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RC MONS : 130.828 - Enregistrement : 08/02/01

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Accreditation N° : 32-Test
according to ISO 17025

TEST REPORT N° 2007B COU 2884

Including 4 pages + 7 annex

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Mons, April 18th, 2007

REQUESTED BY :

Mme. Marenne
GLAVERBEL CRD
Rue de l'Aurore, 2
6040 Jumet
BELGIQUE

REFERENCE OF THE REQUEST :

Email I.Marenne 19/03/2007 ; ref 71289749

CONCERNED MANUFACTURER:

GLAVERBEL GROUP

AGC FLAT GLASS EUROPE from the 7th September 2007

CHAUSSÉE DE LA HULPE, 166

B-1170 BRUXELLES

BELGIQUE

NUMBER OF SAMPLES AND IDENTIFICATION :

See page 2. STOPRAY VISION-60 T

PURPOSE OF THE REQUESTED :

Initial Type Test

Determination of the photo-energetic properties
according to EN 1096-1 standard and durability.

SAMPLES RECEIVED ON :

March 21st, 2007

TESTING DATE :

March 27th, 2007

REMARKS : - * Test under BELTEST accreditation



Notified body (Id.N°1174)

according to ART.18 of the « Construction Products Directive » CPD 89/106/EEC

DESCRIPTION OF THE MATERIAL

Name of the applicant	GLAVERBEL GROUP AGC FLAT GLASS EUROPE from the 7th September 2007 CHAUSSEE DE LA HULPE, 166 B-1170 BRUXELLES BELGIQUE	
Production site (EN 572-9)	Lodelinsart. See GLAVERBEL product description	
Commercial name of the product	STOPRAY VISION-60 T (Heat treated)	
Customer's references	71289749 – code 33970	
Internal reference	CCOU2884	
Sampling	under responsibility of the applicant	
Sampling information	traceability of the samples is under responsibility of the applicant	
Class of the coating	C	
Coating position	3	
Low emissivity	Yes	
Glass Substrate	clear float glass (EN 572-2)	
Normal emissivity of clear float glass (ε _n)	0.89	
Samples		IGU
Number of samples	1 (92 x 83 mm)	/
Nominal Thickness	6 mm	
Nature of gas		
Composition of IGU		

INSTRUMENTS DESCRIPTION

Technical description	For emissivity	For optical properties
Spectrophotometer	PerkinElmer PARAGON 1000	PerkinElmer LAMDA 19
Type	Single Beam (FTIR)	Double Beam
Reflectance accessory	PerkinElmer	
Type of references	SnO ₂ Coated Glass Gold Mirror	Primary surface Ag Mirrors Secondary surface Ag Mirrors
Measurement Responsible	JS	JS

Notes : Uncertainty calculated on emissivity measurement is ± 0.01

Reproducibility on emissivity measurement is estimated to ± 0.005

PHOTO-ENERGETIC PROPERTIES - EN 1096-1

Considered parameters for the calculation of g and Ug	
Composition of the insulating glass	5.85/16/3.85
Position of the coating	2
Filling up	90% Argon

PHOTO-ENERGETIC PROPERTIES STOPRAY VISION 60-T	COATED GLASS ACCORDING TO EN 1096-1	IGU ACCORDING TO EN 673
U.V. range (280 – 380 nm)		
• Transmission τ_{uv}	15.89 %	12.73 %
Visible range (380 – 780 nm) – III D65/obs 2°		
• Transmission τ_v	66.16 %	60.40 %
• Reflection coated side ρ_v	13.71 %	/
• Reflection opposite side ρ'_v	10.21 %	/
Solar range (300 – 2500 nm)		
• Transmission τ_e	38.57 %	34.56 %
• Reflection coated side ρ_e	40.74 %	/
• Reflection opposite side ρ'_e	28.04 %	/
• Solar factor g	0.44	0.37
• Shading Coef SC	0.51	0.43
Thermal range (5000 – 50000 nm)		
• Emissivity ϵ_n	0.017	/
• Thermal coefficient U_g	5.7	1.1 W/m ² °K

