OPTICS CONCEPT

HEBO
SPEZIALGLAS

Color Filter Glass

HEBO - Series

Ultraviolet

Yellow

Orange

Red

Infrared

Blue

Green

Violet

Neutral Density

Heat Absorbing

Rising Color

Wavelength Calibrated

Color Filter Glass HEBO-Series

The HEBO-Series filter glass types shown in the charts are available as polished filters manufactured according to your specifications.
Raw material of filter glass HEBO-Series is not available.

We offer a wide range of customized processing such as:
Polishing, cutting, grinding, drilling, water-jet cutting, coating (various coatings are possible), thermal hardening, bonding and many others.

The polished filters are available in thicknesses from 0.2 up to 10.0 mm and edge length from 1.0 up to 300.0 mm.

The indication of the equivalent filter glass type of Schott or Hoya is only informative - this does not imply that the filter glass types from HEBO-Series are 100 % identical with the Schott / Hoya glasses.

Please check on the filter datasheets if the material complies with the requirements you have.

Small quantities or large series – convince yourself of our level of performance.
We're awaiting your informal request.

Standards in size 50 × 50 × 1 / 2 / 3 mm ex stock available, see prices below:

Pricelist for standards Filter Glass HEBO-Series
Standard dimensions: 50.0 × 50.0 ± 0.2 mm
Both surfaces polished P2/P3
Protection chamfers, edge grinded

Thickness 1.0 ± 0.1 mm	
1 pce. / type	€ 21,00 / pce.
2 - 5 pcs. / type	€ 16,00 / pce.
6 - 20 pcs. / type	€ 14,00 / pce.
> 21 pcs. / type	€ 12,00 / pce.

Thickness 2.0 ± 0.1 mm	
1 pce. / type	€ 23,00 / pce.
2 - 5 pcs. / type	€ 18,00 / pce.
6 - 20 pcs. / type	€ 16,00 / pce.
> 21 pcs. / type	€ 14,00 / pce.

Thickness 3.0 ± 0.1 mm	
1 pce. / type	€ 28,00 / pce.
2 - 5 pcs. / type	€ 23,00 / pce.
6 - 20 pcs. / type	€ 21,00 / pce.
> 21 pcs. / type	€ 19,00 / pce.

Deliveries ex stock Aalen / Germany within one day (subject to prior sale).
For all other dimensions, quantities and specifications please send us your informal request.

Filterglas HEBO-Serie

Die Filtergläser der HEBO-Serie sind lieferbar als polierte Filter, produziert nach Ihren Vorgaben.
Rohmaterial der HEBO-Serie ist nicht lieferbar.

Wir bieten Ihnen umfassende Bearbeitungsmöglichkeiten nach Ihren Vorgaben an:
Polieren, Sägen, Schleifen, Bohren, Wasserstrahlschneiden, Beschichten (verschiedene Beschichtungen möglich), Thermisches Härten, Verkitten u.v.a.

Die polierten Filter sind lieferbar in Dicken von 0.2 bis 10.0 mm und Kantenlängen von 1.0 bis zu 300.0 mm.

Die Angabe der äquivalenten Typen von Schott bzw. Hoya ist rein informativ und impliziert nicht automatisch, dass die Filterglas-Typen der HEBO-Serie zu 100 % identisch sind.

Bitte überprüfen Sie anhand der Datenblätter und ggf. anhand von Filterstandards, ob das Material mit Ihren Anforderungen übereinstimmt.

Ob Kleinmengen oder Großserien – überzeugen Sie sich von unserer Leistungsstärke. Gerne erwarten wir Ihre unverbindliche Anfrage.

Ab Lager sind Filterstandards in den Abmessungen 50 × 50 × 1 / 2 / 3 mm lieferbar; sehen Sie hierzu die nachfolgende Preisliste.

Preisliste für Standard-Filter HEBO-Serie
Standardabmessungen: 50.0 × 50.0 ± 0.2 mm
Beidseitig poliert P2/P3
Schutzfacetten, Kanten geschliffen

Dicke 1.0 ± 0.1 mm	
Bei Abnahme von 1 Stk. / Typ	€ 21,00 / Stk.
Bei Abnahme von 2 - 5 Stk. / Typ	€ 16,00 / Stk.
Bei Abnahme von 6 - 20 Stk. / Typ	€ 14,00 / Stk..
Bei Abnahme von > 21 Stk. / Typ	€ 12,00 / Stk.

Dicke 2.0 ± 0.1 mm	
Bei Abnahme von 1 Stk. / Typ	€ 23,00 / Stk.
Bei Abnahme von 2 - 5 Stk. / Typ	€ 18,00 / Stk.
Bei Abnahme von 6 - 20 Stk. / Typ	€ 16,00 / Stk.
Bei Abnahme von > 21 Stk. / Typ	€ 14,00 / Stk.

Dicke 3.0 ± 0.1 mm	
Bei Abnahme von 1 Stk. / Typ	€ 28,00 / Stk.
Bei Abnahme von 2 - 5 Stk. / Typ	€ 23,00 / Stk.
Bei Abnahme von 6 - 20 Stk. / Typ	€ 21,00 / Stk.
Bei Abnahme von > 21 Stk. / Typ	€ 19,00 / Stk.

Lieferungen ab Lager Aalen / DE innerhalb von einem Tag. Zwischenverkauf vorbehalten. Für abweichende Abmessungen, Mengen und Spezifikationen senden Sie uns bitte Ihre unverbindliche Anfrage.

Ultraviolet 6 / 7

HEBO	Schott	Hoya
HU 01	≈ UG 11	≈ U-340
HU 02	≈ UG 1	≈ U-360
HU 03	≈ UG 5	≈ U-330

Ultraviolet 8 / 9

HEBO	Schott	Hoya
UV 280	≈ WG 280	≈ UV-28
UV 320	≈ WG 320	≈ UV-32
UV 340	≈ WG 345	≈ UV-34
UV 360	≈ WG 360	≈ UV-36

Yellow 10 / 11

HEBO	Schott	Hoya
Y 380	≈ GG 375	≈ L-38
Y 400	≈ GG 400	≈ L-40
Y 420	≈ GG 420	≈ L-42

Yellow 12 / 13

HEBO	Schott	Hoya
Y 460	≈ GG 455	≈ Y-46
Y 500	≈ GG 495	≈ Y-50
Y 510	≈ OG 515	

Orange 14 / 15

HEBO	Schott	Hoya
O 530	≈ OG 530	
O 540		≈ O-54
O 550	≈ OG 550	
O 565	≈ OG 570	
O 580		≈ O-58

Red 16 / 17

HEBO	Schott	Hoya
R 600		≈ R-60
R 610	≈ RG 610	
R 630	≈ RG 630	
R 640	≈ RG 645	≈ R-64

Red 18 / 19

HEBO	Schott	Hoya
R 650		
R 670	≈ RG 665	
R 700	≈ RG 695	≈ R-70
R 720	≈ RG 715	≈ R-72

Infrared 20 / 21

HEBO	Schott	Hoya
IR 760		≈ IR-76
IR 780	≈ RG 780	
IR 800		≈ IR-80
IR 830	≈ RG 830	≈ IR-83
IR 850	≈ RG 850	≈ IR-85

Infrared 22 / 23

HEBO	Schott	Hoya
HR 01		≈ RM-86
HR 02	≈ RG 7	≈ RM-90
HR 03		

Blue 24 / 25

HEBO	Schott	Hoya
B 01		
B 02		≈ B-410
B 03		
B 05		≈ B-440

Blue 26 / 27

HEBO	Schott	Hoya
B 09		
B 10		
B 11		≈ B-460
B 13		
B 14	≈ BG 14	

Blue 28 / 29

HEBO	Schott	Hoya
B 15		
B 38	≈ BG 38	
B 39	≈ BG 39	
B 40	≈ BG 40	

Blue 30 / 31

HEBO	Schott	Hoya
B 07	≈ BG 7	≈ B-480
B 12	≈ BG 12	
B 18	≈ BG 18	
B 25	≈ BG 25	≈ B-380

Green 32 / 33

HEBO	Schott	Hoya
G 05	≈ VG 5	
G 06	≈ VG 6	
G 13		≈ G-545
G 16		

Green 34 / 35

HEBO	Schott	Hoya
G 08	≈ VG 8	≈ G-533
G 09	≈ VG 9	
G 10	≈ VG 10	
G 11	≈ VG 11	
G 12		≈ G-550

Violet 36 / 37

HEBO	Schott	Hoya
V 01		≈ B-390
V 02	≈ BG 3	
V 03		≈ B-370

Neutral Density 38 / 39

HEBO	Schott	Hoya
NF 01	≈ NG 1	≈ ND-0
NF 04	≈ NG 4	≈ ND-25
NF 05	≈ NG 5	≈ ND-50
NF 11	≈ NG 11	≈ ND-70

Heat Absorbing 40 / 41

HEBO	Schott	Hoya
HA 02		
HA 03	≈ KG 3	≈ HA-30

Rising Color Wavelength Calibrated 42 / 43

HEBO	Schott	Hoya
RC 01		
WL 01	≈ BG 20	≈ V-10

Color Filter Glass Types

Explanation of data tables

Y	Tristimulus value
A(2856K)	CIE standard illuminant A, Planckian radiator at 2.855.6 K, light from incandescent bulbs
D_{65}	CIE standard illuminant D_{65}, standard daylight
x, y	Chromaticity coordinates
D_A	Acid durability
D_W	Water durability
n	Refractive index (He 587.6 nm)
α	Mean coefficient of linear thermal expansion
T_g (°C)	Transformation temperature
T_s (°C)	Sag temperature
ρ	Specific gravity (g/cm³)
v	Conversion value
(mired)	Micro reciprocal degree
λ_t 50%	Edge position ($_t$ = 50 %)
λ_p	Limit of the passband
T_p	Filter factor
T_k	Temperature coefficient
Homogeneity	Deviance of refractive index acc. to DIN ISO 10110-4 : 2000-02
Striae	Density of striae acc. to DIN ISO 10110-4 : 2000-02
Bubbles	Classification of bubble content from grade 0 to grade 4
Edition June 2016.	All indications and values in this catalogue are standard values.
	ALL DATA WITHOUT OBLIGATION.

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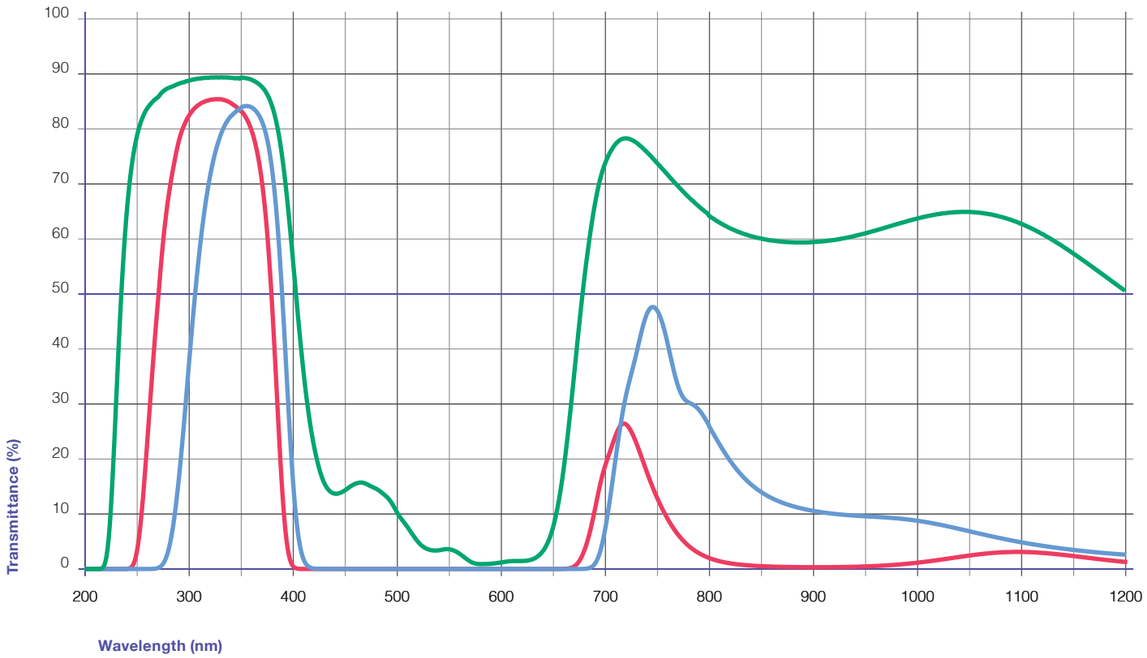
HEBO	Schott	Hoya
HU 01	≈ UG 11	≈ U-340
HU 02	≈ UG 1	≈ U-360
HU 03	≈ UG 5	≈ U-330

Glass Characteristics – Ultraviolet

HEBO	Thickness	n (587,6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
HU 01	1 mm	1.557	2.87	529	588	94	4	4	3	0	1
HU 02	1 mm	1.520	2.65	515	589	97	2	2	3	0	1
HU 03	1 mm	1.526	2.63	527	616	85	2	3	3	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
HU 01	1 mm	0.734	0.266	0.1	0.726	0.262	0.0
HU 02	1 mm	0.532	0.171	0.9	0.231	0.032	0.4
HU 03	1 mm	0.711	0.256	0.3	0.538	0.176	0.1

HEBO
HU 01
HU 02
HU 03



	HU 01	HU 02	HU 03
Thickness	1 mm	1 mm	1 mm
λ (nm)			
190	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000
220	0.0000	0.0000	2.3338
230	0.0000	0.0000	33.6744
240	0.0214	0.0000	66.2741
250	4.1318	0.0000	79.5958
260	25.4680	0.0007	84.3038
270	50.0904	0.2250	86.2140
280	68.3184	3.7697	87.8406
290	78.2176	17.2862	88.6132
300	82.6856	38.9746	89.2038
310	84.5862	58.9119	89.5517
320	85.3196	71.9905	89.7151
330	85.3938	79.1914	89.7391
340	84.6733	82.5630	89.6580
350	83.1552	84.1449	89.7072
360	79.3650	84.0463	89.2884
370	69.3926	81.2804	87.9299
380	44.9022	71.6305	84.1672
390	11.1007	46.4742	74.0423
400	0.3437	14.4584	55.3927
410	0.0006	1.5407	35.4573
420	0.0000	0.0695	22.2438
430	0.0000	0.0028	15.5637
440	0.0000	0.0000	13.7376
450	0.0000	0.0000	14.4000
460	0.0000	0.0000	15.5789
470	0.0000	0.0000	15.5400
480	0.0000	0.0000	14.6080
490	0.0000	0.0000	13.1282
500	0.0000	0.0000	10.2427
510	0.0000	0.0000	7.6067
520	0.0000	0.0000	4.9511
530	0.0000	0.0000	3.5702
540	0.0000	0.0000	3.4054
550	0.0000	0.0000	3.5987
560	0.0000	0.0000	2.7782
570	0.0000	0.0000	1.3955
580	0.0000	0.0000	0.8891
590	0.0000	0.0000	0.9482
600	0.0000	0.0000	1.1906
610	0.0000	0.0000	1.4286
620	0.0000	0.0000	1.4547
630	0.0000	0.0000	1.7537
640	0.0000	0.0000	3.1992
650	0.0002	0.0000	7.5816
660	0.0228	0.0000	17.9352
670	0.5418	0.0003	34.8546
680	3.8078	0.0308	52.7873
690	11.4462	0.9896	66.2240
700	19.2447	7.5701	73.9745
710	24.6609	20.4677	77.5187
720	26.1736	31.8445	78.6032
730	22.4659	39.4704	77.8602
740	17.2418	46.5407	76.1794
750	12.5708	47.0051	74.1534
760	8.8502	40.9022	72.0592
770	6.0587	33.2210	69.9558
780	4.1042	30.3404	68.0111
790	2.7912	28.9781	66.2666
800	1.9198	25.9101	64.5225
810	1.3656	22.6261	63.2761
820	1.0029	19.6820	62.2436
830	0.7650	17.2956	61.4302
840	0.6078	15.4184	60.7948
850	0.5001	13.9915	60.3320
900	0.3170	10.5814	59.6656
950	0.4665	9.6017	61.2411
1000	1.1596	8.7861	63.9278
1050	2.4616	6.8759	65.1833
1065	2.7980	6.2217	64.9145
1100	3.0936	4.8656	63.0481
1200	1.2619	2.6138	50.9217
1300	0.3988	2.5527	41.6294
1400	0.3587	3.2954	41.8351
1500	0.3163	2.3060	40.5847
1600	0.3663	2.8939	41.4340
1700	0.4748	2.3372	43.6834
1800	0.4585	1.7824	44.2915
1900	0.5231	2.2091	46.7392
2000	0.7850	2.9746	50.5258
2100	1.3192	3.9765	53.8002
2200	2.1935	5.5663	55.5083
2300	3.3612	7.7908	56.6565
2400	4.6500	10.1509	58.0864
2500	5.7263	12.1947	57.6927
2600	6.3619	13.9673	54.9754
2700	6.8658	15.7118	52.2859
2800	4.5465	15.1759	24.4649
2900	1.7190	16.6570	6.7903
3000	0.9066	18.8480	3.0325
3100	0.5119	20.7406	1.6284
3200	0.2134	22.1173	0.9866

