Planning condition NS18 – Summary note

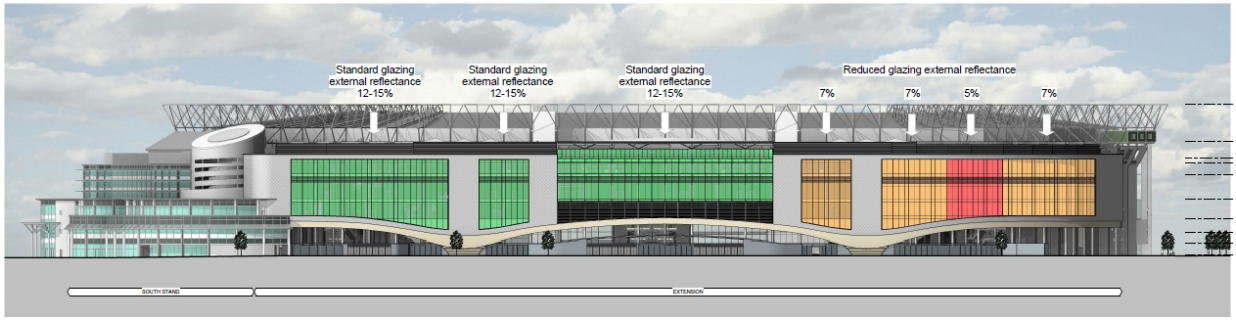
RFU Twickenham Stadium East Stand Development

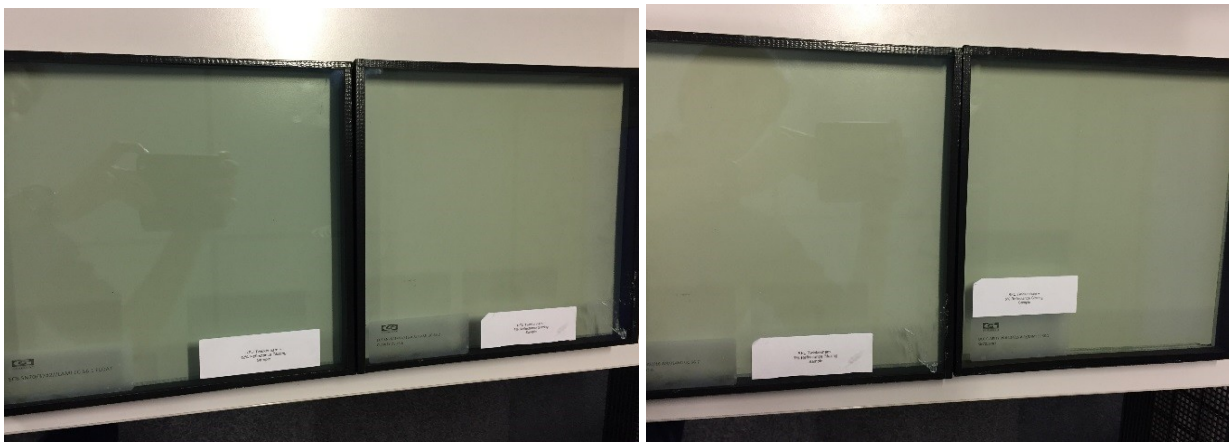
Planning condition NS18:

Details of all glazed elements of the building façade including glazing specification (including measures to reduce solar glare), rebates, method of fixing, framing to support glazing and any additional measures to reduce solar reflectance shall be submitted to and approved in writing by the Local Planning Authority within 3 months of commencement of construction of the development. The development shall then be built out in accordance with these details.

Please refer to summary notes below:

- For measures to reduce the solar glare, please refer to drawing 15735 – 346 P01 that indicates the proposed glazing external reflectance that varies from 12% (standard) to 7% and 5%. Please refer to to the attached Guardian performance calculator documents and Guardian glazing samples.
- For rebates, method of fixing, expressed vertical caps and fins please refer to typical detail for Schueco FW60+XR included in the drawing 15735 – 244 P01 and 15735 – 245 P02.
- For the curtain wall specification, please refer to the NBS specification document 15735-SPEC-NBS-H11-T5.
- Please refer to Envelope contractor mark-up showing the location of the Schueco V8 expressed caps along the east elevation.
- Please refer to drawings 303P02, 345P01, 344P01 (already submitted) for general details of the glazing elements





Images of the glazing samples with 12%, 7%, 5% reflectance

RFU – Twickenham 12% reflectance

GUARDIAN GLASS | PERFORMANCE CALCULATOR

February 22, 2017
By David Palmer
dpalmer1@guardian.com 01405 726800

KIWA confirms to have verified the calculation engine of the software Guardian Performance Calculator 4.1 to be compliant to EN 410 and EN 673.

Paul Anderson - KSS Group - SP - 22.02.17

Make-up Name	Make-up Icon	Glass 1 & Coating	Glass 2 & Coating	Transmittance		Reflectance				U-Value (U_g in W/m²-K)	Solar Factor (g)	Secondary Heat Transfer (q_i)
				Visible (τ_v %)	Solar (τ_e %)	Visible		Solar				
						ρ_v % out	ρ_v % in	ρ_e % out	ρ_e % in			
8EC_SN70/37 - 16Ar - 66.1EC Iam		SunGuard SN 70/37 (CE) on Guardian Float Glass ExtraClear (CE)	Guardian Float Glass ExtraClear (CE)	68.2	32.3	11.2	11.9	36.9	28.7	1.0	36.2	3.9