COLOUR DETERMINATION ACCORDING TO CIE 1976	COATED GLASS
Visible range (380 – 780 nm) – III D65/obs 2°	
• Colour	
- transmission	L* 85.10 a* -1.06 b* 1.74
- reflection coated side	L* 43.80 a* -6.98 b* 12.43

IRRADIATION TEST
EN1096-3

Previous test report to consider : 2006B COU 2751-1

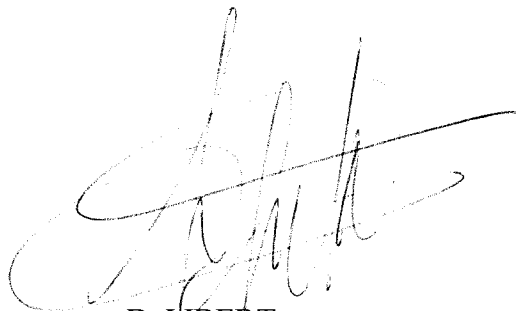
Composition of coatings : the manufacturer has provided a list of the layers forming the coating.

EVALUATION

Considering Previous test report and composition of coatings given by the manufacturer, coating STOPRAY VISION 60-T is approved as Class C coating without testing in accordance with EN1096-3, annex B.

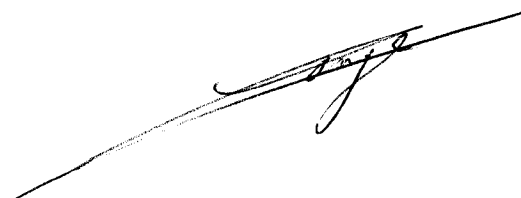
CONCLUSION :

Test pieces are in accordance with EN1096-1 and EN 1096-3 requirements.

A large, stylized handwritten signature in black ink, appearing to read "D. Libert".

D. LIBERT
Chief of Laboratory

Glazing & Components

A large, stylized handwritten signature in black ink, appearing to read "S. Lange".

S. LANGE
Head of Department

Identification du vitrage

Vitrage Simple couche en position 1
 2884 5.85 mm
 Ug(W/°C.m2) 5.7

Propriétés Lumineuses

nm	Trans	Refl	nm	Trans	Refl
380	36.3%	19.6%	580	66.1%	14.9%
390	46.8%	17.3%	590	66.2%	14.4%
400	54.5%	14.6%	600	66.1%	13.8%
410	58.4%	12.3%	610	66.2%	13.0%
420	60.6%	10.4%	620	66.2%	12.2%
430	62.2%	9.2%	630	66.2%	11.2%
440	63.3%	8.6%	640	66.1%	10.3%
450	64.3%	8.4%	650	65.7%	9.5%
460	65.1%	8.7%	660	65.4%	8.9%
470	65.7%	9.2%	670	64.7%	8.5%
480	65.9%	9.9%	680	63.7%	8.4%
490	66.2%	10.8%	690	62.5%	8.8%
500	66.4%	11.7%	700	60.8%	9.7%
510	66.2%	12.5%	710	59.0%	11.0%
520	66.3%	13.4%	720	56.7%	13.0%
530	66.3%	14.1%	730	54.2%	15.4%
540	66.4%	14.6%	740	51.3%	18.3%
550	66.1%	15.0%	750	48.2%	21.7%
560	66.2%	15.2%	760	45.1%	25.3%
570	66.2%	15.2%	770	41.9%	29.1%
			780	39.0%	33.0%

	Y	x	y	L*	a*	b*	
TI	66.16%	(+ - 0.50)	0.3145	0.3334	85.1	-1.06	1.74
RI	13.71%	(+ - 0.75)	0.3346	0.3823	43.8	-6.98	12.43