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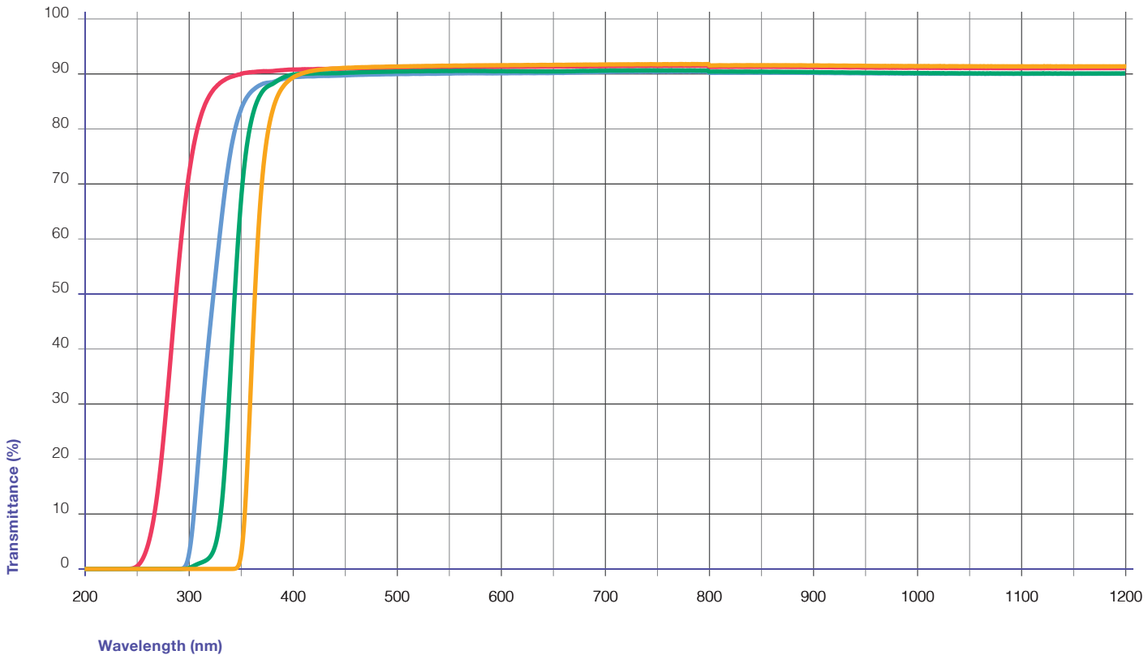
HEBO	Schott	Hoya
UV 280	≈ WG 280	≈ UV-28
UV 320	≈ WG 320	≈ UV-32
UV 340	≈ WG 345	≈ UV-34
UV 360	≈ WG 360	≈ UV-36

Glass Characteristics – Ultraviolet

HEBO	Thickness	n (587,6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
UV 280	2 mm	1.512	2.52	586	656	81	1	4	2	1	2
UV 320	2 mm	1.575	3.23	459	526	91	1	3	3	0	1
UV 340	2 mm	1.620	3.67	453	522	95	1	3	3	0	1
UV 360	2 mm	1.643	3.72	487	546	98	5	4	3	0	1

HEBO	Thickness	λ_t 50% (nm)	λ_p (nm)	T λ_p(%)	T_k (nm/ °C)
UV 280	2 mm	280 ± 9	350	≥ 89.5	0.02
UV 320	2 mm	320 ± 9	400	≥ 89.5	0.02
UV 340	2 mm	340 ± 9	420	≥ 88.0	0.07
UV 360	2 mm	360 ± 9	440	≥ 87.0	0.08

HEBO
UV 280
UV 320
UV 340
UV 360



Thickness λ (nm)	UV 280 2 mm	UV 320 2 mm	UV 340 2 mm	UV 360 2 mm
190	0.0000	0.0102	0.0088	0.0000
200	0.0039	0.0110	0.0100	0.0000
210	0.0056	0.0105	0.0092	0.0000
220	0.0133	0.0172	0.0157	0.0000
230	0.0225	0.0236	0.0214	0.0001
240	0.0279	0.0262	0.0233	0.0001
250	0.6031	0.0283	0.0247	0.0000
260	4.4688	0.0310	0.0265	0.0000
270	15.3163	0.0334	0.0279	0.0004
280	34.7615	0.0342	0.0276	0.0006
290	56.5416	0.0343	0.0234	0.0019
300	72.8519	3.3558	0.2295	0.0032
310	82.1424	23.7419	1.0821	0.0036
320	86.6793	44.7146	2.2957	0.0043
330	88.8157	62.6278	10.0791	0.0053
340	89.8440	76.7986	38.1609	0.0078
350	90.4441	84.1726	68.4084	3.3629
360	90.7092	87.2590	82.3054	38.6849
370	90.8523	88.5313	87.1364	71.5362
380	90.8899	88.8866	88.5543	83.6774
390	91.0657	89.4678	89.7341	87.9078
400	91.1810	89.7914	90.2575	89.6095
410	91.2230	89.8928	90.4389	90.3847
420	91.2423	89.9398	90.4740	90.8176
430	91.2778	90.0179	90.4893	91.0571
440	91.3252	90.0528	90.5132	91.1946
450	91.3695	90.1294	90.5863	91.3074
460	91.3897	90.1950	90.6502	91.3785
470	91.4264	90.2380	90.7057	91.4208
480	91.4560	90.2759	90.7519	91.4800
490	91.4857	90.3248	90.7804	91.5177
500	91.5125	90.3598	90.8313	91.5491
510	91.5248	90.3663	90.8465	91.5811
520	91.5676	90.4009	90.8828	91.6204
530	91.5766	90.4225	90.9135	91.6487
540	91.5944	90.4272	90.9050	91.6772
550	91.5878	90.4427	90.9102	91.6821
560	91.6129	90.4949	90.9469	91.7123
570	91.6556	90.5090	90.9424	91.7357
580	91.6301	90.5041	90.9170	91.7504
590	91.6508	90.4877	90.8961	91.7650
600	91.6753	90.5032	90.8961	91.7765
610	91.6709	90.5263	90.8676	91.7904
620	91.6695	90.5232	90.8465	91.7940
630	91.6973	90.5287	90.8500	91.8139
640	91.6999	90.5444	90.8292	91.8326
650	91.7065	90.5522	90.8420	91.8367
660	91.7082	90.5599	90.8392	91.8271
670	91.7392	90.6253	90.8792	91.8632
680	91.7629	90.6843	90.9295	91.8822
690	91.7762	90.7060	90.9434	91.8848
700	91.7893	90.7525	90.9681	91.9099
710	91.7915	90.7744	90.9927	91.9269
720	91.8139	90.7826	91.0054	91.9324
730	91.8398	90.7940	91.0272	91.9565
740	91.8172	90.8094	91.0229	91.9462
750	91.8181	90.7875	91.0071	91.9305
760	91.8600	90.8062	91.0158	91.9789
770	91.8487	90.8051	91.0263	91.9674

Thickness λ (nm)	UV 280 2 mm	UV 320 2 mm	UV 340 2 mm	UV 360 2 mm
780	91.8511	90.8198	91.0077	91.9695
790	91.8713	90.7983	90.9944	91.9624
800	91.6530	90.5968	90.7976	91.7385
810	91.6693	90.6136	90.8088	91.7804
820	91.6553	90.5976	90.8053	91.7573
830	91.6746	90.6138	90.7995	91.7647
840	91.6718	90.6181	90.7946	91.7800
850	91.6706	90.6180	90.7985	91.7734
900	91.6232	90.5695	90.7094	91.7433
950	91.5323	90.4845	90.6040	91.6642
1000	91.4985	90.4503	90.5282	91.6166
1050	91.4564	90.4312	90.5027	91.6082
1065	91.4444	90.4165	90.4777	91.5923
1100	91.4003	90.3809	90.4422	91.5504
1200	91.4356	90.4280	90.4850	91.5734
1300	91.4838	90.4972	90.5433	91.6184
1400	91.1407	90.3832	90.4381	91.0898
1500	91.3770	90.4919	90.5209	91.4990
1600	91.3067	90.4623	90.4625	91.4574
1700	91.1199	90.2850	90.2283	91.3249
1800	90.8395	89.9773	89.8346	91.1701
1900	90.5337	89.6381	89.3700	90.9663
2000	90.0812	89.0954	88.6802	90.5810
2100	89.3229	88.4873	87.8970	89.5228
2200	87.8423	87.2313	86.3404	88.2134
2300	87.4243	86.5356	85.4902	88.0870
2400	86.7805	85.8006	84.5680	87.1931
2500	85.0826	84.5209	83.0113	85.0939
2600	84.0337	83.4625	81.7261	83.6050
2700	78.0592	80.3961	77.9648	74.2486
2800	29.1781	45.7185	38.7936	18.7069
2900	30.8838	42.4281	35.5888	23.4948
3000	30.9302	39.0147	32.1819	27.1134
3100	28.3567	33.5966	26.8183	27.8973
3200	24.8249	27.4014	20.9394	27.4807

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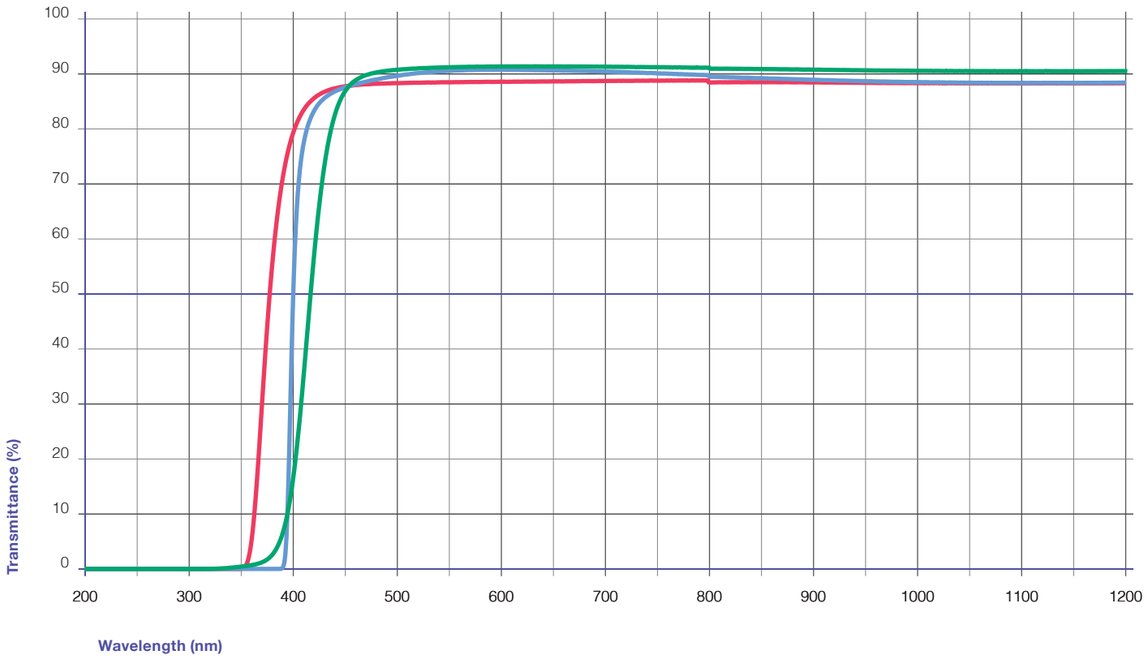
HEBO	Schott	Hoya
Y 380	≈ GG 375	≈ L-38
Y 400	≈ GG 400	≈ L-40
Y 420	≈ GG 420	≈ L-42

Glass Characteristics – Yellow

HEBO	Thickness	n (587,6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
Y 380	2 mm	1.547	2.85	487	546	98	1	2	2	1	1
Y 400	2 mm	1.632	3.65	497	555	95	1	1	2	1	1
Y 420	2 mm	1.632	3.69	497	555	95	2	3	2	1	1

HEBO	Thickness	λ_t 50% (nm)	λ_p (nm)	T λ_p(%)	T_K (nm/ °C)	A (2856 K)			D_{65}		
						x	y	Y (%)	x	y	Y (%)
Y 380	2 mm	380 ± 9	500	≥ 86.0	0.06						
Y 400	2 mm	400 ± 9	560	≥ 86.0	0.07	0.449	0.409	89	0.314	0.332	89
Y 420	2 mm	420 ± 9	560	≥ 86.0	0.07	0.450	0.412	89	0.317	0.340	89

HEBO
Y 380
Y 400
Y 420



Thickness λ (nm)	Y 380 2 mm	Y 400 2 mm	Y 420 2 mm
190	0.0000	0.0049	0.0000
200	0.0003	0.0099	0.0035
210	0.0006	0.0105	0.0047
220	0.0012	0.0123	0.0055
230	0.0027	0.0131	0.0055
240	0.0029	0.0140	0.0050
250	0.0027	0.0159	0.0046
260	0.0026	0.0177	0.0043
270	0.0026	0.0186	0.0039
280	0.0025	0.0186	0.0031
290	0.0024	0.0189	0.0028
300	0.0016	0.0191	0.0019
310	0.0006	0.0197	0.0038
320	0.0000	0.0198	0.0227
330	0.0000	0.0197	0.0965
340	0.0000	0.0198	0.2440
350	0.0455	0.0204	0.4488
360	5.7037	0.0204	0.7256
370	30.8942	0.0201	1.2662
380	56.4372	0.0204	2.7639
390	71.7228	0.4122	6.9865
400	79.7500	52.5145	17.4633
410	83.8283	77.9475	36.4714
420	85.9729	83.5946	58.1938
430	87.1125	85.8625	74.1496
440	87.7478	87.0397	82.9291
450	88.1141	87.7792	87.0744
460	88.3336	88.3513	88.9450
470	88.4792	88.8027	89.8366
480	88.5834	89.2043	90.3095
490	88.6509	89.5817	90.5930
500	88.6944	89.8737	90.7788
510	88.7380	90.1282	90.9225
520	88.7692	90.3590	91.0400
530	88.8159	90.5347	91.1159
540	88.8334	90.6709	91.1832
550	88.8375	90.7508	91.2373
560	88.8767	90.8524	91.2862
570	88.9004	90.9037	91.3165
580	88.8967	90.9472	91.3349
590	88.9212	90.9474	91.3572
600	88.9421	90.9657	91.3644
610	88.9420	90.9425	91.3748
620	88.9589	90.9132	91.3821
630	88.9785	90.9025	91.3763
640	88.9943	90.8637	91.3757
650	89.0149	90.8462	91.3729
660	89.0011	90.7837	91.3624
670	89.0286	90.7576	91.3597
680	89.0567	90.7362	91.3555
690	89.0559	90.6687	91.3410
700	89.0913	90.6294	91.3312
710	89.0992	90.5793	91.3142
720	89.1065	90.5153	91.3088
730	89.1418	90.4755	91.2563
740	89.1340	90.3661	91.2642
750	89.1444	90.3071	91.2497
760	89.1781	90.2641	91.2344
770	89.1516	90.1501	91.2130
780	89.1521	90.1003	91.1760
790	89.1621	90.0204	91.1504
800	88.8271	89.7103	90.9784
810	88.8506	89.6510	90.9722
820	88.8472	89.5806	90.9545
830	88.8570	89.5310	90.9461
840	88.8640	89.4735	90.9231
850	88.8645	89.4327	90.9054
900	88.8233	89.1337	90.7782
950	88.7524	88.8873	90.6709
1000	88.6875	88.6996	90.6131
1050	88.6690	88.6054	90.5419
1065	88.6543	88.5737	90.5195
1100	88.6343	88.5415	90.5104
1200	88.6763	88.6239	90.5342
1300	88.7279	88.8086	90.5967
1400	88.6565	88.8369	90.4823
1500	88.6673	89.2965	90.7018
1600	88.5857	89.5605	90.7110
1700	88.3694	89.5916	90.5672
1800	88.0159	89.3775	90.3298
1900	87.6150	89.0679	90.0774
2000	87.1066	88.5373	89.7093
2100	86.5949	87.8720	89.1472
2200	85.2394	86.5459	87.9118
2300	84.2453	86.0875	87.5093
2400	83.5739	85.4276	86.9286
2500	82.1332	84.0231	85.6372
2600	80.6786	82.9927	84.6980
2700	77.1729	78.7241	80.7213
2800	45.1883	34.0373	35.0183
2900	38.5891	31.9821	32.4784
3000	34.7329	29.6558	30.2379
3100	28.2149	25.6524	26.5869
3200	21.4126	21.2021	22.5767

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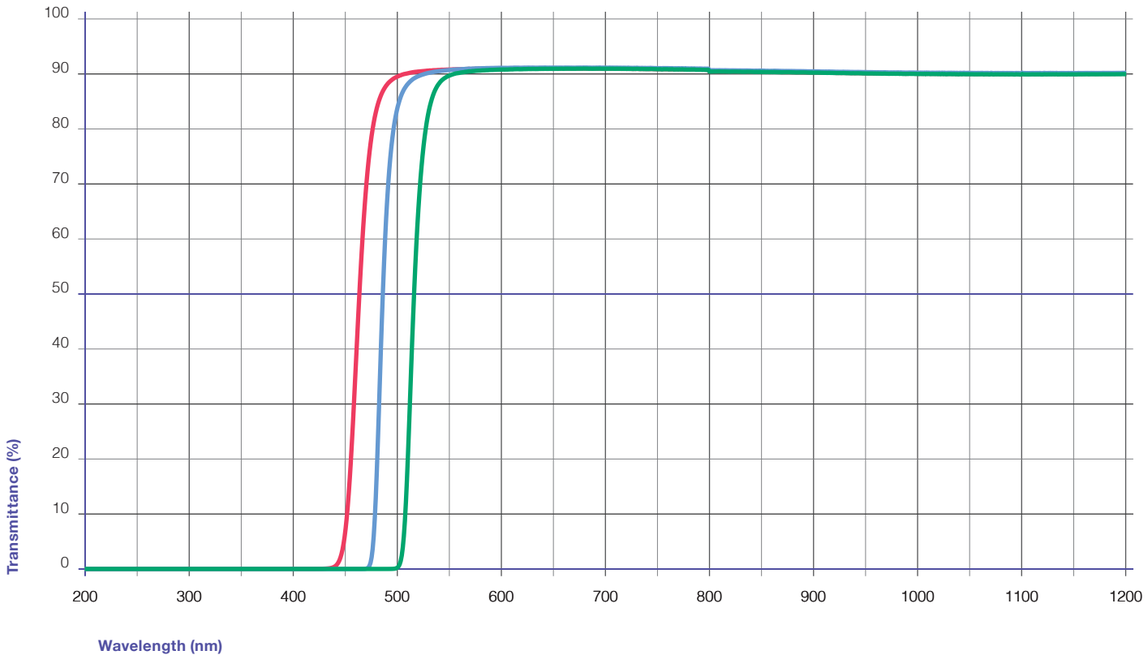
HEBO	Schott	Hoya
Y 460	≈ GG 455	≈ Y-46
Y 500	≈ GG 495	≈ Y-50
Y 510	≈ OG 515	

Glass Characteristics – Yellow

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
Y 460	2 mm	1.523	2.64	527	605	103	1	3	2	1	1
Y 500	2 mm	1.523	2.64	527	605	103	1	3	2	1	1
Y 510	2 mm	1.523	2.64	527	605	103	2	2	2	1	1

HEBO	Thickness	λ_t 50% (nm)	λ_p (nm)	T λ_p(%)	T_k (nm/ °C)	A (2856 K)			D_{65}		
						x	y	Y (%)	x	y	Y (%)
Y 460	2 mm	460 ± 9	560	≥ 89.5	0.08	0.470	0.439	89	0.354	0.416	88
Y 500	2 mm	500 ± 9	580	≥ 89.5	0.10	0.508	0.473	88	0.434	0.525	85
Y 510	2 mm	510 ± 9	600	≥ 89.5	0.11	0.527	0.467	84	0.468	0.521	78

