

TEST REPORT N° 2010B COU 8856

Including 3 pages + 1 annex
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Mons, January 21th, 2010

REQUESTED BY :

AGC Glass Europe - R&D Centre
2 rue de l'Aurore
B-6040 Jumet
Belgium

REFERENCE OF THE REQUEST :

Order nr 450026047

CONCERNED MANUFACTURER:

AGC Glass Europe - R&D Centre
2 rue de l'Aurore
B-6040 Jumet
Belgium

NUMBER OF SAMPLES AND IDENTIFICATION :

Pyropane 231-28
See page 2

PURPOSE OF THE REQUESTED :

Initial Type Test
Determination of the photo-energetic properties
according to EN 1096-1.*

SAMPLES RECEIVED ON :

19/01/2010

TESTING DATE :

20/10/2010

REMARKS : * Test under accreditation



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

DESCRIPTION OF THE SAMPLES

Concerned manufacturer : **AGC Glass Europe - R&D Centre**
2 rue de l'Aurore
B-6040 Jumet
Belgium

Production site : **Lodelinsart**
Commercial name of the product : **Pyropane 231-28**

Customer's references : **code AGC 55815**

Internal reference : **CCOU 8856**

Sampling : **Under responsibility of the applicant**

Sampling information : **Traceability of the samples is under responsibility of the manufacturer.**

Class of Coating : **C**

Coating position : **2**

Low emissivity : **yes**

Glass Substrate : **Clear Float Glass**

Normal emissivity of clear glass (ϵ_n) : **0.89**

Samples :

 Number of samples : **1 (100 * 100 mm)**

 Nominal Thickness : **6 mm**

PHOTO-ENERGETIC PROPERTIES - EN 1096-1*

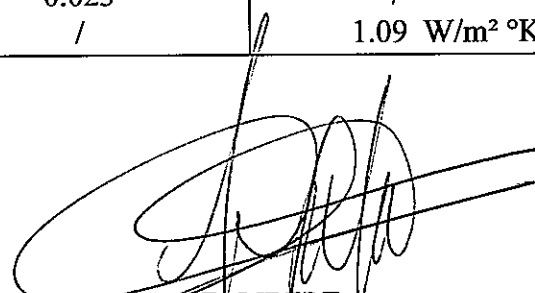
Instruments Description	For emissivity	For optical properties
Spectrophotometer	PerkinElmer SPECTRUM 100	PerkinElmer LAMDA 19
Type	Single Beam (FTIR)	Double Beam
Reflectance accessory	PerkinElmer	
Type of references	SnO ₂ Coated Glass	Primary surface Ag Mirrors
	Gold Mirror	Secondary surface Ag Mirrors
Measurement Responsible	DL	DL

Notes : Uncertainty calculated on emissivity measurement is ± 0.01
Reproducibility on emissivity measurement is estimated to ± 0.005

Considered parameters for the calculation of g and Ug	
Composition of the insulating glass	: 5.85/15/5.85
Position of the coating	: 2
Filling up	: 90% Ar

8856 : 5.85 mm

		COATED GLASS (EN 1096-1)		IGU (EN 673)	
U.V. range (280 – 380 nm)					
• Transmission	τ_{uv}	12.1	%	9.2	%
Visible range (380 – 780 nm) – III D65/obs 2°					
• Transmission	τ_v	55.5	%	50.3	%
• Reflection coated side	ρ_v	15.9	%	17.9	%
• Reflection opposite side	ρ'_v	15.6	%	/	
Solar range (300 – 2500 nm)					
• Transmission	τ_e	31.7	%	28.0	%
• Reflection coated side	ρ_e	44.3	%	31.4	%
• Reflection opposite side	ρ'_e	30.3	%	/	
• Solar factor	g	0.38		0.31	
Thermal range (5000 – 50000 nm)					
• Emissivity	ϵ_n	0.023		/	
• Thermal coefficient	Ug	/		1.09	W/m ² °K