Identification du vitrage

Vitrage Simple	couche en position 1
2884	5.85 mm
Ug(W/°C.m2)	5.7

Propriétés Energétiques

nm	Trans	Refl	nm	Trans	Refl
300	0.0%	19.4%	950	8.6%	79.4%
320	0.3%	26.1%	1000	5.9%	83.3%
340	8.7%	25.4%	1050	4.3%	87.0%
360	22.5%	23.4%	1100	3.1%	89.6%
380	36.3%	19.6%	1150	2.4%	91.0%
400	54.5%	14.6%	1200	1.9%	91.9%
420	60.6%	10.4%	1250	1.5%	93.2%
440	63.3%	8.6%	1300	1.1%	93.9%
460	65.1%	8.7%	1350	0.9%	94.2%
480	65.9%	9.9%	1400	0.6%	94.4%
500	66.4%	11.7%	1450	0.5%	95.6%
520	66.3%	13.4%	1500	0.4%	95.8%
540	66.4%	14.6%	1550	0.3%	96.6%
560	66.2%	15.2%	1600	0.2%	96.3%
580	66.1%	14.9%	1650	0.2%	96.4%
600	66.1%	13.8%	1700	0.1%	96.0%
620	66.2%	12.2%	1750	0.0%	96.6%
640	66.1%	10.3%	1800	0.0%	97.2%
660	65.4%	8.9%	1850	0.0%	98.3%
680	63.7%	8.4%	1900	0.0%	99.4%
700	60.8%	9.7%	1950	0.0%	100.9%
720	56.7%	13.0%	2000	0.0%	99.8%
740	51.3%	18.3%	2050	0.0%	99.8%
760	45.1%	25.3%	2100	0.0%	99.8%
780	39.0%	33.0%	2200	0.0%	99.2%
800	32.9%	41.0%	2300	0.0%	98.9%
850	20.7%	57.8%	2400	0.0%	100.2%
900	13.2%	72.2%	2500	0.0%	101.5%

Te = 38.57% (+-0.50)
Re = 40.74% (+-0.75)
g = 43.9% (+-0.75)
Shading coef = 0.51 (g/0.87)
Tuv = 15.89% (+-0.50)
Ruv = 23.67% (+-0.75)

Identification du vitrage

Vitrage Simple	couche en position 2
2884	5.85 mm
Ug(W/°C.m2)	5.7

Propriétés Lumineuses

nm	Trans	Refl	nm	Trans	Refl
380	36.3%	17.7%	580	66.1%	9.6%
390	46.8%	20.3%	590	66.2%	9.0%
400	54.5%	21.2%	600	66.1%	8.4%
410	58.4%	20.0%	610	66.2%	7.7%
420	60.6%	18.4%	620	66.2%	7.0%
430	62.2%	16.9%	630	66.2%	6.3%
440	63.3%	15.6%	640	66.1%	5.8%
450	64.3%	14.6%	650	65.7%	5.3%
460	65.1%	13.8%	660	65.4%	5.1%
470	65.7%	13.2%	670	64.7%	5.0%
480	65.9%	12.6%	680	63.7%	5.3%
490	66.2%	12.2%	690	62.5%	5.8%
500	66.4%	12.0%	700	60.8%	6.7%
510	66.2%	11.7%	710	59.0%	8.0%
520	66.3%	11.5%	720	56.7%	9.5%
530	66.3%	11.3%	730	54.2%	11.4%
540	66.4%	11.1%	740	51.3%	13.5%
550	66.1%	10.8%	750	48.2%	15.8%
560	66.2%	10.5%	760	45.1%	18.3%
570	66.2%	10.1%	770	41.9%	20.8%
			780	39.0%	23.1%

	Y		x	y	L*	a*	b*
TI	66.16%	(+ - 0.50)	0.3145	0.3334	85.1	-1.06	1.74
RI	10.21%	(+ - 0.75)	0.2630	0.2885	38.2	-3.21	-11.80