HEBO
Y 460
Y 500
Y 510



Thickness λ (nm)	Y 460 2 mm	Y 500 2 mm	Y 510 2 mm
190	0.0000	0.0000	0.0000
200	0.0035	0.0031	0.0008
210	0.0045	0.0039	0.0013
220	0.0056	0.0045	0.0014
230	0.0062	0.0047	0.0014
240	0.0064	0.0048	0.0013
250	0.0068	0.0050	0.0014
260	0.0075	0.0050	0.0013
270	0.0082	0.0050	0.0014
280	0.0087	0.0051	0.0013
290	0.0097	0.0053	0.0014
300	0.0104	0.0052	0.0011
310	0.0111	0.0055	0.0016
320	0.0112	0.0053	0.0014
330	0.0115	0.0052	0.0011
340	0.0118	0.0054	0.0012
350	0.0121	0.0053	0.0011
360	0.0121	0.0055	0.0013
370	0.0121	0.0055	0.0013
380	0.0135	0.0055	0.0015
390	0.0171	0.0052	0.0012
400	0.0206	0.0055	0.0015
410	0.0205	0.0056	0.0010
420	0.0245	0.0059	0.0014
430	0.0594	0.0059	0.0013
440	0.5101	0.0059	0.0013
450	7.3713	0.0063	0.0014
460	37.8535	0.0069	0.0018
470	70.1746	0.0737	0.0017
480	83.9504	17.7365	0.0020
490	88.2920	67.2622	0.0043
500	89.7341	84.1369	0.2740
510	90.3149	88.4045	20.8588
520	90.6293	89.7846	65.5663
530	90.7981	90.3896	83.4278
540	90.9156	90.7115	88.4760
550	90.9818	90.9022	89.9016
560	91.0532	91.0438	90.4108
570	91.0947	91.1470	90.6538
580	91.1246	91.2192	90.8065
590	91.1619	91.2715	90.9220
600	91.1697	91.3066	90.9871
610	91.1761	91.3130	91.0246
620	91.1647	91.3264	91.0574
630	91.1846	91.3477	91.1066
640	91.1921	91.3475	91.1191
650	91.1828	91.3470	91.1368
660	91.1607	91.3325	91.1274
670	91.1543	91.3285	91.1405
680	91.1639	91.3512	91.1562
690	91.1553	91.3260	91.1389
700	91.1512	91.3282	91.1502
710	91.1542	91.3278	91.1336
720	91.1316	91.3096	91.1122
730	91.1319	91.3227	91.1189
740	91.1057	91.2660	91.0735
750	91.0667	91.2382	91.0463
760	91.0690	91.2482	91.0438
770	91.0327	91.2262	90.9927
780	91.0173	91.1922	90.9836
790	91.0020	91.1722	90.9530
800	90.6599	90.8763	90.6253
810	90.6505	90.8631	90.6307
820	90.6232	90.8319	90.5920
830	90.6140	90.8237	90.5882
840	90.5866	90.7966	90.5736
850	90.5814	90.7945	90.5539
900	90.4511	90.6669	90.4207
950	90.3219	90.5301	90.2843
1000	90.2231	90.4287	90.1765
1050	90.1941	90.3835	90.1487
1065	90.1812	90.3658	90.1239
1100	90.1710	90.3445	90.1044
1200	90.2351	90.3949	90.1555
1300	90.3468	90.4609	90.2575
1400	90.2593	90.3870	90.1958
1500	90.5048	90.5984	90.4219
1600	90.5618	90.6380	90.4819
1700	90.4626	90.5164	90.3908
1800	90.2570	90.2768	90.1874
1900	90.0300	90.0305	89.9541
2000	89.6513	89.6264	89.6109
2100	89.1251	89.0692	89.0988
2200	87.9648	87.8766	87.9621
2300	87.5928	87.4524	87.6174
2400	87.0473	86.8768	87.1009
2500	85.8116	85.6247	85.8776
2600	84.9731	84.7468	85.0302
2700	81.2079	80.9809	81.2616
2800	36.9294	36.8253	37.1978
2900	34.3683	33.8902	34.8338
3000	32.1204	31.3857	32.7586
3100	28.3423	27.5075	29.0722
3200	24.1317	23.2680	24.8867

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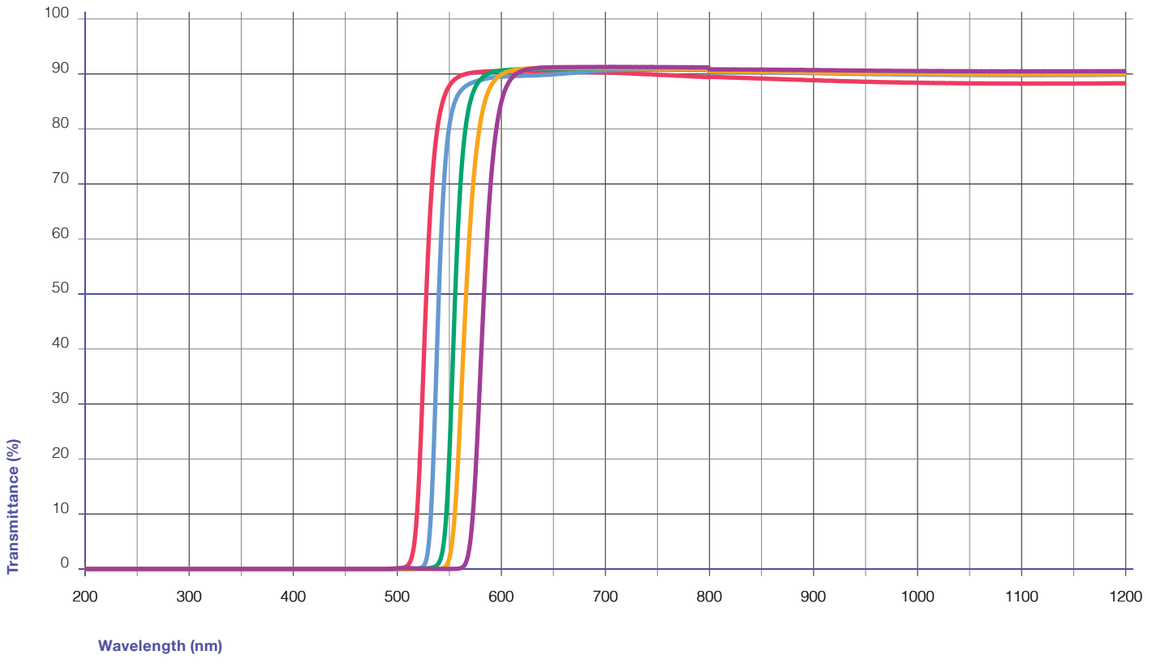
HEBO	Schott	Hoya
O 530	≈ OG 530	
O 540		≈ O-54
O 550	≈ OG 550	
O 565	≈ OG 570	
O 580		≈ O-58

Glass Characteristics – Orange

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
O 530	2 mm	1.523	2.64	527	605	103	3	2	2	1	1
O 540	2 mm	1.523	2.64	527	605	103	3	2	2	1	1
O 550	2 mm	1.523	2.64	527	605	103	3	2	2	1	1
O 565	2 mm	1.523	2.64	527	605	103	3	2	2	1	1
O 580	2 mm	1.523	2.64	527	605	103	1	2	2	1	1

HEBO	Thickness	λ_t 50% (nm)	λ_p (nm)	T λ_p(%)	T_k (nm/ °C)	A (2856 K)			D_{65}		
						x	y	Y (%)	x	y	Y (%)
O 530	2 mm	530 ± 9	620	≥ 88.7	0.12	0.549	0.448	82.2	0.504	0.492	70.2
O 540	2 mm	540 ± 9	630	≥ 88.7	0.13	0.572	0.427	72.9	0.537	0.461	59.3
O 550	2 mm	550 ± 9	640	≥ 88.7	0.13	0.594	0.405	63.6	0.569	0.430	48.4
O 565	2 mm	565 ± 9	655	≥ 88.7	0.14	0.622	0.377	51.6	0.605	0.395	36.7
O 580	2 mm	580 ± 9	680	≥ 88.7	0.15	0.658	0.342	35.9	0.649	0.351	23.3

HEBO
- O 530
- O 540
- O 550
- O 565
- O 580



Thickness / λ (nm)	O 530 2 mm	O 540 2 mm	O 550 2 mm	O 565 2 mm	O 580 2 mm
190	0.0000	0.0000	0.0000	0.0000	0.0000
200	0.0013	0.0003	0.0008	0.0000	0.0002
210	0.0018	0.0008	0.0010	0.0003	0.0008
220	0.0020	0.0007	0.0012	0.0006	0.0010
230	0.0022	0.0008	0.0013	0.0008	0.0010
240	0.0024	0.0008	0.0013	0.0008	0.0010
250	0.0024	0.0008	0.0012	0.0007	0.0011
260	0.0023	0.0006	0.0011	0.0005	0.0009
270	0.0023	0.0007	0.0012	0.0008	0.0008
280	0.0021	0.0006	0.0009	0.0004	0.0006
290	0.0024	0.0007	0.0010	0.0006	0.0008
300	0.0023	0.0005	0.0010	0.0006	0.0006
310	0.0023	0.0008	0.0011	0.0008	0.0008
320	0.0023	0.0006	0.0010	0.0007	0.0007
330	0.0021	0.0006	0.0008	0.0005	0.0006
340	0.0023	0.0004	0.0010	0.0004	0.0007
350	0.0022	0.0003	0.0007	0.0003	0.0004
360	0.0022	0.0006	0.0010	0.0004	0.0005
370	0.0024	0.0006	0.0010	0.0006	0.0007
380	0.0024	0.0007	0.0008	0.0005	0.0006
390	0.0020	0.0004	0.0007	0.0001	0.0002
400	0.0025	0.0004	0.0011	0.0006	0.0005
410	0.0022	0.0006	0.0007	0.0003	0.0005
420	0.0025	0.0006	0.0009	0.0006	0.0005
430	0.0025	0.0005	0.0010	0.0006	0.0006
440	0.0025	0.0003	0.0010	0.0006	0.0007
450	0.0027	0.0007	0.0012	0.0006	0.0006
460	0.0028	0.0006	0.0013	0.0007	0.0007
470	0.0035	0.0006	0.0014	0.0006	0.0007
480	0.0104	0.0008	0.0014	0.0006	0.0011
490	0.0361	0.0010	0.0023	0.0008	0.0101
500	0.1011	0.0040	0.0045	0.0009	0.0910
510	0.7052	0.0160	0.0127	0.0017	0.1482
520	14.1865	0.0888	0.0398	0.0023	0.0856
530	60.2527	4.6223	0.1383	0.0035	0.0458
540	82.2550	51.6159	1.2149	0.0361	0.0137
550	88.0887	80.9687	21.7211	2.1497	0.0081
560	89.7942	86.9324	68.6405	26.5530	0.1155
570	90.3619	88.4452	85.1868	63.2974	5.1003
580	90.5664	89.0831	89.2201	81.7314	37.3622
590	90.6899	89.4861	90.4294	88.0830	71.2978
600	90.7241	89.6909	90.8170	90.1104	85.2061
610	90.7254	89.7888	90.9602	90.8062	89.4757
620	90.7181	89.8418	91.0347	91.0929	90.7600
630	90.7093	89.9102	91.0838	91.2056	91.1865
640	90.6843	90.0089	91.1288	91.2638	91.3489
650	90.6452	90.1111	91.1420	91.2754	91.3848
660	90.6031	90.2305	91.1502	91.2646	91.4056
670	90.5763	90.4057	91.1664	91.2727	91.4241
680	90.5563	90.6020	91.2052	91.2828	91.4551
690	90.4935	90.7474	91.1967	91.2653	91.4543
700	90.4444	90.8368	91.2164	91.2619	91.4570
710	90.3818	90.9040	91.2270	91.2556	91.4636
720	90.3091	90.9263	91.2145	91.2514	91.4481
730	90.2476	90.9632	91.2308	91.2361	91.4635
740	90.1462	90.9663	91.2017	91.1960	91.4390
750	90.0377	90.9547	91.1705	91.1495	91.3958
760	89.9748	90.9873	91.2020	91.1624	91.4424
770	89.8584	90.9113	91.1646	91.1420	91.4116

Thickness / λ (nm)	O 530 2 mm	O 540 2 mm	O 550 2 mm	O 565 2 mm	O 580 2 mm
780	89.7830	90.9208	91.1582	91.1098	91.3912
790	89.6771	90.8867	91.1588	91.0817	91.3765
800	89.6687	90.5671	90.7906	90.7222	91.0273
810	89.6104	90.5600	90.7886	90.7101	91.0242
820	89.5409	90.5342	90.7609	90.6706	91.0020
830	89.4752	90.5170	90.7542	90.6603	90.9943
840	89.4125	90.5067	90.7409	90.6251	90.9880
850	89.3619	90.4860	90.7366	90.6173	90.9835
900	89.0405	90.3335	90.6216	90.4664	90.8970
950	88.7693	90.1718	90.5141	90.3170	90.7879
1000	88.5764	90.0567	90.4206	90.2103	90.7065
1050	88.4773	90.0049	90.3975	90.1770	90.6853
1065	88.4534	89.9802	90.3848	90.1497	90.6665
1100	88.4241	89.9691	90.3580	90.1387	90.6595
1200	88.4899	90.0740	90.4326	90.1834	90.7056
1300	88.6860	90.2531	90.5217	90.2916	90.7635
1400	88.7237	90.2074	90.4419	90.2750	90.6467
1500	89.1891	90.4255	90.6409	90.4674	90.8340
1600	89.4386	90.4753	90.6748	90.5174	90.8298
1700	89.4685	90.3811	90.5772	90.4523	90.6914
1800	89.2537	90.1630	90.3720	90.2779	90.4556
1900	88.9376	89.9370	90.1434	90.0782	90.2069
2000	88.4745	89.5976	89.8054	89.7346	89.8491
2100	87.8163	89.0877	89.2905	89.2661	89.2926
2200	86.4919	88.0245	88.1935	88.3407	88.1139
2300	86.0456	87.7080	87.8164	87.9257	87.7032
2400	85.4372	87.2272	87.2898	87.4001	87.1396
2500	84.0448	86.0813	86.1010	86.3953	85.8686
2600	83.0438	85.2705	85.2960	85.6341	85.0076
2700	78.8059	81.7001	81.6822	82.8365	81.2336
2800	33.9345	38.9068	39.3746	46.1309	37.2330
2900	31.8573	36.5380	36.9018	42.2593	34.6669
3000	29.5883	34.4148	34.5958	38.8851	32.3668
3100	25.6608	30.7328	30.7161	34.3749	28.5485
3200	21.3601	26.5500	26.3850	29.5870	24.3442

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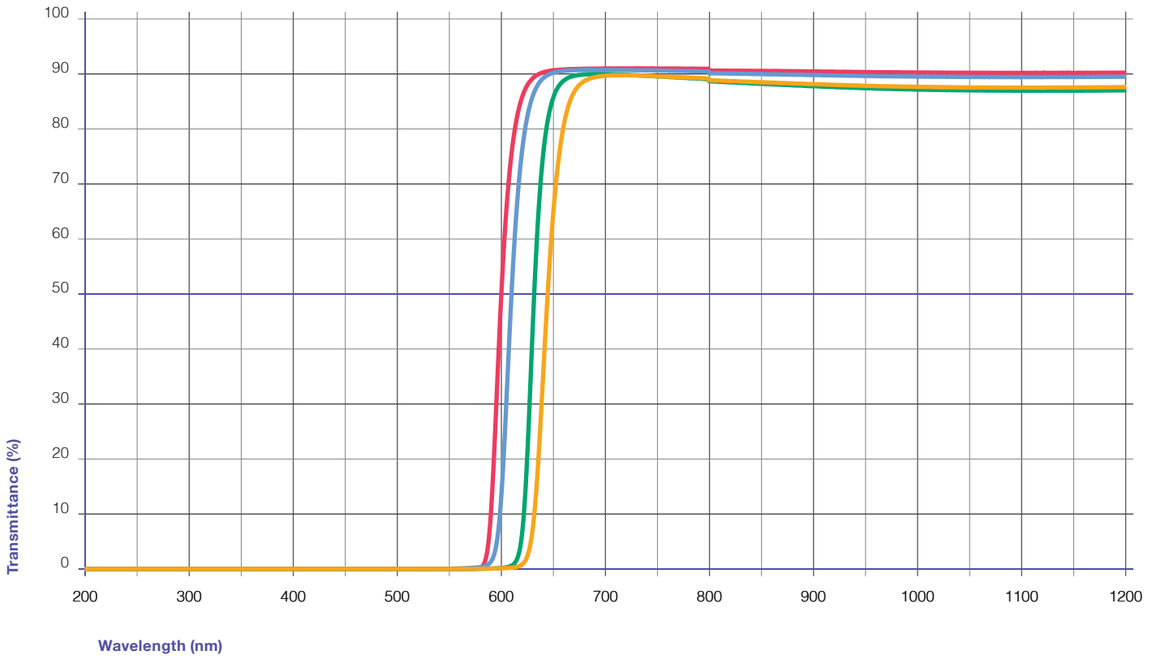
HEBO	Schott	Hoya
R 600		≈ R-60
R 610	≈ RG 610	
R 630	≈ RG 630	
R 640	≈ RG 645	≈ R-64

Glass Characteristics – Red

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
R 600	2 mm	1.523	2.64	527	605	103	1	2	2	1	1
R 610	2 mm	1.523	2.64	527	605	103	1	2	2	1	1
R 630	2 mm	1.523	2.64	527	605	103	1	2	2	1	1
R 640	2 mm	1.523	2.64	527	605	103	1	2	2	1	1

HEBO	Thickness	λ_t 50% (nm)	λ_p (nm)	T λ_p(%)	T_k (nm/ °C)	A (2856 K)			D_{65}		
						x	y	Y (%)	x	y	Y (%)
R 600	2 mm	600 ± 9	685	≥ 88.7	0.16	0.680	0.319	27.0	0.675	0.325	16.5
R 610	2 mm	610 ± 9	695	≥ 88.7	0.16	0.695	0.305	18.4	0.690	0.310	10.7
R 630	2 mm	630 ± 9	710	≥ 88.7	0.17	0.713	0.287	10.4	0.711	0.289	5.5
R 640	2 mm	640 ± 9	720	≥ 88.7	0.17	0.724	0.276	5.0	0.723	0.277	2.4