D. LIBERT
Head of Department

Glazing and Components - INISMa

Avenue Gouverneur Cornez, 4 B-7000 MONS (Belgique)

☎ : 32/(0)65/40.34.34
Fax : 32/(0)65/34.80.05

e-mail : info@bcrc.be
url : www.bcrc.be

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Identification du vitrage

Vitrage Simple
8856 5.85 mm

micron	cm ⁻¹	Reflexion
5.5	1620	97.52
6.6	1504	97.52
7.4	1348	97.68
8.1	1240	97.69
8.6	1158	97.63
9.2	1088	97.66
9.7	1030	97.71
10.2	978	97.70
10.8	930	97.61
11.3	886	97.60
11.8	846	97.60
12.4	808	97.60
13.0	772	97.61
13.6	738	97.70
14.2	706	97.70
14.8	674	97.61
15.6	642	97.74
16.3	612	97.82
17.2	582	97.78
18.1	552	97.78
19.2	522	97.76
20.3	492	97.72
21.7	460	98.07
23.3	430	97.82
25.3	396	97.93
27.8	360	97.82
30.9	324	97.77
35.7	280	97.50
43.9	228	97.10

reflexion Moy
Emissivité

97.68
0.023

Incertitude *reproductibilit*
±0.010 ±0.005

Identification du vitrage

Vitrage Simple couche en position 1
8856 5.85 mm

Propriétés Lumineuses

```

*****
* WL * TOTAL * TOTAL * TOTAL ** WL * TOTAL * TOTAL * TOTAL *
* (nm) * TRANS * REFLE * ABSORB ** (nm) * TRANS * REFLE * ABSORB *
*****
* 390 * 37.72 * 21.83 * 40.45 ** 580 * 54.96 * 18.19 * 26.86 *
* 400 * 45.10 * 18.41 * 36.48 ** 590 * 54.58 * 18.82 * 26.61 *
* 410 * 49.69 * 15.25 * 35.06 ** 600 * 54.20 * 19.33 * 26.47 *
* 420 * 52.26 * 12.79 * 34.95 ** 610 * 53.73 * 19.77 * 26.50 *
* 430 * 53.96 * 11.00 * 35.04 ** 620 * 53.14 * 20.18 * 26.68 *
* 440 * 55.03 * 9.80 * 35.17 ** 630 * 52.60 * 20.57 * 26.83 *
* 450 * 55.92 * 9.09 * 34.99 ** 640 * 52.02 * 20.96 * 27.02 *
* 460 * 56.67 * 8.85 * 34.48 ** 650 * 51.20 * 21.39 * 27.40 *
* 470 * 57.02 * 8.95 * 34.03 ** 660 * 50.58 * 21.94 * 27.49 *
* 480 * 57.20 * 9.35 * 33.45 ** 670 * 49.71 * 22.58 * 27.71 *
* 490 * 57.26 * 9.98 * 32.76 ** 680 * 48.61 * 23.42 * 27.97 *
* 500 * 57.14 * 10.84 * 32.03 ** 690 * 47.33 * 24.48 * 28.20 *
* 510 * 57.07 * 11.73 * 31.20 ** 700 * 46.03 * 25.78 * 28.19 *
* 520 * 56.86 * 12.73 * 30.41 ** 710 * 44.43 * 27.33 * 28.24 *
* 530 * 56.54 * 13.78 * 29.68 ** 720 * 42.70 * 29.10 * 28.20 *
* 540 * 56.37 * 14.78 * 28.85 ** 730 * 40.73 * 31.17 * 28.10 *
* 550 * 56.11 * 15.75 * 28.14 ** 740 * 38.79 * 33.45 * 27.76 *
* 560 * 55.76 * 16.67 * 27.57 ** 750 * 36.58 * 35.91 * 27.52 *
* 570 * 55.32 * 17.46 * 27.22 ** 760 * 34.44 * 38.53 * 27.03 *
*****

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Propriétés lumineuses
Light properties Illuminant D65
Licht Eigenschaften

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-----
Transmission lumineuse            (TL)
Light transmittance                (LT)            55.5 +- .5%
Lichtdurchlässigkeit                (LR)

Reflexion lumineuse                (RL)
Light reflectance                    (LR)            15.9 +- .75%
Lichtreflexion                        (LR)

Absorption lumineuse                (AL)
Light absorption                     (LA)            28.5 +- 1%
Lichtabsorption                      (LA)