Identification du vitrage

Vitrage Simple	couche en position 2
2884	5.85 mm
Ug(W/°C.m2)	5.7

Propriétés Energétiques

nm	Trans	Refl	nm	Trans	Refl
300	0.0%	6.4%	950	8.6%	47.2%
320	0.3%	5.7%	1000	5.9%	48.9%
340	8.7%	7.2%	1050	4.3%	50.8%
360	22.5%	15.3%	1100	3.1%	52.3%
380	36.3%	17.7%	1150	2.4%	53.5%
400	54.5%	21.2%	1200	1.9%	54.8%
420	60.6%	18.4%	1250	1.5%	56.7%
440	63.3%	15.6%	1300	1.1%	58.7%
460	65.1%	13.8%	1350	0.9%	60.8%
480	65.9%	12.6%	1400	0.6%	62.8%
500	66.4%	12.0%	1450	0.5%	66.3%
520	66.3%	11.5%	1500	0.4%	68.9%
540	66.4%	11.1%	1550	0.3%	71.6%
560	66.2%	10.5%	1600	0.2%	72.9%
580	66.1%	9.6%	1650	0.2%	73.7%
600	66.1%	8.4%	1700	0.1%	73.6%
620	66.2%	7.0%	1750	0.0%	73.9%
640	66.1%	5.8%	1800	0.0%	74.1%
660	65.4%	5.1%	1850	0.0%	74.4%
680	63.7%	5.3%	1900	0.0%	75.0%
700	60.8%	6.7%	1950	0.0%	76.5%
720	56.7%	9.5%	2000	0.0%	75.3%
740	51.3%	13.5%	2050	0.0%	75.4%
760	45.1%	18.3%	2100	0.0%	75.4%
780	39.0%	23.1%	2200	0.0%	70.6%
800	32.9%	27.9%	2300	0.0%	71.8%
850	20.7%	36.8%	2400	0.0%	72.8%
900	13.2%	44.2%	2500	0.0%	69.4%

Te = 38.57%	(+0.50)	38.57%
Re = 28.04%	(+0.75)	
g = 47.2%	(+0.75)	47.2%
Shading coef =	0.54 (g/0.87)	0.54
Tuv = 15.89%	(+0.50)	15.89%
Ruv = 11.36%	(+0.75)	

Identification du vitrage

Vitrage Simple
2884

Mesure de l'emissivite à 30 lambda

Microns	Reflexion
5.5	98.14
6.6	98.11
7.4	98.39
8.1	98.33
8.6	98.41
9.2	98.48
9.7	98.31
10.2	98.17
10.8	98.12
11.3	98.18
11.8	98.32
12.4	98.29
13.0	98.29
13.6	98.27
14.2	98.30
14.8	98.59
15.6	98.42
16.3	98.38
17.2	98.31
18.1	98.46
19.2	98.43
20.3	98.53
21.7	98.31
23.3	98.40
25.3	98.24
27.8	98.31
30.9	98.10
35.7	98.01
43.9	98.36

Reflexion Moyenne
98.31

Emissivite
0.017 +/- 0.01

Identification du vitrage

Vitrage Double couche en position 2
 2884 5.85 / 16 / 3.85
 Gaz 90% Argon
 Ug(W/°C.m2) 1.1

Propriétés Lumineuses

nm	Trans	Refl	nm	Trans	Refl
380	31.7%	18.8%	580	60.3%	13.1%
390	41.6%	22.1%	590	60.3%	12.6%
400	49.5%	23.7%	600	60.0%	11.9%
410	52.7%	22.9%	610	59.9%	11.2%
420	54.5%	21.5%	620	59.7%	10.5%
430	55.9%	20.1%	630	59.5%	9.8%
440	56.9%	18.9%	640	59.1%	9.2%
450	58.0%	18.0%	650	58.7%	8.7%
460	59.0%	17.3%	660	58.2%	8.4%
470	59.7%	16.7%	670	57.5%	8.3%
480	60.0%	16.2%	680	56.4%	8.4%
490	60.4%	15.8%	690	55.2%	8.9%
500	60.7%	15.6%	700	53.5%	9.6%
510	60.7%	15.3%	710	51.8%	10.7%
520	60.7%	15.1%	720	49.7%	12.0%
530	60.8%	14.9%	730	47.5%	14.0%
540	60.9%	14.7%	740	44.8%	15.6%
550	60.7%	14.4%	750	42.0%	17.6%
560	60.7%	14.1%	760	39.3%	19.8%
570	60.6%	13.7%	770	36.5%	22.1%
			780	33.9%	24.3%