HEBO
R 600
R 610
R 630
R 640



Thickness / λ (nm)	R 600 2 mm	R 610 2 mm	R 630 2 mm	R 640 2 mm
190	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000	0.0000
220	0.0000	0.0000	0.0000	0.0000
230	0.0000	0.0001	0.0000	0.0000
240	0.0000	0.0001	0.0000	0.0000
250	0.0000	0.0002	0.0000	0.0000
260	0.0000	0.0001	0.0000	0.0000
270	0.0001	0.0002	0.0001	0.0001
280	0.0000	0.0000	0.0000	0.0000
290	0.0002	0.0001	0.0000	0.0001
300	0.0000	0.0000	0.0000	0.0000
310	0.0001	0.0000	0.0000	0.0000
320	0.0000	0.0000	0.0000	0.0000
330	0.0000	0.0000	0.0000	0.0000
340	0.0000	0.0000	0.0000	0.0000
350	0.0000	0.0000	0.0000	0.0000
360	0.0000	0.0000	0.0000	0.0000
370	0.0000	0.0000	0.0000	0.0000
380	0.0000	0.0000	0.0000	0.0000
390	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000
410	0.0000	0.0000	0.0000	0.0000
420	0.0000	0.0000	0.0000	0.0000
430	0.0000	0.0000	0.0000	0.0000
440	0.0000	0.0000	0.0000	0.0000
450	0.0000	0.0000	0.0000	0.0000
460	0.0000	0.0000	0.0000	0.0000
470	0.0000	0.0000	0.0000	0.0000
480	0.0000	0.0000	0.0000	0.0000
490	0.0000	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000	0.0000
510	0.0000	0.0000	0.0000	0.0000
520	0.0000	0.0014	0.0000	0.0000
530	0.0001	0.0056	0.0002	0.0003
540	0.0001	0.0155	0.0006	0.0011
550	0.0016	0.0429	0.0021	0.0037
560	0.0051	0.0981	0.0049	0.0094
570	0.0191	0.1829	0.0125	0.0228
580	0.2747	0.3602	0.0322	0.0463
590	10.7813	1.3834	0.0738	0.0755
600	50.8598	13.8885	0.1772	0.1217
610	76.2864	51.5886	0.6441	0.2323
620	86.0717	76.5176	6.8190	0.8577
630	89.3965	86.1646	43.9865	7.3249
640	90.4665	89.3927	75.4515	35.2439
650	90.8586	90.4094	85.9878	65.3466
660	90.9873	90.7294	88.9822	80.9753
670	91.0765	90.8612	89.8377	86.9541
680	91.1376	90.9138	90.0930	88.9098
690	91.1364	90.9158	90.1458	89.5944
700	91.1830	90.9142	90.1390	89.8537
710	91.1867	90.9077	90.0897	89.9430
720	91.1978	90.8963	90.0236	89.9445
730	91.2153	90.8797	89.9404	89.9117
740	91.1799	90.8417	89.8432	89.8498
750	91.1678	90.8080	89.7243	89.7600
760	91.1955	90.8109	89.6538	89.7017
770	91.1598	90.7274	89.5329	89.6094

Thickness / λ (nm)	R 600 2 mm	R 610 2 mm	R 630 2 mm	R 640 2 mm
780	91.1500	90.7150	89.4222	89.5259
790	91.1278	90.6718	89.3373	89.4408
800	90.7999	90.3094	88.8609	89.0365
810	90.7901	90.2903	88.7669	88.9790
820	90.7697	90.2469	88.6631	88.8872
830	90.7669	90.2230	88.5671	88.8219
840	90.7487	90.1930	88.4832	88.7515
850	90.7525	90.1673	88.3994	88.6761
900	90.6476	89.9846	87.9627	88.3253
950	90.5319	89.8259	87.5910	88.0319
1000	90.4399	89.6928	87.3409	87.8339
1050	90.4083	89.6519	87.2040	87.7383
1065	90.3895	89.6303	87.1754	87.7075
1100	90.3745	89.6145	87.1347	87.6890
1200	90.4324	89.6892	87.2227	87.8081
1300	90.5058	89.8234	87.4776	88.0496
1400	90.4627	89.8158	87.6679	88.1525
1500	90.6337	90.0966	88.2824	88.7304
1600	90.6470	90.1982	88.6955	89.0813
1700	90.5397	90.1403	88.8647	89.1905
1800	90.3475	89.9334	88.7637	89.0047
1900	90.1327	89.6679	88.5136	88.6988
2000	89.7937	89.2615	88.1089	88.2071
2100	89.2941	88.7067	87.5484	87.5633
2200	88.3004	87.5988	86.3670	86.2865
2300	87.8719	87.1224	86.0758	85.8504
2400	87.3217	86.5387	85.5899	85.2533
2500	86.2479	85.3731	84.3336	83.9040
2600	85.4787	84.4939	83.4878	82.9209
2700	82.4163	81.1088	79.3917	78.8256
2800	43.3231	39.7177	34.2843	34.4942
2900	39.4574	35.8291	32.3349	32.2781
3000	36.1805	32.5561	30.4346	29.9352
3100	31.8909	28.3024	26.8888	25.9985
3200	27.4022	23.9358	22.9314	21.7446

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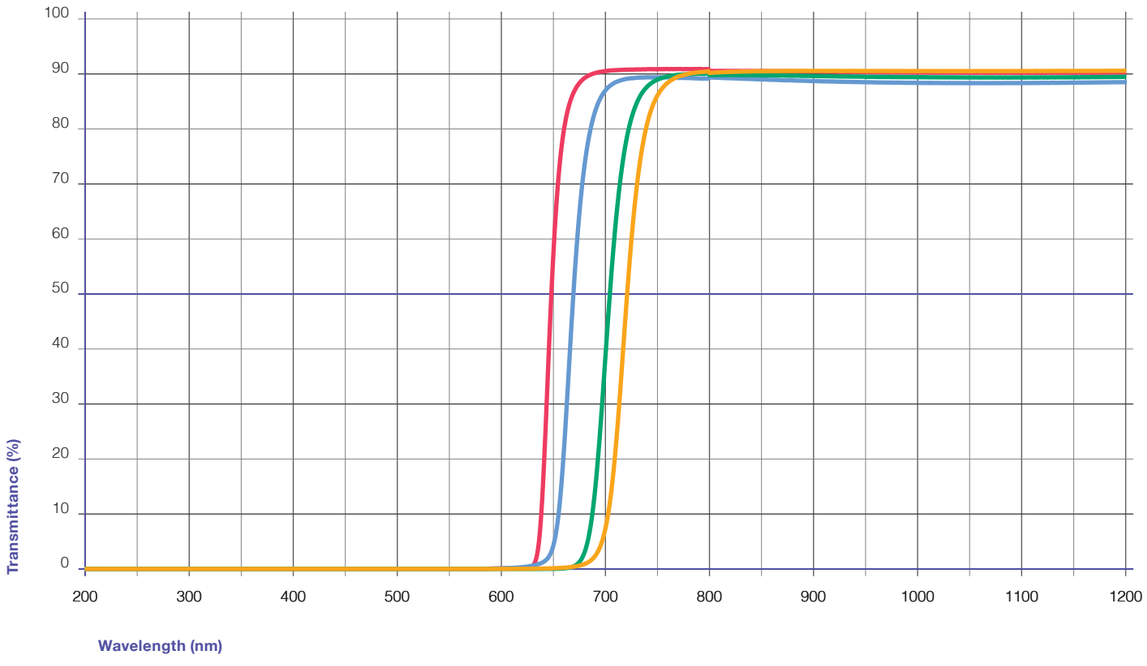
HEBO	Schott	Hoya
R 650		
R 670	≈ RG 665	
R 700	≈ RG 695	≈ R-70
R 720	≈ RG 715	≈ R-72

Glass Characteristics – Red

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
R 650	2 mm	1.523	2.64	527	605	103	1	2	2	1	1
R 670	2 mm	1.523	2.64	527	605	103	1	2	2	1	1
R 700	2 mm	1.523	2.64	527	605	103	1	2	2	1	1
R 720	2 mm	1.523	2.77	534	592	111	4	4	2	1	1

HEBO	Thickness	λ_t 50% (nm)	λ_p (nm)	T λ_p(%)	T_K (nm/ °C)	A (2856 K)			D_{65}		
						x	y	Y (%)	x	y	Y (%)
R 650	2 mm	650 ± 9	730	≥ 88.5	0.17	0.728	0.272	3.2	0.728	0.272	1.5
R 670	2 mm	670 ± 9	750	≥ 87.5	0.17	0.731	0.269	1.1	0.730	0.270	0.5
R 700	2 mm	700 ± 9	800	≥ 79.8	0.18	0.735	0.265	0.0	0.735	0.265	0.0
R 720	2 mm	720 ± 9	810	≥ 80.0	0.18						

HEBO
R 650
R 670
R 700
R 720



Thickness	R 650 2 mm	R 670 2 mm	R 700 2 mm	R 720 2 mm
λ (nm)				
190	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000	0.0000
220	0.0000	0.0000	0.0000	0.0000
230	0.0000	0.0000	0.0000	0.0000
240	0.0000	0.0001	0.0000	0.0000
250	0.0000	0.0000	0.0000	0.0000
260	0.0000	0.0000	0.0000	0.0000
270	0.0001	0.0000	0.0000	0.0000
280	0.0000	0.0000	0.0000	0.0000
290	0.0001	0.0001	0.0000	0.0000
300	0.0000	0.0000	0.0000	0.0000
310	0.0000	0.0000	0.0000	0.0000
320	0.0000	0.0000	0.0000	0.0000
330	0.0000	0.0000	0.0000	0.0000
340	0.0000	0.0000	0.0000	0.0000
350	0.0000	0.0000	0.0000	0.0000
360	0.0000	0.0000	0.0000	0.0000
370	0.0000	0.0000	0.0000	0.0000
380	0.0000	0.0000	0.0000	0.0000
390	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000
410	0.0000	0.0000	0.0000	0.0000
420	0.0000	0.0000	0.0000	0.0000
430	0.0000	0.0000	0.0000	0.0000
440	0.0000	0.0000	0.0000	0.0000
450	0.0000	0.0000	0.0000	0.0000
460	0.0000	0.0000	0.0000	0.0000
470	0.0000	0.0000	0.0000	0.0000
480	0.0000	0.0000	0.0000	0.0000
490	0.0000	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000	0.0000
510	0.0000	0.0000	0.0000	0.0000
520	0.0000	0.0000	0.0000	0.0000
530	0.0000	0.0000	0.0000	0.0000
540	0.0000	0.0005	0.0000	0.0000
550	0.0013	0.0026	0.0000	0.0000
560	0.0032	0.0074	0.0000	0.0001
570	0.0064	0.0152	0.0000	0.0010
580	0.0174	0.0283	0.0000	0.0026
590	0.0545	0.0531	0.0000	0.0052
600	0.1018	0.1016	0.0000	0.0099
610	0.1251	0.1899	0.0004	0.0173
620	0.1242	0.3329	0.0011	0.0285
630	0.5542	0.6070	0.0028	0.0467
640	15.7762	1.2396	0.0088	0.0770
650	57.8297	4.3410	0.0281	0.1294
660	79.9809	21.5227	0.1076	0.2281
670	87.0427	52.5440	0.5335	0.4297
680	89.4535	73.6341	3.0968	0.9117
690	90.3414	83.1937	14.3676	2.3604
700	90.7066	87.0253	38.8258	7.4145
710	90.8747	88.5225	63.3960	22.3944
720	90.9690	89.1140	78.0433	47.9504
730	91.0065	89.3103	84.8599	69.4957
740	91.0476	89.3963	87.8446	81.0699
750	91.0429	89.3970	89.1557	86.2782
760	91.0804	89.3723	89.7480	88.6020
770	91.0814	89.2726	90.0280	89.7177

Thickness	R 650 2 mm	R 670 2 mm	R 700 2 mm	R 720 2 mm
λ (nm)				
780	91.0791	89.2603	90.1578	90.2212
790	91.0868	89.1963	90.2289	90.5047
800	90.7456	89.3870	89.9685	90.3766
810	90.7435	89.3019	89.9902	90.4906
820	90.7315	89.2259	89.9910	90.5594
830	90.7362	89.1524	89.9799	90.6167
840	90.7256	89.0901	89.9613	90.6539
850	90.7288	89.0293	89.9364	90.6754
900	90.6415	88.7124	89.8113	90.7373
950	90.5350	88.5070	89.6637	90.7298
1000	90.4647	88.4088	89.5790	90.7024
1050	90.4327	88.3040	89.5513	90.7042
1065	90.4197	88.3426	89.5506	90.7103
1100	90.4023	88.3686	89.5366	90.7050
1200	90.4560	88.5206	89.6437	90.7602
1300	90.5433	88.7987	89.8419	90.8577
1400	90.4841	88.9955	89.7934	90.7948
1500	90.6608	89.6054	89.9861	90.9191
1600	90.6564	90.0259	90.0148	90.9670
1700	90.5310	90.1659	89.8686	90.9102
1800	90.2990	89.9708	89.6098	90.8027
1900	90.0402	89.6378	89.4536	90.7007
2000	89.6418	89.1594	89.2023	90.5477
2100	89.0651	88.5154	88.7468	90.2458
2200	87.9571	87.2483	87.7922	89.5869
2300	87.4675	86.8294	87.4535	89.3731
2400	86.8465	86.2512	86.8682	88.9922
2500	85.6707	85.0422	85.9239	88.2189
2600	84.7702	84.2451	85.0493	87.6627
2700	81.4523	80.2710	81.7185	85.2012
2800	39.8976	35.8613	32.1735	49.6652
2900	36.1006	33.4600	26.3189	46.8489
3000	32.8783	30.8994	23.1692	44.6707
3100	28.6710	26.5714	20.4682	41.5451
3200	24.3281	21.2774	18.1122	38.0879

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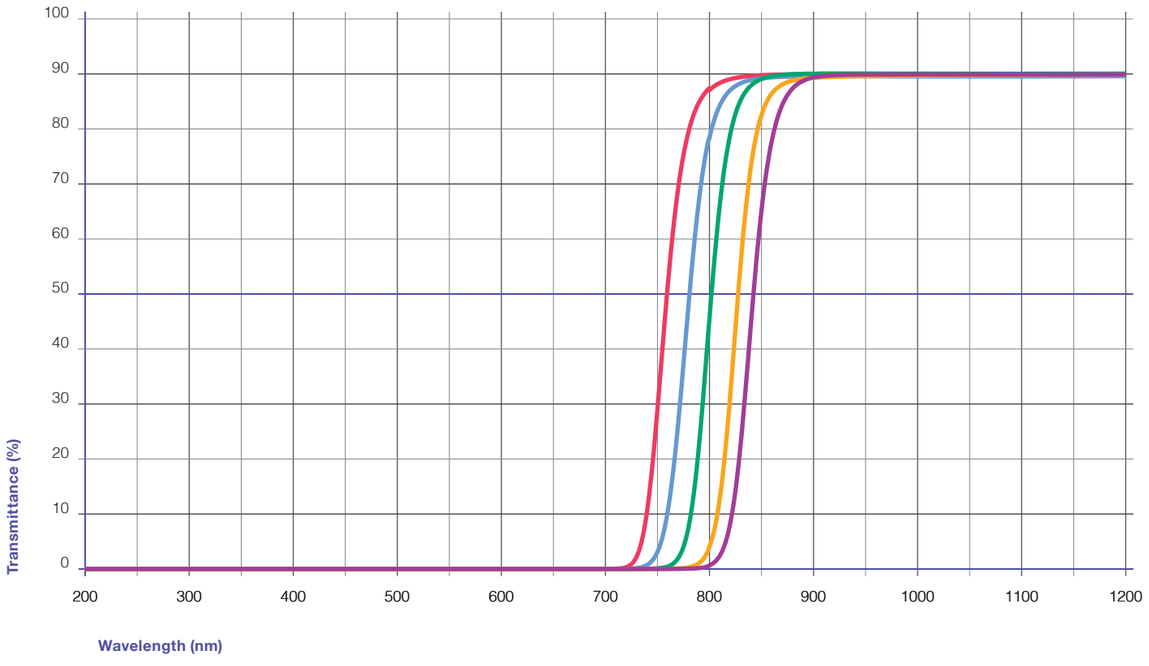
HEBO	Schott	Hoya
IR 760		≈ IR-76
IR 780	≈ RG 780	
IR 800		≈ IR-80
IR 830	≈ RG 830	≈ IR-83
IR 850	≈ RG 850	≈ IR-85

Glass Characteristics – Infrared

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
IR 760	2 mm	1.532	2.77	534	592	111	4	4	2	1	1
IR 780	2 mm	1.532	2.77	534	592	111	4	4	2	1	1
IR 800	2 mm	1.520	3.05	559	615	98	4	4	2	1	1
IR 830	2 mm	1.520	3.05	559	615	98	4	4	2	1	1
IR 850	2 mm	1.520	3.05	559	615	98	4	4	2	1	1

HEBO	Thickness	λ_t 50% (nm)	λ_p (nm)	T λ_p(%)	T_k (nm/ °C)
IR 760	2 mm	760 ± 9	850	≥ 83.6	0.20
IR 780	2 mm	780 ± 9	870	≥ 83.6	0.22
IR 800	2 mm	800 ± 9	900	≥ 83.6	0.22
IR 830	2 mm	830 ± 9	930	≥ 83.6	0.23
IR 850	2 mm	850 ± 9	950	≥ 80.0	0.24

