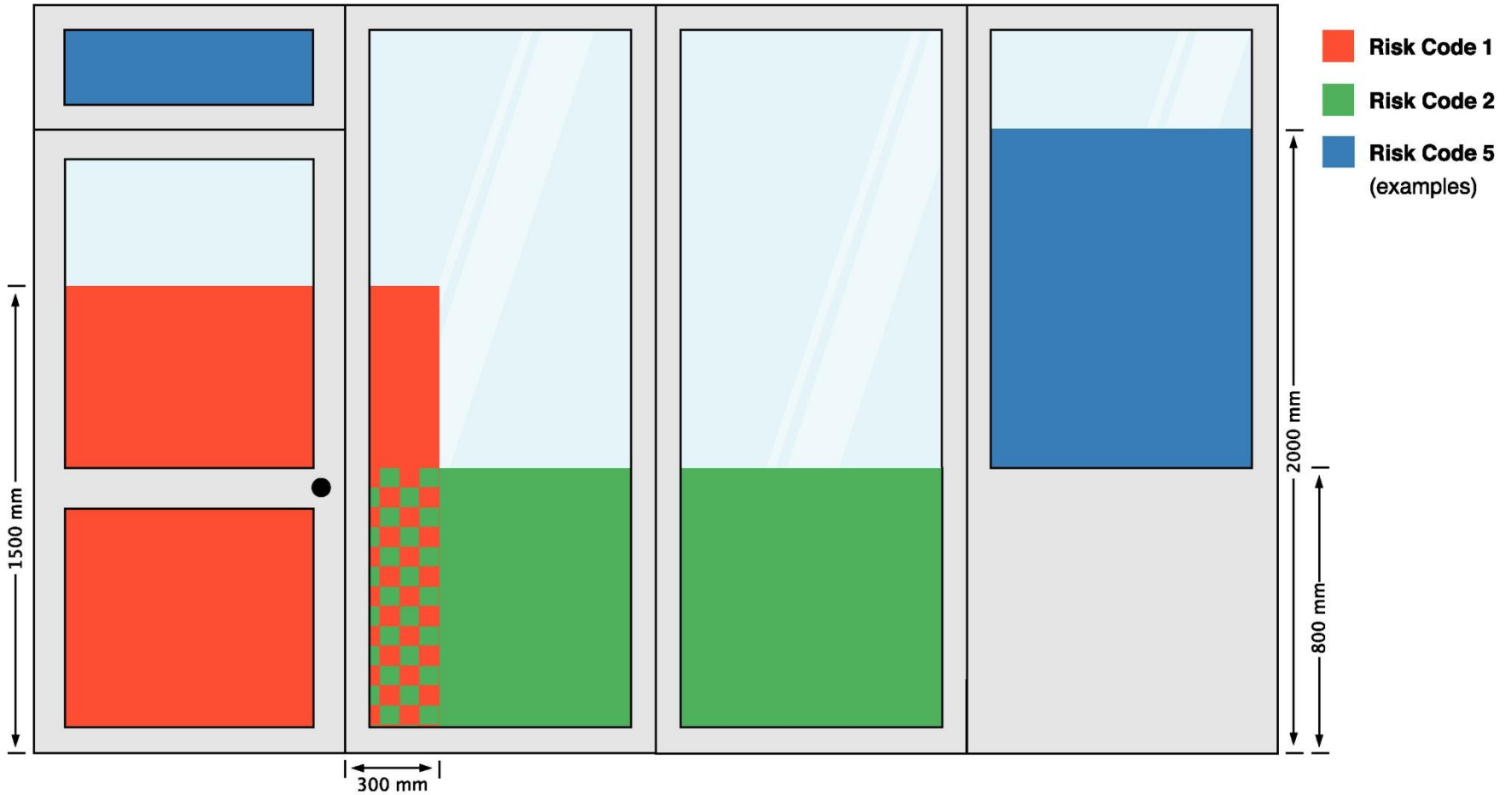
be appropriately marked or incorporate features so as, in either case to make it apparent.

The Five Steps to Compliance



- a) Conduct a risk assessment of your glazing to determine whether or not there is a risk of injury. (Recommendations can be found in BS6262 Part 4).
 - b) Ascertain the type of glass and its safety rating within those critical locations.
 - c) Prepare a schedule of work to ensure that all glazing identified as unsafe for its location will be upgraded.
 - d) Document both the assessment and the schedule of work.
 - e) Monitor and review. (Ensure the schedule of work is completed and any subsequent reorganisation does not create a new potential risk).
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The Reality of Risk Codes



Understanding Glass Types

Float – Annealed – Plate – Cast – Sheet

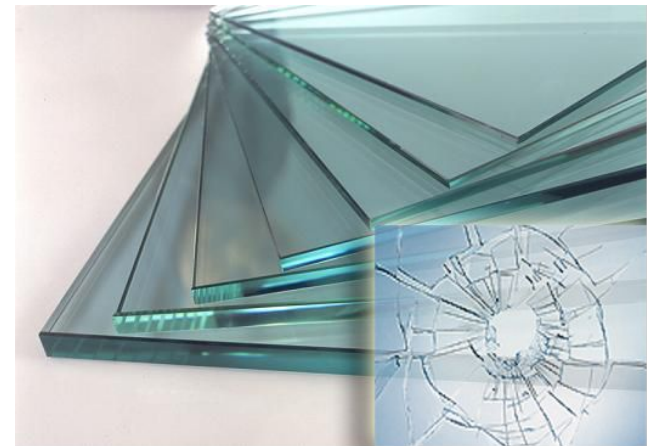
Toughened - Tempered – Heat Strengthened – Heat Soaked