```

Identification du vitrage

Vitrage Simple couche en position 1
8856 5.85 mm

Propriétés Energétiques

```

*****
* WL * TOTAL * TOTAL * TOTAL ** WL * TOTAL * TOTAL * TOTAL *
* (nm) * TRANŞ * REFLE * ABSORB ** (nm) * TRANŞ * REFLE * ABSORB *
*****
* 300 * 0.00 * 23.09 * 76.91 ** 950 * 7.49 * 79.63 * 12.88 *
* 320 * 0.29 * 30.06 * 69.65 ** 1000 * 5.30 * 82.77 * 11.93 *
* 340 * 6.37 * 29.74 * 63.89 ** 1050 * 3.77 * 86.10 * 10.14 *
* 360 * 17.16 * 29.09 * 53.75 ** 1100 * 2.82 * 88.32 * 8.86 *
* 380 * 28.82 * 24.91 * 46.27 ** 1150 * 2.13 * 89.61 * 8.26 *
* 400 * 45.10 * 18.41 * 36.48 ** 1200 * 1.66 * 90.31 * 8.02 *
* 420 * 52.26 * 12.79 * 34.95 ** 1250 * 1.22 * 91.54 * 7.24 *
* 440 * 55.03 * 9.80 * 35.17 ** 1300 * 0.98 * 92.22 * 6.80 *
* 460 * 56.67 * 8.85 * 34.48 ** 1350 * 0.73 * 92.31 * 6.96 *
* 480 * 57.20 * 9.35 * 33.45 ** 1400 * 0.61 * 92.40 * 6.99 *
* 500 * 57.14 * 10.84 * 32.03 ** 1450 * 0.42 * 92.13 * 7.45 *
* 520 * 56.86 * 12.73 * 30.41 ** 1500 * 0.38 * 91.84 * 7.78 *
* 540 * 56.37 * 14.78 * 28.85 ** 1550 * 0.25 * 91.87 * 7.87 *
* 560 * 55.76 * 16.67 * 27.57 ** 1600 * 0.17 * 92.53 * 7.30 *
* 580 * 54.96 * 18.19 * 26.86 ** 1650 * 0.08 * 93.92 * 6.00 *
* 600 * 54.20 * 19.33 * 26.47 ** 1700 * 0.03 * 93.80 * 6.17 *
* 620 * 53.14 * 20.18 * 26.68 ** 1750 * 0.01 * 94.32 * 5.67 *
* 640 * 52.02 * 20.96 * 27.02 ** 1800 * 0.00 * 94.58 * 5.42 *
* 660 * 50.58 * 21.94 * 27.49 ** 1850 * 0.00 * 95.67 * 4.33 *
* 680 * 48.61 * 23.42 * 27.97 ** 1900 * 0.00 * 96.13 * 3.87 *
* 700 * 46.03 * 25.78 * 28.19 ** 1950 * 0.03 * 97.73 * 2.24 *
* 720 * 42.70 * 29.10 * 28.20 ** 2000 * 0.00 * 97.46 * 2.54 *
* 740 * 38.79 * 33.45 * 27.76 ** 2050 * 0.00 * 98.50 * 1.50 *
* 760 * 34.44 * 38.53 * 27.03 ** 2100 * 0.00 * 98.50 * 1.50 *
* 780 * 29.94 * 43.90 * 26.16 ** 2200 * 0.00 * 97.09 * 2.91 *
* 800 * 25.77 * 49.64 * 24.59 ** 2300 * 0.00 * 96.85 * 3.15 *
* 850 * 16.60 * 61.50 * 21.90 ** 2400 * 0.00 * 98.50 * 1.50 *
* 900 * 11.29 * 73.72 * 14.99 ** 2500 * 0.00 * 98.50 * 1.50 *
*****