HEBO
- IR 760
- IR 780
- IR 800
- IR 830
- IR 850



Thickness / λ (nm)	IR 760 2 mm	IR 780 2 mm	IR 800 2 mm	IR 830 2 mm	IR 850 2 mm
190	0.0000	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000	0.0000	0.0000
220	0.0000	0.0000	0.0000	0.0000	0.0000
230	0.0000	0.0000	0.0000	0.0000	0.0000
240	0.0000	0.0000	0.0000	0.0000	0.0000
250	0.0000	0.0000	0.0000	0.0000	0.0000
260	0.0000	0.0000	0.0000	0.0000	0.0000
270	0.0001	0.0000	0.0000	0.0000	0.0000
280	0.0000	0.0000	0.0000	0.0000	0.0000
290	0.0000	0.0001	0.0000	0.0001	0.0000
300	0.0000	0.0000	0.0000	0.0000	0.0000
310	0.0000	0.0000	0.0000	0.0000	0.0000
320	0.0000	0.0000	0.0000	0.0000	0.0000
330	0.0000	0.0000	0.0000	0.0000	0.0000
340	0.0000	0.0000	0.0000	0.0000	0.0000
350	0.0000	0.0000	0.0000	0.0000	0.0000
360	0.0000	0.0000	0.0000	0.0000	0.0000
370	0.0000	0.0000	0.0000	0.0000	0.0000
380	0.0000	0.0000	0.0000	0.0000	0.0000
390	0.0000	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000	0.0000
410	0.0000	0.0000	0.0000	0.0000	0.0000
420	0.0000	0.0000	0.0000	0.0000	0.0000
430	0.0000	0.0000	0.0000	0.0000	0.0000
440	0.0000	0.0000	0.0000	0.0000	0.0000
450	0.0000	0.0000	0.0000	0.0000	0.0000
460	0.0000	0.0000	0.0000	0.0000	0.0000
470	0.0000	0.0000	0.0000	0.0000	0.0000
480	0.0000	0.0000	0.0000	0.0000	0.0000
490	0.0000	0.0000	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000	0.0000	0.0000
510	0.0000	0.0000	0.0000	0.0000	0.0000
520	0.0000	0.0000	0.0000	0.0000	0.0000
530	0.0000	0.0000	0.0000	0.0000	0.0000
540	0.0000	0.0000	0.0000	0.0000	0.0000
550	0.0000	0.0000	0.0000	0.0000	0.0000
560	0.0000	0.0000	0.0000	0.0000	0.0000
570	0.0000	0.0000	0.0000	0.0000	0.0000
580	0.0000	0.0000	0.0000	0.0000	0.0000
590	0.0000	0.0000	0.0000	0.0000	0.0000
600	0.0000	0.0000	0.0000	0.0000	0.0000
610	0.0000	0.0000	0.0000	0.0000	0.0000
620	0.0000	0.0000	0.0000	0.0000	0.0000
630	0.0000	0.0000	0.0000	0.0000	0.0000
640	0.0000	0.0000	0.0000	0.0000	0.0000
650	0.0000	0.0000	0.0000	0.0000	0.0000
660	0.0000	0.0000	0.0000	0.0000	0.0000
670	0.0004	0.0000	0.0000	0.0000	0.0000
680	0.0007	0.0002	0.0001	0.0000	0.0000
690	0.0018	0.0009	0.0000	0.0000	0.0000
700	0.0077	0.0030	0.0005	0.0003	0.0000
710	0.0442	0.0101	0.0013	0.0009	0.0000
720	0.3275	0.0376	0.0031	0.0015	0.0000
730	2.2472	0.1592	0.0098	0.0032	0.0002
740	10.5080	0.7280	0.0307	0.0072	0.0012
750	29.0722	3.0960	0.1086	0.0157	0.0027
760	51.8232	10.6371	0.4526	0.0369	0.0068
770	69.4321	26.6427	1.9824	0.0970	0.0171

Thickness / λ (nm)	IR 760 2 mm	IR 780 2 mm	IR 800 2 mm	IR 830 2 mm	IR 850 2 mm
780	79.7256	48.2896	7.6947	0.2974	0.0492
790	85.0205	67.2525	22.5551	1.0542	0.1594
800	87.2329	78.5140	45.4619	4.0645	0.6663
810	88.5452	84.4626	66.3525	12.8650	2.4182
820	89.2392	87.2328	79.1887	31.6526	8.3092
830	89.6033	88.4851	85.3754	55.5698	22.6570
840	89.8168	89.0857	88.0733	73.4826	44.7722
850	89.9505	89.3974	89.2364	82.6197	65.1354
900	90.1374	89.7623	90.2244	89.4835	89.5478
950	90.1038	89.7548	90.2498	89.7727	90.0733
1000	90.0640	89.7309	90.2256	89.8732	90.0825
1050	90.0458	89.7218	90.2172	89.9461	90.0867
1065	90.0412	89.7267	90.2296	89.9741	90.0950
1100	90.0297	89.7210	90.2125	89.9932	90.0823
1200	90.0455	89.7850	90.2498	90.0763	90.0983
1300	90.1128	89.9130	90.3200	90.1694	90.1668
1400	90.0637	89.8891	90.2291	90.0781	90.0842
1500	90.0739	89.8976	90.2394	90.1171	90.0773
1600	90.0584	89.8878	90.1975	90.0862	90.0403
1700	89.9494	89.7934	90.0357	89.9524	89.8801
1800	89.8532	89.7060	89.8660	89.8119	89.7151
1900	89.8270	89.6901	89.7798	89.7352	89.6294
2000	89.7547	89.6315	89.6218	89.6282	89.4933
2100	89.6303	89.5634	89.4087	89.4730	89.3342
2200	89.0851	89.1463	88.6343	88.7949	88.5821
2300	88.6549	88.7825	88.0882	88.2936	88.0413
2400	87.9196	88.1165	87.2205	87.5226	87.2166
2500	87.3572	87.6231	86.5682	86.9355	86.5923
2600	86.3652	86.6786	85.4163	85.9193	85.4898
2700	84.1311	84.7950	82.5771	83.3187	82.6670
2800	47.7287	53.3650	39.1073	42.1008	39.0116
2900	38.1028	44.4577	28.5461	31.4715	28.4533
3000	33.1407	39.7151	23.3713	26.1749	23.2768
3100	30.0827	36.7236	20.1953	23.0001	20.1952
3200	28.1914	34.7714	18.2865	21.1950	18.4540

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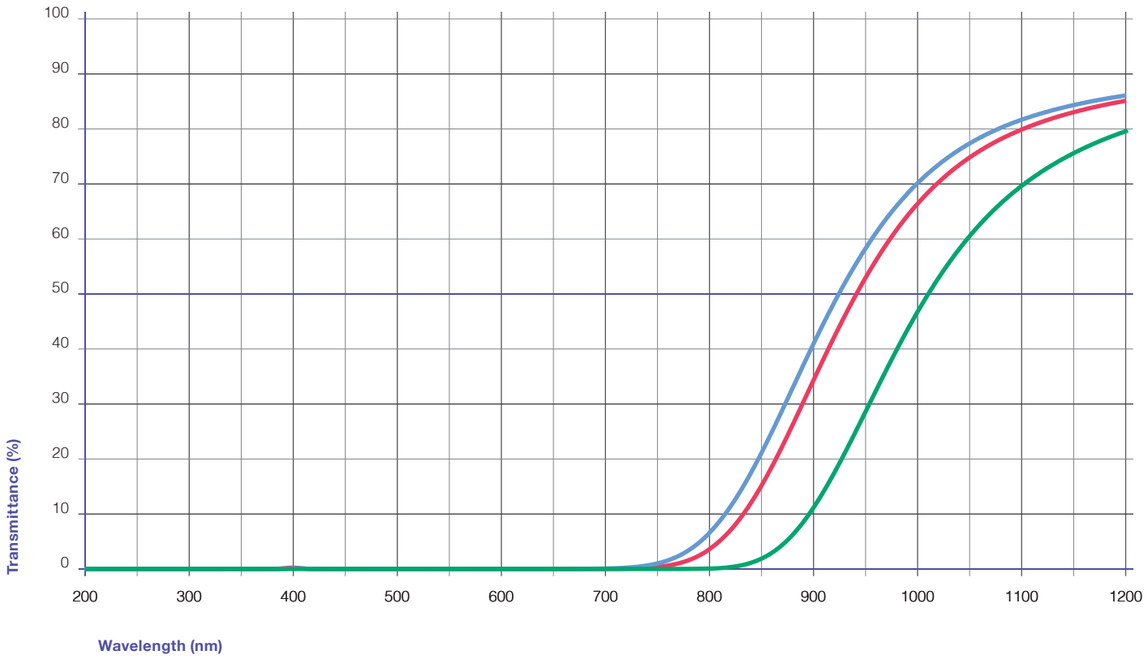
HEBO	Schott	Hoya
HR 01		≈ RM-86
HR 02	≈ RG 7	≈ RM-90
HR 03		

Glass Characteristics – Infrared

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
HR 01	2 mm	1.525	2.53	1	3	3	1	3	3	1	1
HR 02	1 mm	1.525	2.53	1	3	3	1	3	3	1	1
HR 03	2 mm	1.525	2.53	1	3	3	1	3	3	1	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
HR 01	2 mm	0.612	0.260	0.2	0.325	0.111	0.1
HR 02	1 mm						
HR 03	2 mm						

HEBO
HR 01
HR 02
HR 03



Thickness	HR 01 2 mm	HR 02 1 mm	HR 03 2 mm
λ (nm)			
190	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000
220	0.0000	0.0000	0.0000
230	0.0000	0.0000	0.0000
240	0.0000	0.0000	0.0000
250	0.0000	0.0000	0.0000
260	0.0000	0.0000	0.0000
270	0.0000	0.0000	0.0000
280	0.0000	0.0000	0.0000
290	0.0001	0.0000	0.0000
300	0.0000	0.0000	0.0000
310	0.0000	0.0000	0.0000
320	0.0000	0.0000	0.0000
330	0.0030	0.0019	0.0000
340	0.0146	0.0029	0.0000
350	0.0067	0.0001	0.0000
360	0.0021	0.0000	0.0000
370	0.0025	0.0000	0.0000
380	0.0146	0.0009	0.0000
390	0.1100	0.0195	0.0002
400	0.2312	0.1048	0.0000
410	0.0729	0.0709	0.0000
420	0.0041	0.0091	0.0000
430	0.0000	0.0003	0.0000
440	0.0000	0.0000	0.0000
450	0.0000	0.0000	0.0000
460	0.0000	0.0000	0.0000
470	0.0000	0.0000	0.0000
480	0.0000	0.0000	0.0000
490	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000
510	0.0000	0.0000	0.0000
520	0.0000	0.0000	0.0000
530	0.0000	0.0000	0.0000
540	0.0000	0.0000	0.0000
550	0.0000	0.0000	0.0000
560	0.0000	0.0000	0.0000
570	0.0000	0.0000	0.0000
580	0.0000	0.0000	0.0000
590	0.0000	0.0000	0.0000
600	0.0000	0.0001	0.0000
610	0.0000	0.0009	0.0000
620	0.0000	0.0013	0.0000
630	0.0000	0.0025	0.0000
640	0.0002	0.0042	0.0000
650	0.0006	0.0067	0.0000
660	0.0012	0.0107	0.0000
670	0.0025	0.0185	0.0000
680	0.0051	0.0314	0.0000
690	0.0084	0.0466	0.0000
700	0.0161	0.0789	0.0000
710	0.0314	0.1355	0.0000
720	0.0593	0.2311	0.0000
730	0.1116	0.3862	0.0000
740	0.2037	0.6347	0.0000
750	0.3598	1.0090	0.0001
760	0.6130	1.5605	0.0015
770	1.0074	2.3393	0.0058

Thickness	HR 01 2 mm	HR 02 1 mm	HR 03 2 mm
λ (nm)			
780	1.5948	3.3988	0.0157
790	2.4333	4.7963	0.0393
800	3.6227	6.5932	0.0628
810	5.1144	8.7403	0.1692
820	7.0105	11.2989	0.3550
830	9.3228	14.2349	0.6775
840	12.0461	17.5354	1.1953
850	15.1482	21.1055	1.9688
900	34.3208	40.9713	11.4445
950	52.9843	58.3290	28.9785
1000	66.4658	70.2274	47.1146
1050	74.9311	77.4924	60.7510
1065	76.7413	79.0339	63.8879
1100	80.0180	81.8119	69.8007
1200	85.2698	86.2315	79.6644
1300	87.7649	88.3143	84.3542
1400	89.0228	89.3725	86.9238
1500	89.7931	89.9917	88.4245
1600	90.2184	90.3817	89.3459
1700	90.3418	90.5414	89.8812
1800	90.2054	90.5604	90.1950
1900	90.0170	90.5277	90.4049
2000	89.6840	90.4489	90.4501
2100	89.3659	90.3139	90.4827
2200	88.0422	89.6167	89.9992
2300	87.5929	89.4227	89.9702
2400	87.0535	89.1680	89.8536
2500	85.7796	88.4362	89.2895
2600	84.7559	87.8916	88.8678
2700	81.7594	86.2084	87.5005
2800	43.9782	59.3568	63.4777
2900	37.9113	54.6869	61.3993
3000	37.8524	54.8968	62.3380
3100	35.2010	53.2074	60.9531
3200	29.6639	48.9511	57.2334

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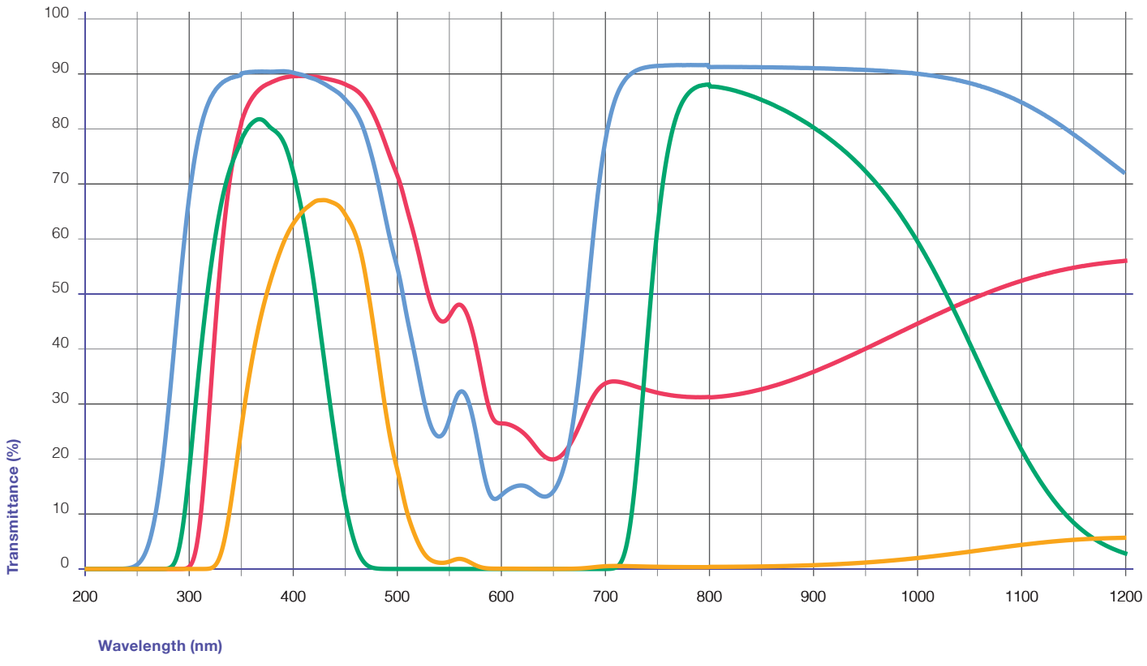
HEBO	Schott	Hoya
B 01		
B 02		≈ B-410
B 03		
B 05		≈ B-440

Glass Characteristics – Blue

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
B 01	2 mm	1.52	2.51	477	550	93	1	3	3	0	1
B 02	2 mm	1.52	2.51	477	550	93	1	3	3	0	1
B 03	2 mm	1.52	2.51	525	577	91	1	3	3	0	1
B 05	2 mm	1.52	2.52	477	550	93	1	2	3	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
B 01	2 mm	0.354	0.379	44.8	0.235	0.258	49.0
B 02	2 mm	0.322	0.334	28.8	0.210	0.206	32.6
B 03	2 mm	0.159	0.042	0.80	0.156	0.028	1.8
B 05	2 mm	0.143	0.106	2.80	0.146	0.146	5.2

HEBO
B 01
B 02
B 03
B 05



Thickness	B 01	B 02	B 03	B 05
λ (nm)	2 mm	2 mm	2 mm	2 mm
190	0.0012	0.0000	0.0000	0.0000
200	0.0100	0.0001	0.0000	0.0000
210	0.0117	0.0002	0.0000	0.0000
220	0.0092	0.0010	0.0000	0.0000
230	0.0072	0.0115	0.0000	0.0000
240	0.0071	0.1127	0.0000	0.0001
250	0.0057	0.8678	0.0000	0.0000
260	0.0046	4.2294	0.0000	0.0000
270	0.0043	13.3762	0.0002	0.0000
280	0.0036	29.9516	0.1452	0.0000
290	0.0049	50.5471	4.0572	0.0001
300	0.5136	68.4990	18.9394	0.0000
310	8.9282	79.9511	38.4398	0.0000
320	32.2964	85.8826	54.5887	0.1140
330	56.7496	88.5293	66.2535	2.8037
340	72.6917	89.6775	73.4483	12.5131
350	81.4859	90.4576	78.2249	26.0855
360	85.6655	90.7420	81.1078	38.1139
370	87.6707	90.8067	81.6261	47.1800
380	88.6345	90.7777	79.8972	53.9260
390	89.3108	90.8581	77.6462	59.3178
400	89.5947	90.5841	71.7053	63.0196
410	89.6249	90.0942	62.7698	65.4039
420	89.5070	89.4535	50.9120	66.8836
430	89.1955	88.5306	36.7774	67.1930
440	88.7602	87.3595	23.1085	66.5525
450	88.0671	85.6922	11.3884	64.4617
460	87.0399	83.3661	3.9296	60.6869
470	84.9091	78.9351	0.7450	52.4710
480	81.2465	71.8282	0.0807	40.0971
490	76.2469	62.9157	0.0064	27.0780
500	71.2598	55.0132	0.0004	17.8383
510	64.5982	45.3880	0.0000	9.7597
520	57.2768	36.1044	0.0000	4.6811
530	49.3597	27.4291	0.0000	1.8987
540	45.2595	24.1857	0.0000	1.1426
550	46.1406	27.2179	0.0000	1.3560
560	48.0266	32.2555	0.0000	1.8350
570	44.3436	29.6756	0.0000	1.1753
580	35.8297	20.6433	0.0000	0.3280
590	27.9039	13.3799	0.0000	0.0714
600	26.4667	13.4367	0.0000	0.0552
610	26.0326	14.7948	0.0000	0.0538
620	24.8359	15.2372	0.0000	0.0431
630	22.7701	14.4271	0.0000	0.0265
640	20.5922	13.2558	0.0000	0.0152
650	19.9423	14.0815	0.0000	0.0131
660	21.2015	18.2661	0.0000	0.0208
670	24.2657	27.6310	0.0000	0.0524
680	28.4497	43.7960	0.0000	0.1522
690	32.0450	63.0403	0.0000	0.3402
700	33.8004	77.7505	0.0042	0.4987
710	34.0844	85.7737	0.3202	0.5464
720	33.6905	89.4477	4.5573	0.5217
730	33.0927	90.9797	19.6195	0.4758
740	32.5181	91.5820	42.4790	0.4319
750	32.0265	91.8293	63.0353	0.3959
760	31.6646	91.9197	76.4274	0.3694
770	31.4184	91.9776	83.4994	0.3502