Calculation Standard: EN 410:2011 / EN 673:2011

8EC_SN70/37 - 16Ar - 66.1EC Iam

Outdoors

GLASS 1	Guardian Float Glass ExtraClear (CE) Thickness = 8mm	#1 ----- #2 SunGuard SN 70/37 (CE)
GAP 1	10% Air, 90% Argon, 16mm (.630")	
GLASS 2	Guardian Float Glass ExtraClear (CE) Thickness = 6mm	#3 ----- #4 -----
INTERLAYER 1	PVB Clear 0.38mm (CE)	
GLASS 3	Guardian Float Glass ExtraClear (CE) Thickness = 6mm	#5 ----- #6 -----

Total Unit (Nominal) = 1 13/32 in / 36.381 mm
Slope = 90°
Estimated Nominal Glazing Weight: 48.96 kg/m²

Indoors

RFU – Twickenham 7% (6.5%) reflectance

GUARDIAN CONFIGURATOR
GLASS PERFORMANCE CALCULATOR

KIWA confirms to have verified the calculation engine of the software Guardian Configurator 4.1 TESTED BY kiwa to be compliant to EN 410 and EN 673.

Product code

73 / 38 / 1.0

total thickness = 41.52 mm

Glazing from external to internal:

Pane 1

8 mm Float Glass ExtraClear SunGuard SN 70/37

Pane 2

Clarity
8 mm Float Glass Guardian UltraClear
1.52 mm PVB Clear
8 mm Float Glass Guardian UltraClear Clarity

Spacer 1 - 16 mm

10% Air
90% Argon

Results

Visible light (EN 410 - 2011)			Solar energy (EN 410 - 2011)	
transmittance [%]	τ_v =	73.0	solar factor [%]	g = 37.8
reflectance external [%]	ρ_v =	6.5	shading coefficient [g/0.87]	sc = 0.43
reflectance internal [%]	ρ_v =	4.8	direct transmittance [%]	τ_e = 33.4
general colour rendering index [%]	R_a =	92.3	direct reflectance external [%]	ρ_e = 35.3
			direct reflectance internal [%]	ρ_e = 30.6
Thermal properties (EN 673 - 2011)			direct absorption [%]	a = 31.3
U-value [W/(m²K)]	U_g =	1.0	UV transmittance [%]	τ_{uv} = 0.0
slope α = 90°			secondary internal heat transfer factor [%]	q_i = 4.4
			Other data	
			estimated sound reduction index [dB]	R_w = NPD
			(EN 717-1)	C = NPD
				C_{tr} = NPD

RFU – Twickenham 5% (4.8%) reflectance

GUARDIAN SUNGUARD ADVANCED ARCHITECTURAL GLASS | PERFORMANCE CALCULATOR

September 26, 2016
By Brook, Andrew
abrook@guardian.com

KIWA confirms to have verified the calculation engine of the software Guardian Performance Calculator 4.1 to be compliant to EN 410 and EN 673.

KSS Group - Neil Hattie - SP2 - 26 Sept 2016

Make-up Name	Make-up Icon	Outboard Substrate & Coating	Inboard Substrate & Coating	Transmittance			Reflectance				U-Value (U_g)	Shading Coefficient (sc)	Solar Factor (g)	General Colour Rendering Index (R_a)
				Visible (τ_v %)	UV (τ_{uv} %)	Solar (τ_e %)	Visible		Solar					
							ρ_v % out	ρ_v % in	ρ_e % out	ρ_e % in				
12.8UC Clarity #1 SN70/37#4-16-17.5UC clarity	C*	Clarity™ (CE) on Guardian Float Glass UltraClear (CE)	Clarity™ (CE) on Guardian Float Glass UltraClear (CE)	72.4	0.0	33.5	4.9	5.8	34.5	31.6	1.02	0.43	37.1	93.1
12.8UC Clarity #1 SN70/37#4-16-8.8UC clarity#8	C*	Clarity™ (CE) on Guardian Float Glass UltraClear (CE)	Clarity™ (CE) on Guardian Float Glass UltraClear (CE)	73.7	0.0	34.9	4.9	6.0	34.6	37.7	1.02	0.43	37.3	93.5
8mm UC DS Clarity-16Ar-SN70.37 17.5EC		Guardian Float Glass UltraClear (CE) Clarity™ (CE) on Surface #1 and Clarity™ (CE) on Surface #2	Guardian Float Glass ExtraClear (CE)	72.8	0.0	32.8	4.8	6.5	38.9	22.6	1.02	0.56	48.4	91.3
8mm UC DS Clarity-16Ar-SN70.37 8.8EC		Guardian Float Glass UltraClear (CE) Clarity™ (CE) on Surface #1 and Clarity™ (CE) on Surface #2	Guardian Float Glass ExtraClear (CE)	74.3	0.1	34.8	4.8	6.4	38.9	30.0	1.03	0.56	48.6	92.6

Calculation Standard: EN 410:2011 / EN 673:2011

8mm UC DS Clarity-16Ar-SN70.37 17.5EC

Outdoors

LITE	Guardian Float Glass UltraClear (CE) Thickness = 8mm	#1 Clarity™ (CE) #2 Clarity™ (CE)
GAP	10% Air, 90% Argon, 16mm (.630")	
LITE	Guardian Float Glass ExtraClear (CE) Thickness = 8mm	#3 SunGuard SN 70/37 (CE) #4 -----
PVB	PVB Clear 1.52mm (CE)	
LITE	Guardian Float Glass ExtraClear (CE) Thickness = 8mm	#5 ----- #6 -----

Total Unit = 1.635 in / 41.524 mm Slope = 90°

Indoors