```

Te	31.7	±0.5%	g	37.9	±1%	Tuv	12.1	±0.50%
Re	44.3	±0.75%	SC	0.44		Ruv	28.6	±0.75%

COLOUR DETERMINATION ACCORDING TO CIE 1976			
VISIBLE RANGE (380 – 780 NM) – ILL D65/OBS 2°			
	L*	a*	b*
Transmission	79.4	-2.75	-0.14
Reflection coated side	46.9	6.07	15.9

Identification du vitrage

Vitrage Simple couche en position 2
8856 5.85 mm

Propriétés Lumineuses

```

*****
* WL * TOTAL * TOTAL * TOTAL ** WL * TOTAL * TOTAL * TOTAL *
* (nm) * TRANS * REPLE * ABSORB ** (nm) * TRANS * REPLE * ABSORB *
*****
* 390 * 37.72 * 22.97 * 39.31 ** 580 * 54.96 * 14.68 * 30.37 *
* 400 * 45.10 * 24.70 * 30.20 ** 590 * 54.58 * 14.34 * 31.09 *
* 410 * 49.69 * 24.25 * 26.06 ** 600 * 54.20 * 14.02 * 31.78 *
* 420 * 52.26 * 23.18 * 24.56 ** 610 * 53.73 * 13.70 * 32.56 *
* 430 * 53.96 * 22.19 * 23.85 ** 620 * 53.14 * 13.45 * 33.41 *
* 440 * 55.03 * 21.24 * 23.73 ** 630 * 52.60 * 13.25 * 34.15 *
* 450 * 55.92 * 20.44 * 23.64 ** 640 * 52.02 * 13.15 * 34.84 *
* 460 * 56.67 * 19.88 * 23.45 ** 650 * 51.20 * 13.11 * 35.69 *
* 470 * 57.02 * 19.29 * 23.69 ** 660 * 50.58 * 13.25 * 36.18 *
* 480 * 57.20 * 18.72 * 24.08 ** 670 * 49.71 * 13.53 * 36.76 *
* 490 * 57.26 * 18.16 * 24.58 ** 680 * 48.61 * 13.95 * 37.44 *
* 500 * 57.14 * 17.70 * 25.16 ** 690 * 47.33 * 14.59 * 38.08 *
* 510 * 57.07 * 17.28 * 25.65 ** 700 * 46.03 * 15.44 * 38.52 *
* 520 * 56.86 * 16.85 * 26.29 ** 710 * 44.43 * 16.43 * 39.14 *
* 530 * 56.54 * 16.45 * 27.01 ** 720 * 42.70 * 17.62 * 39.69 *
* 540 * 56.37 * 16.08 * 27.56 ** 730 * 40.73 * 18.94 * 40.33 *
* 550 * 56.11 * 15.71 * 28.18 ** 740 * 38.79 * 20.39 * 40.82 *
* 560 * 55.76 * 15.38 * 28.86 ** 750 * 36.58 * 21.97 * 41.45 *
* 570 * 55.32 * 15.03 * 29.65 ** 760 * 34.44 * 23.57 * 41.99 *
*****

```

Proprietes lumineuses
Light properties Illuminant D65
Licht Eigenschaften

```

-----
Transmission lumineuse            (TL)
Light transmittance               (LT)            55.5 +- .5%
Lichtdurchlassigkeit              (LR)

Reflexion lumineuse               (RL)
Light reflectance                  (LR)            15.6 +- .75%
Lichtrefexion                      (LR)

Absorption lumineuse              (AL)
Light absorption                   (LA)            28.9 +- 1%
Lichtabsorption                   (LA)