Thickness	B 01	B 02	B 03	B 05
λ (nm)	2 mm	2 mm	2 mm	2 mm
780	31.2735	91.9957	86.6573	0.3384
790	31.2271	91.9741	87.8460	0.3316
800	31.2023	91.6330	87.7251	0.3851
810	31.3485	91.6441	87.5537	0.3872
820	31.5745	91.6333	87.1598	0.3963
830	31.8807	91.6288	86.6272	0.4121
840	32.2563	91.6034	85.9942	0.4291
850	32.7096	91.5869	85.2534	0.4564
900	35.8972	91.4300	80.2029	0.6905
950	40.1070	91.1036	72.1905	1.1708
1000	44.6603	90.4104	59.3306	1.9917
1050	48.9526	88.7620	40.8379	3.1380
1065	50.1112	87.9541	34.7508	3.5194
1100	52.4403	85.2779	21.4311	4.3786
1200	56.0529	72.3462	2.7700	5.6856
1300	59.0226	64.6741	0.6961	7.0548
1400	64.5311	66.8266	0.6396	11.5524
1500	65.8004	62.1162	0.4546	12.4975
1600	69.7420	65.0906	0.6729	17.6090
1700	71.8344	65.4917	0.8048	20.9736
1800	73.4554	66.1864	0.7721	24.3981
1900	77.5213	72.4850	1.6173	34.8933
2000	80.7118	77.7696	3.9815	46.1619
2100	82.5178	80.6228	7.3550	54.3805
2200	82.8811	81.7137	11.6799	60.4157
2300	83.4298	82.7554	18.1043	65.5613
2400	83.6163	83.0940	25.4047	68.8959
2500	82.8408	82.1647	31.0579	69.8526
2600	81.9277	81.0118	34.3634	69.8065
2700	79.4769	78.2920	32.6751	68.0201
2800	53.3799	50.8340	7.6042	43.3458
2900	49.1771	45.6252	9.0073	39.8747
3000	45.4885	41.7701	11.9655	37.1199
3100	38.9714	35.5854	15.2787	31.9859
3200	31.9420	28.9458	19.2392	26.4268

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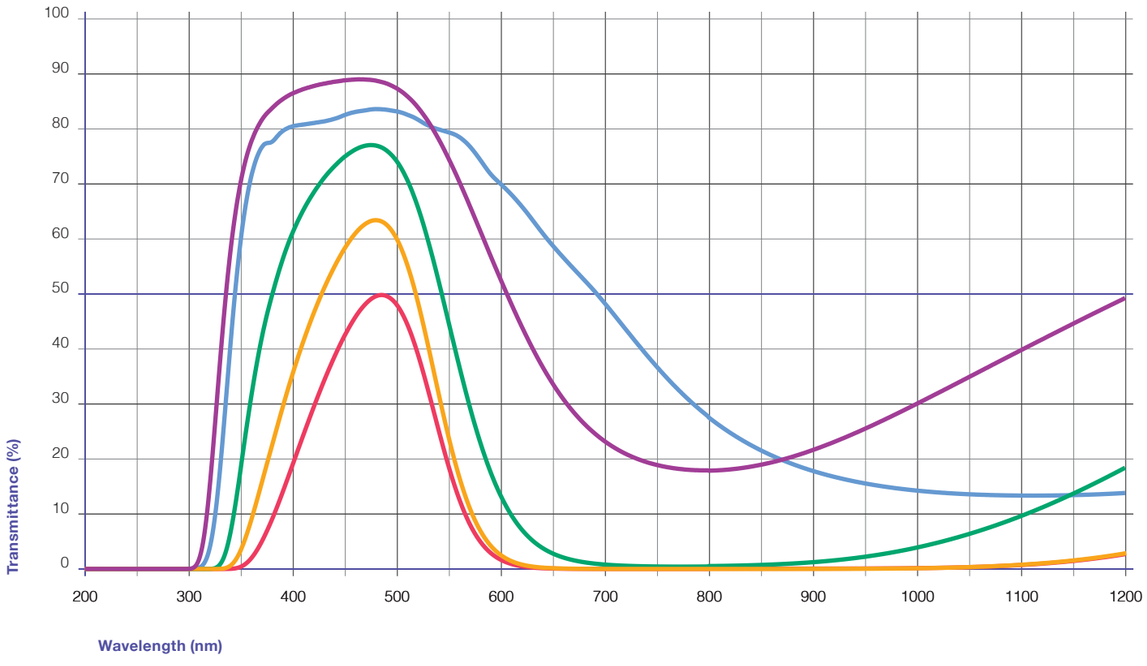
HEBO	Schott	Hoya
B 09		
B 10		
B 11		≈ B-460
B 13		
B 14	≈ BG 14	

Glass Characteristics – Blue

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
B 09	2 mm	1.524	2.56	460	532	89	1	2	3	0	1
B 10	1 mm	1.529	2.63	540	606	84	1	2	4	0	1
B 11	2 mm	1.517	2.59	506	572	91	1	2	3	0	1
B 13	2 mm	1.522	2.61	490	555	90	1	2	3	0	1
B 14	1 mm	1.514	2.57	477	550	93	1	2	3	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
B 09	2 mm	0.187	0.391	14.8	0.156	0.256	20.3
B 10	1 mm	0.409	0.417	74.4	0.283	0.324	76.6
B 11	2 mm	0.269	0.406	36.2	0.194	0.271	44.2
B 13	2 mm	0.189	0.377	17.3	0.157	0.242	23.7
B 14	1 mm	0.328	0.412	52.0	0.226	0.290	59.1

HEBO
- B 09
- B 10
- B 11
- B 13
- B 14



Thickness	B 09 2 mm	B 10 1 mm	B 11 2 mm	B 13 2 mm	B 14 1 mm
λ (nm)					
190	0.0000	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0022	0.0000	0.0062
210	0.0000	0.0002	0.0023	0.0000	0.0067
220	0.0000	0.0005	0.0014	0.0000	0.0048
230	0.0000	0.0000	0.0011	0.0000	0.0034
240	0.0000	0.0001	0.0013	0.0000	0.0035
250	0.0000	0.0000	0.0009	0.0000	0.0024
260	0.0000	0.0000	0.0005	0.0000	0.0017
270	0.0000	0.0000	0.0004	0.0001	0.0017
280	0.0000	0.0000	0.0002	0.0000	0.0011
290	0.0002	0.0001	0.0004	0.0000	0.0013
300	0.0000	0.0038	0.0003	0.0000	0.0336
310	0.0000	0.3028	0.0000	0.0000	2.3056
320	0.0000	4.3729	0.0188	0.0000	16.3114
330	0.0000	19.6401	1.0172	0.0285	39.4633
340	0.0310	42.4107	7.2532	0.7310	59.0817
350	0.4689	61.2129	19.4299	3.8249	71.4062
360	2.1000	72.1527	32.2255	9.4265	78.3090
370	5.1839	77.1087	42.6548	16.1796	82.1049
380	9.3320	78.0688	50.3878	23.0477	84.2223
390	14.2185	79.9940	56.7341	29.8390	85.8052
400	19.4353	80.8427	61.7379	36.1349	86.8840
410	24.6811	81.1379	65.6760	41.8300	87.6294
420	29.7766	81.4126	68.8653	46.9335	88.1678
430	34.5736	81.7235	71.5042	51.4419	88.6015
440	38.9628	82.2005	73.6274	55.3546	88.9491
450	42.8450	82.9034	75.3560	58.6839	89.2066
460	46.0877	83.4441	76.6076	61.2924	89.3544
470	48.4870	83.7437	77.2948	62.9947	89.3412
480	49.8280	83.9470	77.2675	63.5322	89.1202
490	49.7963	83.8214	76.3521	62.6105	88.6054
500	48.0973	83.5047	74.2968	59.8401	87.6697
510	44.5008	82.8992	70.8639	55.0133	86.2403
520	39.1212	82.0142	65.9778	48.2788	84.2349
530	32.3972	80.9370	59.6823	40.1255	81.6279
540	25.2232	80.2411	52.4216	31.5109	78.4205
550	18.3909	79.6766	44.5813	23.3267	74.6835
560	12.6012	78.8148	36.7938	16.3244	70.5969
570	8.1290	77.1076	29.4884	10.8139	66.2042
580	4.9834	74.6514	23.0453	6.8312	61.6647
590	2.9186	72.0789	17.6163	4.1415	57.1018
600	1.6519	70.2123	13.2389	2.4365	52.6463
610	0.9049	68.3234	9.7934	1.3916	48.3183
620	0.4854	66.1621	7.1737	0.7794	44.2049
630	0.2571	63.7635	5.2257	0.4314	40.3756
640	0.1367	61.2860	3.8132	0.2390	36.8793
650	0.0736	58.9816	2.8028	0.1340	33.7485
660	0.0404	56.8329	2.0876	0.0766	30.9848
670	0.0230	54.7818	1.5844	0.0454	28.5873
680	0.0138	52.7681	1.2290	0.0280	26.5255
690	0.0086	50.7016	0.9785	0.0180	24.7723
700	0.0055	48.4608	0.8006	0.0120	23.2857
710	0.0039	46.1194	0.6750	0.0083	22.0431
720	0.0026	43.7496	0.5854	0.0060	21.0190
730	0.0020	41.4046	0.5223	0.0047	20.1842
740	0.0017	39.1043	0.4793	0.0038	19.5157
750	0.0015	36.9081	0.4506	0.0032	18.9864
760	0.0010	34.8079	0.4342	0.0027	18.5890
770	0.0011	32.8495	0.4280	0.0027	18.2954

Thickness	B 09 2 mm	B 10 1 mm	B 11 2 mm	B 13 2 mm	B 14 1 mm
λ (nm)					
780	0.0010	31.0111	0.4298	0.0025	18.1117
790	0.0009	29.3199	0.4383	0.0027	18.0162
800	0.0581	27.6601	0.5304	0.0013	17.9492
810	0.0566	26.2443	0.5544	0.0000	18.0243
820	0.0558	24.9374	0.5857	0.0027	18.1658
830	0.0586	23.7539	0.6277	0.0022	18.3802
840	0.0584	22.6683	0.6761	0.0037	18.6649
850	0.0596	21.6763	0.7352	0.0054	19.0172
900	0.0625	17.9100	1.2318	0.0116	21.7027
950	0.0864	15.6298	2.2189	0.0376	25.5635
1000	0.1547	14.3170	3.8945	0.1283	30.1277
1050	0.3266	13.6427	6.3463	0.3374	34.9793
1065	0.4182	13.5353	7.2381	0.4385	36.4472
1100	0.7142	13.4024	9.6098	0.7707	39.8846
1200	2.6783	13.8634	18.3868	2.8402	49.3691
1300	7.0813	15.7992	29.0742	7.3685	57.8768
1400	14.1276	19.8703	40.0101	14.5340	64.9948
1500	23.0421	26.1322	50.0409	23.5733	70.7146
1600	32.6446	32.7597	58.5902	33.2660	75.1607
1700	41.8904	36.8591	65.4958	42.5599	78.5622
1800	50.0979	37.9785	70.9141	50.7631	81.1274
1900	57.0939	38.0806	75.1282	57.6936	83.1229
2000	62.7514	38.7974	78.3038	63.2196	84.4768
2100	67.3985	40.5794	80.7770	67.6831	85.5769
2200	70.2439	42.9270	82.1362	70.2541	85.9679
2300	73.0999	45.5367	83.6201	72.9120	86.4538
2400	75.2171	47.5066	84.6653	74.8215	86.8243
2500	76.0823	48.5868	84.9417	75.4476	86.7079
2600	76.8313	49.3472	85.2371	75.9140	86.7118
2700	75.3053	49.0626	84.0877	73.9488	85.7488
2800	38.6079	32.8354	57.9841	39.7474	68.6805
2900	31.7667	34.1104	54.1914	35.4699	65.6170
3000	31.6410	36.0930	54.9376	34.7572	63.4221
3100	30.3481	37.3355	53.8288	31.6017	58.5954
3200	26.6101	37.7189	50.6737	26.2530	52.6448

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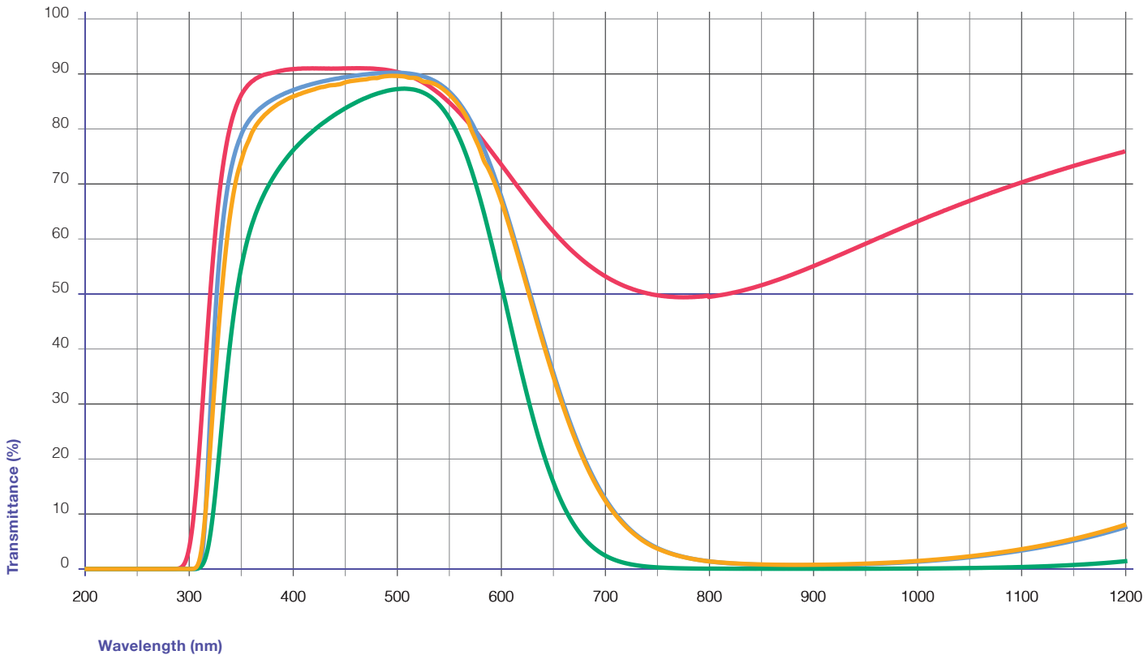
HEBO	Schott	Hoya
B 15		
B 38	≈ BG 38	
B 39	≈ BG 39	
B 40	≈ BG 40	

Glass Characteristics – Blue

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
B 15	1 mm	1.518	2.5	490	555	90	1	3	4	0	1
B 38	1 mm	1.535	2.86	421	463	100	1	3	3	0	1
B 39	1 mm	1.550	2.75	417	489	94	1	3	3	0	1
B 40	1 mm	1.540	2.75	419	492	95	1	3	3	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
B 15	1 mm	0.400	0.413	75.2	0.274	0.315	78.3
B 38	1 mm	0.345	0.439	62.1	0.244	0.326	68.8
B 39	1 mm	0.364	0.431	66.0	0.255	0.321	73.0
B 40	1 mm	0.404	0.422	77.0	0.282	0.327	82.0

HEBO
B 15
B 38
B 39
B 40



Thickness λ (nm)	B 15 1 mm	B 38 1 mm	B 39 1 mm	B 40 1 mm
190	0.0052	0.0000	0.0000	0.0000
200	0.0161	0.0000	0.0000	0.0000
210	0.0178	0.0000	0.0000	0.0000
220	0.0136	0.0000	0.0000	0.0000
230	0.0100	0.0000	0.0000	0.0000
240	0.0097	0.0000	0.0000	0.0000
250	0.0075	0.0000	0.0000	0.0000
260	0.0059	0.0000	0.0000	0.0000
270	0.0054	0.0003	0.0000	0.0002
280	0.0047	0.0003	0.0000	0.0000
290	0.1260	0.0011	0.0001	0.0004
300	4.2549	0.0016	0.0002	0.0021
310	23.4964	0.7267	0.3137	2.1337
320	50.6196	29.8435	6.6774	22.7302
330	70.6181	59.8283	24.6225	48.7618
340	81.4580	73.0801	43.0526	65.9193
350	86.6263	79.2314	55.3704	74.6066
360	88.9963	82.3007	62.8018	79.5693
370	90.0980	84.1123	67.5996	82.2754
380	90.5971	85.3779	71.1371	83.9885
390	91.0254	86.3600	73.9485	85.2071
400	91.2611	87.1286	76.2792	86.1143
410	91.3749	87.7536	78.1990	86.8156
420	91.3700	88.2959	79.8750	87.3847
430	91.3700	88.7381	81.3544	87.8758
440	91.3488	89.1211	82.6728	88.1815
450	91.3822	89.4480	83.8336	88.6667
460	91.4093	89.7197	84.8473	89.0004
470	91.3906	89.9527	85.7231	89.2230
480	91.2934	90.1187	86.4271	89.4292
490	91.0951	90.2092	86.9681	89.7966
500	90.7235	90.2229	87.2651	89.8174
510	90.1323	90.0999	87.2885	89.5394
520	89.3161	89.7932	86.9313	89.3074
530	88.2158	89.1893	86.0162	88.6717
540	86.8348	88.1802	84.3675	87.9249
550	85.1742	86.6629	81.7449	86.4156
560	83.2913	84.4456	77.9733	84.2016
570	81.1401	81.4464	72.8999	80.4682
580	78.8194	77.5833	66.5952	75.9920
590	76.3760	72.8479	59.2285	71.8618
600	73.8755	67.3565	51.1986	66.8806
610	71.3258	61.2524	42.8942	60.8555
620	68.7885	54.7523	34.8200	54.3407
630	66.3013	48.1041	27.3841	47.6739
640	63.9162	41.5649	20.8941	41.1524
650	61.6872	35.3301	15.4811	34.9436
660	59.6366	29.5416	11.1375	29.1824
670	57.7802	24.3436	7.8118	24.0176
680	56.1460	19.7570	5.3440	19.4774
690	54.7095	15.8450	3.5847	15.6232
700	53.4743	12.5676	2.3618	12.3948
710	52.4215	9.8956	1.5411	9.7657
720	51.5608	7.7538	0.9998	7.6600
730	50.8782	6.0740	0.6495	6.0034
740	50.3629	4.7649	0.4246	4.6796
750	49.9900	3.7603	0.2819	3.7051
760	49.7385	2.9909	0.1901	2.9752
770	49.6206	2.4097	0.1318	2.4057
780	49.6045	1.9637	0.0930	1.9710
790	49.6994	1.6284	0.0686	1.6329
800	49.6714	1.3523	0.0688	1.3829
810	49.9576	1.1586	0.0556	1.2056
820	50.2985	1.0113	0.0507	1.0669
830	50.7156	0.9057	0.0481	0.9607
840	51.2078	0.8225	0.0422	0.8816
850	51.7583	0.7636	0.0422	0.8269
900	55.2276	0.6924	0.0364	0.7627
950	59.2949	0.8808	0.0498	0.9702
1000	63.3823	1.3359	0.0837	1.4547
1050	67.1183	2.1317	0.1710	2.2962
1065	68.1715	2.4578	0.2145	2.6355
1100	70.5081	3.3736	0.3565	3.5964
1200	76.1970	7.6380	1.4276	8.0498
1300	80.5628	15.2801	4.6102	15.9085
1400	83.7035	26.4067	11.5455	27.1695
1500	85.9746	39.0197	22.2430	39.7628
1600	87.4994	51.2458	34.9940	51.8774
1700	88.5335	60.9031	47.0626	61.4479
1800	89.2154	67.6089	56.8661	68.0442
1900	89.6022	72.0279	64.1728	72.2762
2000	89.8272	74.5140	69.1710	74.7082
2100	89.9765	75.7094	72.3609	75.9103
2200	89.5547	73.3809	71.8879	73.5737
2300	89.5213	72.0632	72.1233	72.3269
2400	89.3640	72.1436	73.2429	72.3436
2500	88.7847	68.9582	71.1460	69.2356
2600	88.3086	61.1222	64.8252	61.4725
2700	86.8988	54.4415	59.2341	54.9741
2800	66.0963	9.0626	12.2725	9.2337
2900	63.3317	0.7010	1.3248	0.7464
3000	62.3010	0.3104	0.7344	0.3622
3100	59.2097	0.1131	0.5091	0.2449
3200	54.2816	0.0000	0.4473	0.2268