	Y		x	y	L*	a*	b*
TI	60.40%	(+ - 0.75)	0.3141	0.3352	82.1	-1.94	2.20
RI	13.77%	(+ - 1.00)	0.2746	0.2996	43.9	-3.09	-9.61

Identification du vitrage

Vitrage Double couche en position 2
 2884 5.85 /16 / 3.85
 Gaz 90% Argon
 Ug(W/°C.m2) 1.1

Propriétés Energétiques

nm	Trans	Refl	nm	Trans	Refl
300	0.0%	6.4%	950	7.3%	47.3%
320	0.0%	5.7%	1000	5.0%	48.9%
340	5.1%	7.2%	1050	3.7%	50.8%
360	19.1%	15.7%	1100	2.7%	52.3%
380	31.7%	18.8%	1150	2.0%	53.5%
400	49.5%	23.7%	1200	1.6%	54.8%
420	54.5%	21.5%	1250	1.3%	56.7%
440	56.9%	18.9%	1300	1.0%	58.7%
460	59.0%	17.3%	1350	0.8%	60.8%
480	60.0%	16.2%	1400	0.5%	62.8%
500	60.7%	15.6%	1450	0.5%	66.3%
520	60.7%	15.1%	1500	0.4%	68.9%
540	60.9%	14.7%	1550	0.2%	71.6%
560	60.7%	14.1%	1600	0.2%	72.9%
580	60.3%	13.1%	1650	0.1%	73.7%
600	60.0%	11.9%	1700	0.1%	73.6%
620	59.7%	10.5%	1750	0.0%	73.9%
640	59.1%	9.2%	1800	0.0%	74.1%
660	58.2%	8.4%	1850	0.0%	74.4%
680	56.4%	8.4%	1900	0.0%	75.0%
700	53.5%	9.6%	1950	0.0%	76.5%
720	49.7%	12.0%	2000	0.0%	75.3%
740	44.8%	15.6%	2050	0.0%	75.4%
760	39.3%	19.8%	2100	0.0%	75.4%
780	33.9%	24.3%	2200	0.0%	70.6%
800	28.5%	28.7%	2300	0.0%	71.8%
850	17.9%	37.1%	2400	0.0%	72.8%
900	11.3%	44.4%	2500	0.0%	69.4%

Te = 34.56%	(+0.50)	34.0
Re= 29.85%	(+0.75)	29.8
g= 37.4%	(+0.75)	37.1
Shading coef=	0.43	(g/0.87) 0.43
Tuv = 12.73%	(+0.50)	12.7
Ruv=11.67%	(+0.75)	11.7

OFFICIAL AKNOWLEDGEMENT

AUTHORIZED TESTS



Notified body (Id.N°1174) according to ART.18 of the « Construction Products Directive » CPD 89/106/EEC



Authorized by the Belgian organization for technical approval in building (UBAtc)



- Glazing Appearance and geometry
- Photometric and energetic characteristics
- Coated glass durability
- Insulating glass performances
- Mirrors
- Impact resistance of security glazing
- Dessicants for insulating glass
- Sealants for Insulating glass assembling
- Structural glazing sealants



Authorized by the Belgian public federal service for transportation

- Homologation tests of safety glazing for automotive
(UN R.43 - CEE 92/22 and 89/173)



Authorized by the Automotive Manufacturers Equipment Compliance Agency, Inc (AMECA - Washington - U.S.A.)

- Homologation tests of safety glazing for automotive(ANSI Z26.1)



Authorized by "Eisenbahn – Bundesamt" (EBA – Deutschland)

- Optical properties – Safety glazing for railway vehicles