```

Identification du vitrage

Vitrage Simple couche en position 2
8856 5.85 mm

Propriétés Energétiques

```

*****
* WL * TOTAL * TOTAL * TOTAL ** WL * TOTAL * TOTAL * TOTAL *
* (nm) * TRANS * REFLE * ABSORB ** (nm) * TRANS * REFLE * ABSORB *
*****
* 300 * 0.00 * 5.41 * 94.59 ** 950 * 7.49 * 44.38 * 48.14 *
* 320 * 0.29 * 5.15 * 94.56 ** 1000 * 5.30 * 45.93 * 48.77 *
* 340 * 6.37 * 7.37 * 86.26 ** 1050 * 3.77 * 47.81 * 48.42 *
* 360 * 17.16 * 16.59 * 66.25 ** 1100 * 2.82 * 49.35 * 47.84 *
* 380 * 28.82 * 19.70 * 51.48 ** 1150 * 2.13 * 50.68 * 47.20 *
* 400 * 45.10 * 24.70 * 30.20 ** 1200 * 1.66 * 51.83 * 46.50 *
* 420 * 52.26 * 23.18 * 24.56 ** 1250 * 1.22 * 53.70 * 45.08 *
* 440 * 55.03 * 21.24 * 23.73 ** 1300 * 0.98 * 55.65 * 43.37 *
* 460 * 56.67 * 19.88 * 23.45 ** 1350 * 0.73 * 57.65 * 41.62 *
* 480 * 57.20 * 18.72 * 24.08 ** 1400 * 0.61 * 59.30 * 40.09 *
* 500 * 57.14 * 17.70 * 25.16 ** 1450 * 0.42 * 61.50 * 38.08 *
* 520 * 56.86 * 16.85 * 26.29 ** 1500 * 0.38 * 63.81 * 35.82 *
* 540 * 56.37 * 16.08 * 27.56 ** 1550 * 0.25 * 65.83 * 33.91 *
* 560 * 55.76 * 15.38 * 28.86 ** 1600 * 0.17 * 67.60 * 32.23 *
* 580 * 54.96 * 14.68 * 30.37 ** 1650 * 0.08 * 69.41 * 30.52 *
* 600 * 54.20 * 14.02 * 31.78 ** 1700 * 0.03 * 69.63 * 30.33 *
* 620 * 53.14 * 13.45 * 33.41 ** 1750 * 0.01 * 69.58 * 30.41 *
* 640 * 52.02 * 13.15 * 34.84 ** 1800 * 0.00 * 68.99 * 31.01 *
* 660 * 50.58 * 13.25 * 36.18 ** 1850 * 0.00 * 68.95 * 31.05 *
* 680 * 48.61 * 13.95 * 37.44 ** 1900 * 0.00 * 68.02 * 31.98 *
* 700 * 46.03 * 15.44 * 38.52 ** 1950 * 0.03 * 68.32 * 31.66 *
* 720 * 42.70 * 17.62 * 39.69 ** 2000 * 0.00 * 68.37 * 31.63 *
* 740 * 38.79 * 20.39 * 40.82 ** 2050 * 0.00 * 69.05 * 30.95 *
* 760 * 34.44 * 23.57 * 41.99 ** 2100 * 0.00 * 69.08 * 30.92 *
* 780 * 29.94 * 26.81 * 43.25 ** 2200 * 0.00 * 62.16 * 37.84 *
* 800 * 25.77 * 30.08 * 44.15 ** 2300 * 0.00 * 63.22 * 36.78 *
* 850 * 16.60 * 36.41 * 46.98 ** 2400 * 0.00 * 64.01 * 35.99 *
* 900 * 11.29 * 41.88 * 46.83 ** 2500 * 0.00 * 57.80 * 42.20 *
*****