Laminated

Georgian Wired Polished Plate – Georgian Wired Cast –
Georgian Wired Safety

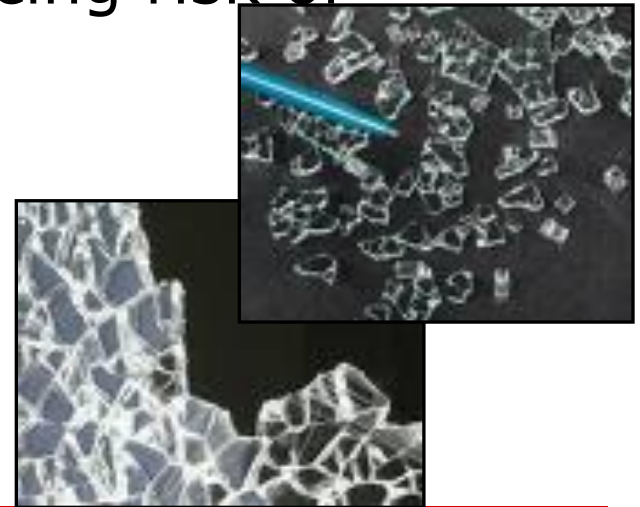
Types of glass - Annealed

- ❑ Produced by floating molten glass on a bed of molten tin and allowed to cool slowly
- ❑ Weakest of all glass types
- ❑ Breaks into sharp, dangerous shards



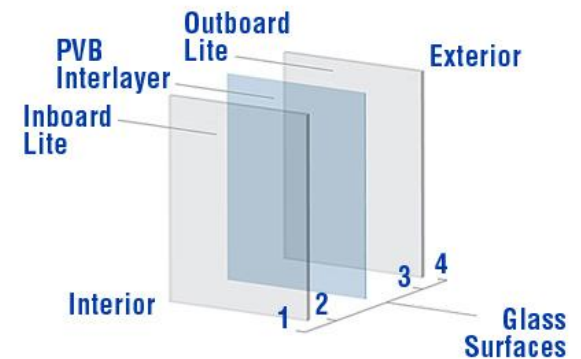
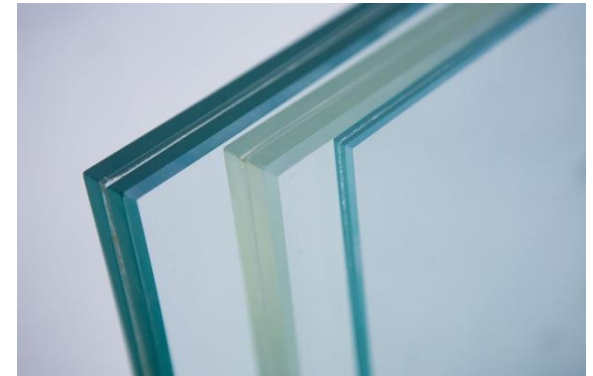
Types of Glass - Tempered

- ❑ Produced by reheating annealed glass and quickly cooling it
- ❑ 4 times stronger than annealed glass
- ❑ Breaks into small pieces reducing risk of personal injury
- ❑ Meets EN12600



Types of Glass - Laminated

- ❑ Annealed Glass bonded together
- ❑ Cracks and deflects rather than breaks
- ❑ Meets EN12600



Window Film the Facts

- Warranty/ Lifetime

 - Testing/Evaluation

 - Specification
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Simple Risk Assessment

RISK ASSESSMENT SURVEY DETAILS

EXAMPLE

Location of Glazing	Int Ext	No:	Width	Height	Risk Code	Glass Type	Safety Marked
FIRST FLOOR							
CLASSROOM MR1 25	E	1	26	42	1	L	N
SIDE PANEL	E	1	34	46	1	GWPP	
STAIRS MR1 256	E	2	26	12	5	ASF	N
STAIRS MR1 416	E	2	26	12	5	ASF	Y
EXIT DOOR BY MR1/32	E	1	23	39	1	L	N
OFFICE MR1/29	E	2	18	10	2	F4	
STAGE GANTRY	E	4	18	10	2	F4	
GROUND FLOOR							
EXIT OPPOSITE LECTURE THEATRE	E	4	20	11	1	T	Y
KITCHEN DOORS	E	4	12	13	1	GWS	Y
KITCHEN DOORS	I	2	17	17	1	GWS	N
FOYER MRG/01A	I	4	20	12	1	ASF	Y
EXIT BY MRG 20 (FILM EXTERNALLY)	E	2	29	12	1	GWC	EXT
MRG 24 KASSAM 1AB	E	2	24	41	1	T	N
DOORS AND SIDES	E	2	17	44	1	T	Y
DOOR	E	1	24	41	1	L	Y
BALUSTRADES	E	24	33	44	3	T	Y
GYM ENTRANCE	E	4	21	11	1	GWC	EXT
HIGH LEVEL IN SHOWER AREA	E	6	34	18	4	F4	
1. NO ACCESS REQUIRED 2. CHANGE EXTERNAL FACING ASF VERY OLD AND DEGRADED 3. INTERNAL FACING ASF STILL VALID							

Too Bare?

Simple Solutions

.....to using your glass in a practical way!!



The Way Forward

- Free no obligation surveys

 - Full Documented Risk Assessments available.

 - Audit existing film specification and performance.
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Thanks For Your Time



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Any Questions?