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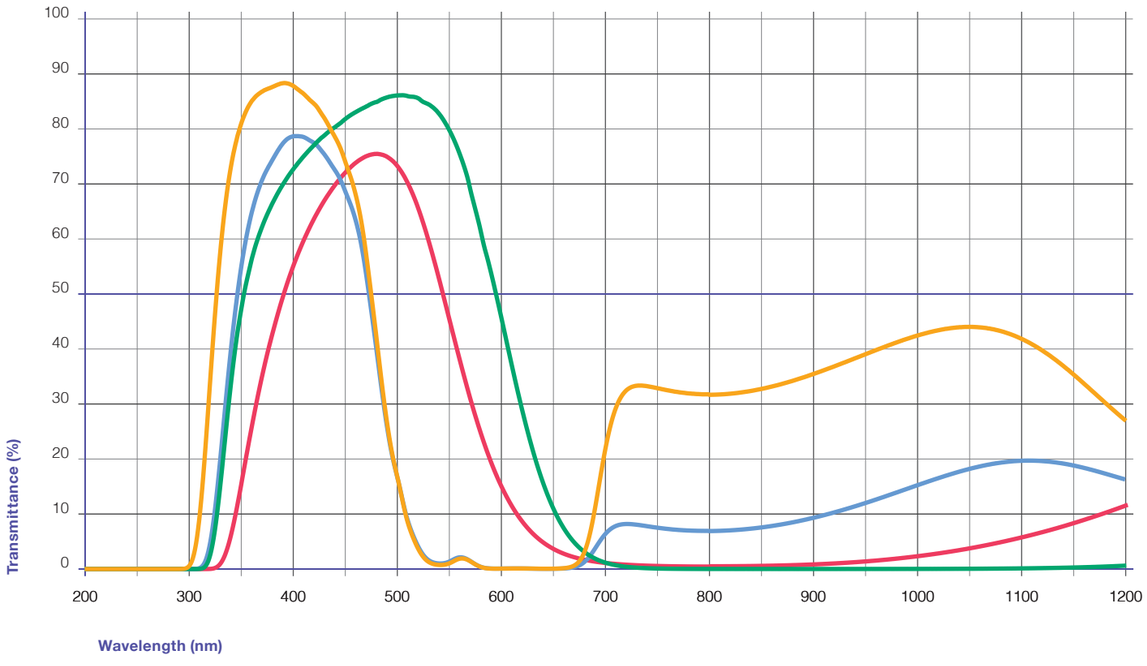
HEBO	Schott	Hoya
B 07	≈ BG 7	≈ B-480
B 12	≈ BG 12	
B 18	≈ BG 18	
B 25	≈ BG 25	≈ B-380

Glass Characteristics – Blue

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
B 07	1 mm	1.517	2.56	477	550	93	1	2	3	0	1
B 12	1 mm	1.513	2.56	477	550	93	4	3	3	0	1
B 18	1 mm	1.536	2.82	549	624	74	4	4	4	0	1
B 25	1 mm	1.517	2.56	477	550	93	1	2	3	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
B 07	1 mm	0.306	0.440	10.0	0.207	0.229	51.2
B 12	1 mm	0.148	0.084	1.4	0.148	0.053	4.75
B 18	1 mm	0.375	0.452	57.2	0.266	0.356	61.8
B 25	1 mm	0.158	0.093	2.1	0.151	0.070	4.5

HEBO
B 07
B 12
B 18
B 25



Thickness / λ (nm)	B 07 1 mm	B 12 1 mm	B 18 1 mm	B 25 1 mm
190	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0000
210	0.0001	0.0000	0.0000	0.0003
220	0.0000	0.0000	0.0000	0.0001
230	0.0000	0.0000	0.0000	0.0000
240	0.0000	0.0000	0.0000	0.0000
250	0.0000	0.0000	0.0000	0.0000
260	0.0000	0.0000	0.0000	0.0000
270	0.0001	0.0000	0.0000	0.0001
280	0.0000	0.0000	0.0000	0.0000
290	0.0001	0.0002	0.0000	0.0022
300	0.0000	0.0000	0.0000	0.6815
310	0.0002	0.2018	0.0270	10.5025
320	0.0381	4.9704	2.7627	35.1425
330	1.2623	20.9750	16.2640	58.9690
340	6.8666	40.4692	34.3320	73.6742
350	16.4964	55.4835	47.7872	81.4131
360	26.7776	65.2049	56.7062	85.3442
370	35.9047	71.0934	62.5297	87.0221
380	43.5443	74.7623	66.7870	87.8608
390	50.1026	77.7418	70.1635	88.5219
400	55.6100	79.0093	72.9297	87.9668
410	60.1951	78.8468	75.2667	86.5048
420	64.0790	77.7620	77.2978	84.6957
430	67.3354	75.6428	79.0656	82.0232
440	70.0627	72.7944	80.5308	78.6260
450	72.3073	68.9084	82.0358	74.0172
460	74.0121	63.6140	83.2766	67.9512
470	75.1245	53.8280	84.2865	56.9541
480	75.4899	39.9899	85.0998	41.5856
490	74.8533	26.1350	85.9405	26.4591
500	73.0308	16.7925	86.2829	16.5667
510	69.7940	8.9144	86.1433	8.3516
520	65.1013	4.1585	85.7537	3.6172
530	59.0619	1.6414	84.6416	1.2808
540	52.0991	1.0145	82.9226	0.7460
550	44.6539	1.3497	79.8806	1.0537
560	37.2963	2.1298	75.4993	1.8900
570	30.3844	1.4970	69.0931	1.4024
580	24.2426	0.4280	61.5225	0.3759
590	18.9763	0.0935	53.8993	0.0740
600	14.6487	0.0835	45.6439	0.0726
610	11.1471	0.0992	37.0110	0.0961
620	8.4037	0.0938	28.8520	0.1006
630	6.2995	0.0676	21.6561	0.0773
640	4.7226	0.0440	15.6786	0.0530
650	3.5601	0.0465	10.9561	0.0621
660	2.7100	0.0945	7.3929	0.1506
670	2.0957	0.3195	4.8387	0.6435
680	1.6479	1.2545	3.0718	3.2144
690	1.3220	3.6041	1.9056	11.1301
700	1.0825	6.3122	1.1581	21.9787
710	0.9078	7.8165	0.6948	29.3521
720	0.7761	8.2149	0.4140	32.5460
730	0.6786	8.1037	0.2472	33.3954
740	0.6060	7.8340	0.1477	33.3152
750	0.5519	7.5556	0.0899	32.9455
760	0.5114	7.3269	0.0564	32.5566
770	0.4832	7.1481	0.0366	32.2334

Thickness / λ (nm)	B 07 1 mm	B 12 1 mm	B 18 1 mm	B 25 1 mm
780	0.4632	7.0335	0.0239	31.9991
790	0.4518	6.9745	0.0166	31.8661
800	0.5053	6.9364	0.0190	31.7479
810	0.5080	6.9699	0.0161	31.8055
820	0.5174	7.0531	0.0131	31.9386
830	0.5297	7.1827	0.0106	32.1618
840	0.5534	7.3597	0.0133	32.4454
850	0.5785	7.5753	0.0100	32.8143
900	0.8491	9.3185	0.0107	35.5373
950	1.3986	11.9959	0.0139	39.1244
1000	2.3552	15.2397	0.0247	42.5362
1050	3.7950	18.2259	0.0496	44.1147
1065	4.3344	18.8946	0.0643	43.9343
1100	5.7966	19.7521	0.1177	41.9713
1200	11.6073	16.4120	0.6139	27.1292
1300	19.5887	14.6877	2.5016	19.8732
1400	28.7629	19.6108	7.5224	24.2839
1500	38.0734	17.7696	16.5364	19.6793
1600	46.7440	22.8388	28.5987	24.1671
1700	54.3616	25.0121	41.0070	25.5060
1800	60.7351	27.5261	51.6878	27.2407
1900	65.9641	38.8144	59.9984	39.0732
2000	70.1107	50.8091	65.8547	51.9760
2100	73.4636	59.0862	69.8445	60.5936
2200	75.6782	65.2788	70.0868	66.8857
2300	77.6070	70.3624	70.7683	71.9026
2400	79.1295	73.3980	72.1022	74.6906
2500	79.9795	74.1624	70.3486	75.1566
2600	80.6193	73.7189	64.1978	74.3844
2700	80.2776	72.6153	58.9951	72.9799
2800	63.5854	56.7932	12.7418	60.7750
2900	59.6114	53.8450	1.3894	58.9670
3000	56.7573	51.9856	0.7512	57.4105
3100	51.3159	47.6976	0.4919	53.4031
3200	44.8885	42.1834	0.3901	47.8964

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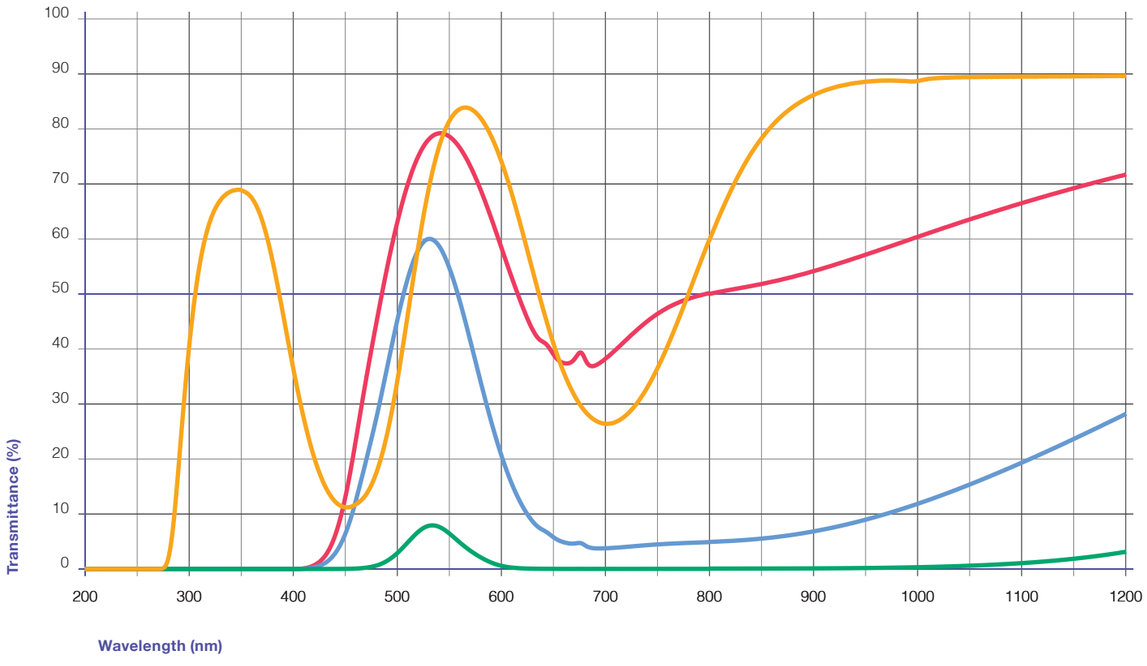
HEBO	Schott	Hoya
G 05	≈ VG 5	
G 06	≈ VG 6	
G 13		≈ G-545
G 16		

Glass Characteristics – Green

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
G 05	1 mm	1.547	2.85	458	526	104	1	2	3	0	1
G 06	2 mm	1.547	2.85	458	526	104	1	2	3	0	1
G 13	2 mm	1.527	2.53	597	663	98	1	3	3	0	1
G 16	2 mm	1.535	2.84	421	463	100	4	4	3	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
G 05	1 mm	0.455	0.477	73.4	0.362	0.476	73.5
G 06	2 mm	0.377	0.543	40.9	0.299	0.536	44.8
G 13	2 mm	0.352	0.568	15.2	0.284	0.554	16.9
G 16	2 mm	0.484	0.476	74.0	0.405	0.483	70.2

HEBO
G 05
G 06
G 13
G 16



Thickness	G 05	G 06	G 13	G 16
λ (nm)	1 mm	2 mm	2 mm	2 mm
190	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0010
210	0.0000	0.0000	0.0000	0.0007
220	0.0000	0.0000	0.0000	0.0003
230	0.0005	0.0001	0.0000	0.0000
240	0.0005	0.0001	0.0000	0.0000
250	0.0005	0.0003	0.0000	0.0000
260	0.0005	0.0002	0.0000	0.0003
270	0.0003	0.0002	0.0000	0.0029
280	0.0000	0.0000	0.0000	2.4072
290	0.0001	0.0000	0.0000	20.2602
300	0.0000	0.0000	0.0000	41.5359
310	0.0000	0.0000	0.0000	55.8670
320	0.0000	0.0000	0.0000	63.5871
330	0.0000	0.0000	0.0000	67.3102
340	0.0000	0.0000	0.0000	68.8308
350	0.0000	0.0000	0.0000	68.9529
360	0.0000	0.0000	0.0000	67.5289
370	0.0000	0.0000	0.0000	63.3066
380	0.0000	0.0000	0.0000	55.8727
390	0.0000	0.0000	0.0000	46.2185
400	0.0006	0.0000	0.0000	36.1782
410	0.1053	0.0396	0.0000	27.2464
420	0.7051	0.3054	0.0000	20.1469
430	2.3259	1.0517	0.0008	15.1825
440	6.1544	2.8748	0.0039	12.2659
450	13.3282	6.5470	0.0172	11.2300
460	23.6783	12.5634	0.0722	11.7860
470	34.8944	19.9885	0.2408	13.6493
480	45.2502	27.8838	0.6415	17.7542
490	54.9405	36.7456	1.4903	24.6522
500	63.3856	45.5548	2.9411	34.5823
510	70.2174	53.0606	4.8807	46.6110
520	75.2239	58.1716	6.7855	58.8305
530	78.2627	60.1219	7.8599	69.3232
540	79.3847	58.8220	7.6669	76.9812
550	78.7623	54.7208	6.4267	81.6820
560	76.6944	48.6989	4.8050	83.8144
570	73.3601	41.5257	3.3217	83.8492
580	69.0238	34.0348	2.1099	82.1281
590	63.9479	26.8966	1.1734	78.8601
600	58.4744	20.6120	0.5646	74.1862
610	53.0071	15.4580	0.2473	68.2787
620	47.8989	11.4869	0.1067	61.4967
630	43.5605	8.6390	0.0501	54.3171
640	41.3640	7.0831	0.0307	47.3259
650	39.0848	5.7739	0.0200	41.0243
660	37.5108	4.8626	0.0147	35.7367
670	38.1893	4.6323	0.0148	31.6539
680	38.3769	4.3426	0.0154	28.7918
690	37.0567	3.7592	0.0119	27.0909
700	38.3050	3.7668	0.0121	26.4470
710	39.9578	3.8756	0.0131	26.7873
720	41.7443	4.0228	0.0143	28.0389
730	43.4978	4.1854	0.0156	30.1202
740	45.0897	4.3393	0.0172	32.9942
750	46.4741	4.4736	0.0181	36.5610
760	47.6233	4.5823	0.0188	40.7273
770	48.5145	4.6735	0.0191	45.3300