```

Te	31.7	±0.5%	g	41.5	±1%	Tuv	12.1	±0.50%
Re	30.3	±0.75%	SC	0.48		Ruv	12.0	±0.75%

Identification du vitrage

Vitrage Double couche en position 2
8856 5.85/15/5.85
Gaz : 90% Ar

Propriétés Lumineuses

nm	Trans	Refl	nm	Trans	Refl
380	24.4%	20.3%	580	49.7%	16.9%
390	32.9%	24.0%	590	49.3%	16.5%
400	40.5%	26.3%	600	48.8%	16.2%
410	44.4%	26.1%	610	48.2%	15.8%
420	46.5%	25.9%	620	47.5%	15.5%
430	47.9%	24.4%	630	46.8%	15.3%
440	48.8%	23.5%	640	46.1%	15.1%
450	48.8%	22.8%	650	45.2%	15.0%
460	50.8%	22.3%	660	44.5%	15.1%
470	51.3%	21.7%	670	43.6%	15.3%
480	51.6%	21.2%	680	42.5%	15.8%
490	51.8%	20.6%	690	41.2%	16.2%
500	51.8%	20.2%	700	39.9%	16.9%
510	51.9%	19.7%	710	38.3%	17.8%
520	51.8%	19.3%	720	36.7%	18.9%
530	51.5%	18.9%	730	34.8%	20.1%
540	51.4%	18.5%	740	33.0%	21.4%
550	51.1%	18.1%	750	31.0%	22.9%
560	50.8%	17.7%	760	29.0%	24.4%
570	50.2%	17.3%	770	27.0%	25.9%
			780	25.1%	27.4%

	Y		x	y	L*	a*	b*
TI	50.31%	(+ - 0.75)	0.3078	0.3331	76.3	-3.67	0.50
RI	17.92%	(+ -1.00)	0.2839	0.3013	49.4	-0.80	-9.19

Identification du vitrage

Vitrage Double couche en position 2
8856 5.85/15/5.85
Gaz : 90% Ar

Propriétés Energétiques

nm	Trans	Refl	nm	Trans	Refl
300	0.0%	5.4%	950	6.0%	44.4%
320	0.0%	5.1%	1000	4.2%	45.9%
340	2.9%	7.4%	1050	3.0%	47.8%
360	14.0%	16.8%	1100	2.2%	49.4%
380	24.4%	20.3%	1150	1.7%	50.7%
400	40.5%	26.3%	1200	1.3%	51.8%
420	46.6%	25.3%	1250	1.0%	53.7%
440	48.8%	23.5%	1300	0.8%	55.7%
460	50.8%	22.3%	1350	0.6%	57.7%
480	51.6%	21.2%	1400	0.5%	59.3%
500	51.8%	20.2%	1450	0.4%	61.5%
520	51.8%	19.3%	1500	0.3%	63.8%
540	51.4%	18.5%	1550	0.2%	65.8%
560	50.8%	17.7%	1600	0.2%	67.6%
580	49.7%	16.9%	1650	0.1%	69.4%
600	48.8%	16.2%	1700	0.0%	69.6%
620	47.5%	15.5%	1750	0.0%	69.6%
640	46.1%	15.1%	1800	0.0%	69.0%
660	44.5%	15.1%	1850	0.0%	69.0%
680	42.5%	15.6%	1900	0.0%	68.0%
700	39.9%	16.9%	1950	0.0%	68.3%
720	36.7%	18.9%	2000	0.0%	68.4%
740	33.0%	21.4%	2050	0.0%	69.0%
760	29.0%	24.4%	2100	0.0%	69.1%
780	25.1%	27.4%	2200	0.0%	62.2%
800	21.4%	30.5%	2300	0.0%	63.2%
850	13.5%	36.6%	2400	0.0%	64.0%
900	9.1%	42.0%	2500	0.0%	57.8%

$T_e =$	27.95%	(+ - 0.75)
$R_e =$	31.42%	(+ -1.00)

$g =$	31.42%	(+ -1.00)
Shading coef =	0.36	(g/0.87)

$T_{uv} =$	9.22%	(+ - 0.80)
$R_{uv} =$	12.20%	(+ -1.10)