Thickness	G 05	G 06	G 13	G 16
λ (nm)	1 mm	2 mm	2 mm	2 mm
780	49.2331	4.7508	0.0201	50.2052
790	49.7934	4.8213	0.0211	55.1982
800	50.1036	4.9257	0.0716	59.9138
810	50.5002	5.0057	0.0714	64.4927
820	50.8521	5.1035	0.0698	68.6878
830	51.1963	5.2185	0.0725	72.4252
840	51.5455	5.3581	0.0761	75.6788
850	51.9135	5.5281	0.0770	78.4208
900	54.2564	6.8386	0.1043	86.3361
950	57.2353	8.9626	0.1685	88.7642
1000	60.4876	11.8501	0.3147	88.8945
1050	63.6657	15.3529	0.5884	89.6140
1065	64.5821	16.5099	0.7031	89.6598
1100	66.5927	19.3225	1.0597	89.6622
1200	71.8314	28.1962	3.1065	89.8459
1300	75.9634	37.4109	7.1525	89.9344
1400	79.1811	46.0505	12.6248	89.9608
1500	81.6709	53.7214	18.8305	89.4617
1600	83.5189	60.1812	24.9185	89.0881
1700	84.9441	65.5306	29.8944	87.9954
1800	86.0365	69.8626	33.4161	86.4618
1900	86.8663	73.3277	36.1431	85.1517
2000	87.4412	76.0193	38.8676	83.5703
2100	87.8377	78.1251	42.0444	82.1981
2200	87.9171	79.5015	45.1359	78.8299
2300	88.0840	80.7691	48.7716	75.6196
2400	88.1526	81.6757	52.0821	74.8164
2500	87.9279	82.0865	54.5939	71.4821
2600	87.7368	82.4187	56.9279	65.2605
2700	86.9786	81.6740	57.6390	59.4155
2800	72.5096	61.2427	34.6438	24.1003
2900	70.7393	59.0595	33.3091	2.4944
3000	68.9084	56.6112	35.1489	0.5898
3100	65.6901	52.4601	34.7839	0.2679
3200	61.6254	47.4753	31.7632	0.3549

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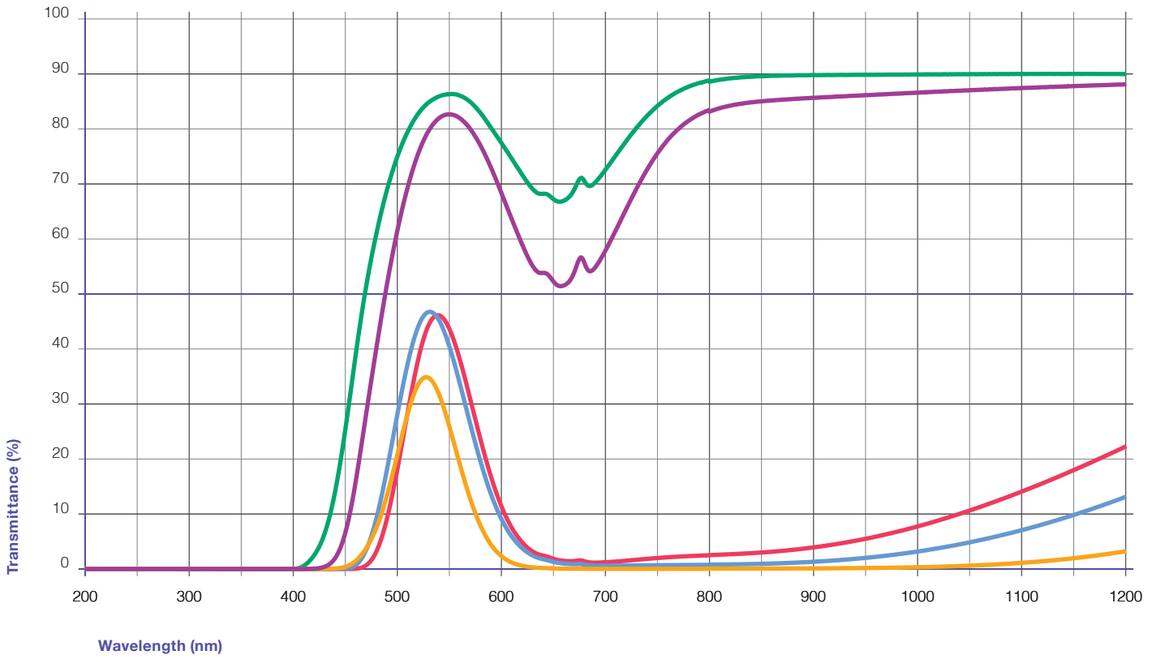
HEBO	Schott	Hoya
G 08	≈ VG 8	≈ G-533
G 09	≈ VG 9	
G 10	≈ VG 10	
G 11	≈ VG 11	
G 12		≈ G-550

Glass Characteristics – Green

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷/°C)	D_A	D_W	Bubbles	Homogeneity	Striae
G 08	2 mm	1.547	2.85	458	526	104	1	2	3	0	1
G 09	2 mm	1.524	2.52	535	599	96	1	3	3	0	1
G 10	2 mm	1.547	2.85	458	526	104	1	2	3	0	1
G 11	2 mm	1.524	2.52	535	599	96	1	2	3	0	1
G 12	2 mm	1.547	2.85	458	526	104	1	3	3	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
G 08	2 mm	0.360	0.603	25.6	0.308	0.629	28.4
G 09	2 mm	0.328	0.593	24.6	0.268	0.586	28.2
G 10	2 mm	0.462	0.452	86.7	0.353	0.429	85.2
G 11	2 mm	0.250	0.669	9.7	0.216	0.658	11.9
G 12	2 mm	0.472	0.477	79.2	0.383	0.495	77.6

HEBO
- G 08
- G 09
- G 10
- G 11
- G 12



Thickness λ (nm)	G 08 2 mm	G 09 2 mm	G 10 2 mm	G 11 2 mm	G 12 2 mm
190	0.0000	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0008	0.0000	0.0000
210	0.0000	0.0000	0.0012	0.0000	0.0005
220	0.0000	0.0000	0.0022	0.0000	0.0008
230	0.0000	0.0000	0.0029	0.0000	0.0011
240	0.0000	0.0000	0.0028	0.0000	0.0010
250	0.0000	0.0000	0.0028	0.0000	0.0011
260	0.0000	0.0000	0.0024	0.0000	0.0009
270	0.0000	0.0000	0.0017	0.0000	0.0005
280	0.0000	0.0000	0.0011	0.0000	0.0000
290	0.0000	0.0001	0.0007	0.0000	0.0001
300	0.0000	0.0000	0.0001	0.0000	0.0000
310	0.0000	0.0000	0.0003	0.0000	0.0000
320	0.0000	0.0000	0.0023	0.0000	0.0000
330	0.0000	0.0000	0.0007	0.0000	0.0000
340	0.0000	0.0000	0.0000	0.0000	0.0000
350	0.0000	0.0000	0.0000	0.0000	0.0000
360	0.0000	0.0000	0.0000	0.0000	0.0000
370	0.0000	0.0000	0.0000	0.0000	0.0000
380	0.0000	0.0000	0.0000	0.0000	0.0000
390	0.0000	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0178	0.0000	0.0000
410	0.0000	0.0000	0.6038	0.0000	0.0026
420	0.0000	0.0000	2.5700	0.0005	0.0604
430	0.0000	0.0000	6.5844	0.0107	0.4156
440	0.0000	0.0017	14.2026	0.0804	2.0018
450	0.0008	0.0634	25.7835	0.4154	6.7987
460	0.0540	0.7431	39.4279	1.5159	16.2721
470	0.6956	3.5776	51.7507	3.8526	28.5448
480	3.3468	9.5132	61.4223	7.6458	40.7411
490	9.3289	18.3112	69.2042	13.5358	52.0937
500	18.3965	28.3814	75.2516	21.0230	61.8403
510	28.8387	37.6373	79.7715	28.4855	69.7385
520	38.3014	44.2305	82.9948	33.6722	75.7712
530	44.4986	46.8304	85.0164	34.8014	79.8747
540	46.2076	45.2673	86.1078	31.7414	82.1519
550	43.6663	40.4141	86.5140	25.8283	82.8217
560	38.0905	33.6855	86.2427	18.9985	82.1073
570	30.8913	26.3207	85.0655	12.7062	80.1259
580	23.4354	19.3988	83.0203	7.7871	77.0492
590	16.7344	13.5536	80.3437	4.4011	73.0590
600	11.3635	9.0662	77.5880	2.3235	68.4472
610	7.4496	5.8748	74.6884	1.1669	63.6450
620	4.8178	3.7563	71.7787	0.5714	59.0603
630	3.1822	2.4374	69.2087	0.2849	55.1866
640	2.4376	1.7758	68.3602	0.1682	53.9354
650	1.8475	1.2885	67.3653	0.0970	52.3670
660	1.4781	0.9775	67.1025	0.0603	51.6535
670	1.4554	0.8780	69.1487	0.0483	54.0739
680	1.3880	0.7762	70.5699	0.0363	55.6202
690	1.1534	0.6180	70.3984	0.0248	54.9178
700	1.2238	0.6011	72.7606	0.0222	58.0234
710	1.3490	0.6077	75.3647	0.0209	61.7316
720	1.5028	0.6246	77.9686	0.0206	65.6045
730	1.6726	0.6458	80.4037	0.0204	69.3393
740	1.8404	0.6665	82.5573	0.0206	72.7647
750	1.9936	0.6844	84.3753	0.0205	75.7269
760	2.1292	0.6998	85.8397	0.0202	78.2045
770	2.2445	0.7127	86.9987	0.0205	80.1330

Thickness λ (nm)	G 08 2 mm	G 09 2 mm	G 10 2 mm	G 11 2 mm	G 12 2 mm
780	2.3378	0.7238	87.8713	0.0203	81.6491
790	2.4185	0.7350	88.5202	0.0209	82.8023
800	2.5294	0.7924	88.7823	0.0772	83.3245
810	2.6005	0.8092	89.1369	0.0787	83.9634
820	2.6843	0.8313	89.3860	0.0775	84.4115
830	2.7701	0.8583	89.5629	0.0792	84.7495
840	2.8776	0.8955	89.6852	0.0823	85.0089
850	2.9965	0.9366	89.7748	0.0845	85.2078
900	3.9237	1.3113	89.9827	0.1082	85.8290
950	5.4909	2.0167	90.0341	0.1681	86.3172
1000	7.7377	3.1715	90.0979	0.3098	86.7814
1050	10.6235	4.8386	90.1530	0.5980	87.2278
1065	11.6058	5.4475	90.1778	0.7248	87.3647
1100	14.0696	7.0506	90.1076	1.1104	87.5599
1200	22.2676	13.1008	90.1954	3.2089	88.2984
1300	31.3616	20.8695	90.1765	7.2654	88.7883
1400	40.3001	29.3813	90.2014	13.3417	89.0637
1500	48.5200	37.8910	90.2355	20.8715	89.4225
1600	55.5922	45.7148	90.2303	29.0881	89.5568
1700	61.4649	52.5979	90.0567	37.2360	89.5139
1800	66.1872	58.4068	89.7694	44.7658	89.3032
1900	69.9301	63.1816	89.4988	51.3955	88.9993
2000	72.7266	66.9627	89.0388	56.9792	88.5073
2100	74.8106	69.8820	88.4543	61.7109	87.8769
2200	75.7454	71.7354	87.1846	65.0149	86.5069
2300	76.8035	73.5435	86.4768	68.0266	85.7583
2400	77.4839	74.8078	85.6907	70.4616	84.9453
2500	77.3670	75.2831	84.4042	71.9295	83.5672
2600	77.1981	75.6677	83.2912	73.0639	82.3931
2700	74.8743	73.8279	80.2506	72.5440	79.0419
2800	38.9739	38.1035	46.3249	48.4774	42.4493
2900	35.1532	35.4683	42.7907	43.7491	38.9356
3000	31.7501	32.6386	39.0039	40.9179	35.2901
3100	26.9123	28.5721	33.3239	35.2153	29.8296
3200	21.7475	24.1008	27.1996	28.5345	24.0249

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HEBO	Schott	Hoya
V 01		≈ B-390
V 02	≈ BG 3	
V 03		≈ B-370

Glass Characteristics – Violet

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷/°C)	D_A	D_W	Bubbles	Homogeneity	Striae
V 01	2 mm	1.524	2.53	519	589	89	1	3	3	0	1
V 02	1 mm	1.495	2.40	551	655	58	1	2	3	0	1
V 03	2 mm	1.495	2.40	538	636	57	1	2	3	0	1

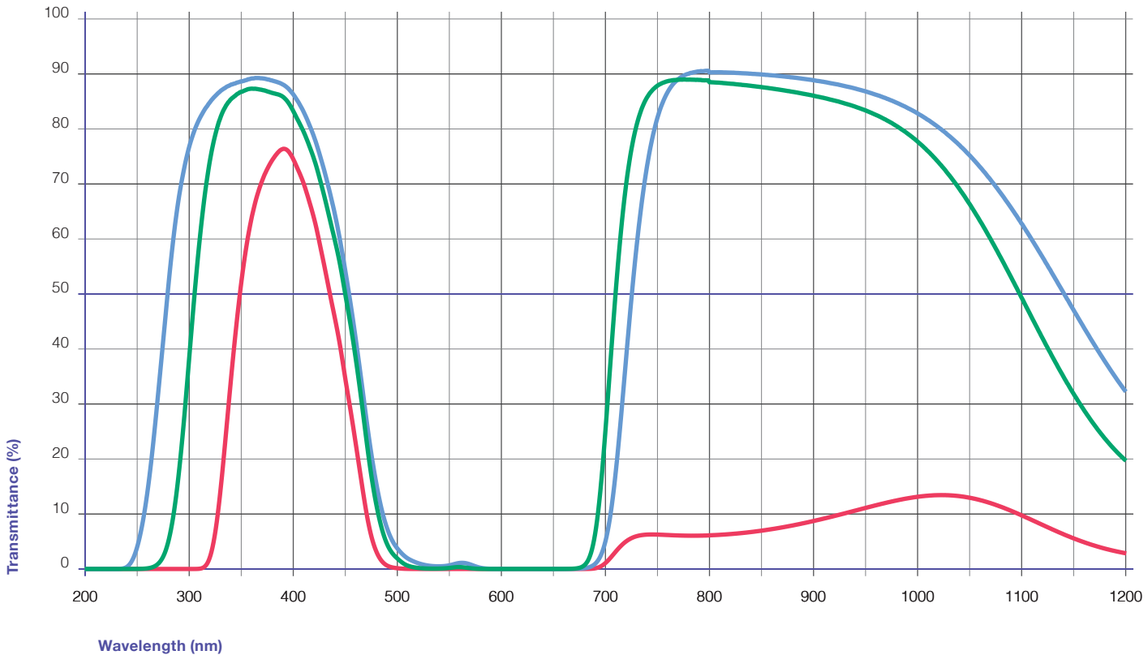
HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
V 01	2 mm	0.519	0.018	0.2	0.160	0.016	0.6
V 02	1 mm	0.152	0.034	1.0	0.154	0.027	1.4
V 03	2 mm	0.165	0.011	0.1	0.166	0.010	0.2

HEBO

V 01

V 02

V 03



Thickness λ (nm)	V 01 2 mm	V 02 1 mm	V 03 2 mm
190	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000
220	0.0000	0.0000	0.0000
230	0.0000	0.0041	0.0000
240	0.0000	0.4364	0.0002
250	0.0000	4.3714	0.0113
260	0.0000	14.9857	0.1299
270	0.0000	32.6661	1.0149
280	0.0000	52.5978	5.4408
290	0.0000	68.1918	18.2909
300	0.0000	77.2480	39.5937
310	0.0576	82.2346	60.7347
320	2.4828	85.1830	74.9928
330	15.0593	87.1471	82.4723
340	35.1773	88.2655	85.6422
350	52.7514	88.8230	86.9298
360	64.3764	89.3734	87.5088
370	70.8854	89.3816	87.2585
380	74.6628	88.9459	86.7054
390	76.5470	88.2284	85.9880
400	74.5071	86.3644	83.2846
410	70.0221	83.1223	79.4803
420	63.5834	78.4977	74.4474
430	54.7592	72.1836	67.5184
440	45.3779	64.3166	59.5664
450	34.3056	53.9391	49.6895
460	22.5036	41.4993	37.9754
470	10.2694	27.2564	23.5179
480	2.9798	15.0660	11.2849
490	0.6101	7.3530	4.4866
500	0.1308	3.6811	1.8634
510	0.0166	1.8934	0.5853
520	0.0020	1.0452	0.1866
530	0.0001	0.6022	0.0683
540	0.0000	0.4866	0.0693
550	0.0011	0.6727	0.1891
560	0.0038	1.1011	0.3387
570	0.0005	0.8187	0.1396
580	0.0000	0.2094	0.0162
590	0.0000	0.0295	0.0013
600	0.0000	0.0114	0.0017
610	0.0000	0.0112	0.0032
620	0.0000	0.0139	0.0038
630	0.0000	0.0134	0.0032
640	0.0000	0.0097	0.0020
650	0.0000	0.0081	0.0028
660	0.0000	0.0107	0.0090
670	0.0000	0.0286	0.0647
680	0.0029	0.1429	0.7277
690	0.1169	0.9273	6.3502
700	1.0862	5.0725	25.3096
710	3.1944	17.9012	50.9030
720	5.0439	38.7169	70.2543
730	5.9742	58.8776	80.9093
740	6.2618	73.4094	85.9255
750	6.2638	82.2211	88.0441
760	6.1857	86.9450	88.8710
770	6.1075	89.2283	89.1303

Thickness λ (nm)	V 01 2 mm	V 02 1 mm	V 03 2 mm
780	6.0644	90.2336	89.1504
790	6.0691	90.6427	89.1007
800	6.1345	90.4675	88.7017
810	6.2252	90.4904	88.5898
820	6.3545	90.4263	88.4121
830	6.5212	90.3345	88.2402
840	6.7288	90.2291	88.0262
850	6.9757	90.1021	87.7924
900	8.7298	89.0412	86.2278
950	11.1097	87.0207	83.5564
1000	13.1450	83.0340	77.9132
1050	12.9871	75.4244	66.5812
1065	12.3078	72.2130	61.9326
1100	9.7948	62.9987	49.5400
1200	2.8848	32.4533	19.8447
1300	2.0843	17.9777	14.3580
1400	2.7974	17.9955	15.3939
1500	1.7993	15.1741	11.1331
1600	3.0346	16.5614	14.4969
1700	3.2934	18.2780	14.8340
1800	3.8194	18.6566	15.7711
1900	8.1906	25.6808	23.8912
2000	15.9751	36.2769	34.4497
2100	24.4463	44.7345	43.5139
2200	33.5297	51.3975	51.4611
2300	42.8714	58.7474	58.9747
2400	49.3429	64.7228	63.5830
2500	51.6610	67.8132	64.5988
2600	51.8303	69.2368	64.1998
2700	50.3811	64.6935	61.6896
2800	29.5810	22.2106	31.2286
2900	27.7890	24.8944	28.1458
3000	29.3558	30.3401	29.5116
3100	29.3476	35.6161	29.0215
3200	27.1222	41.3918	25.9230

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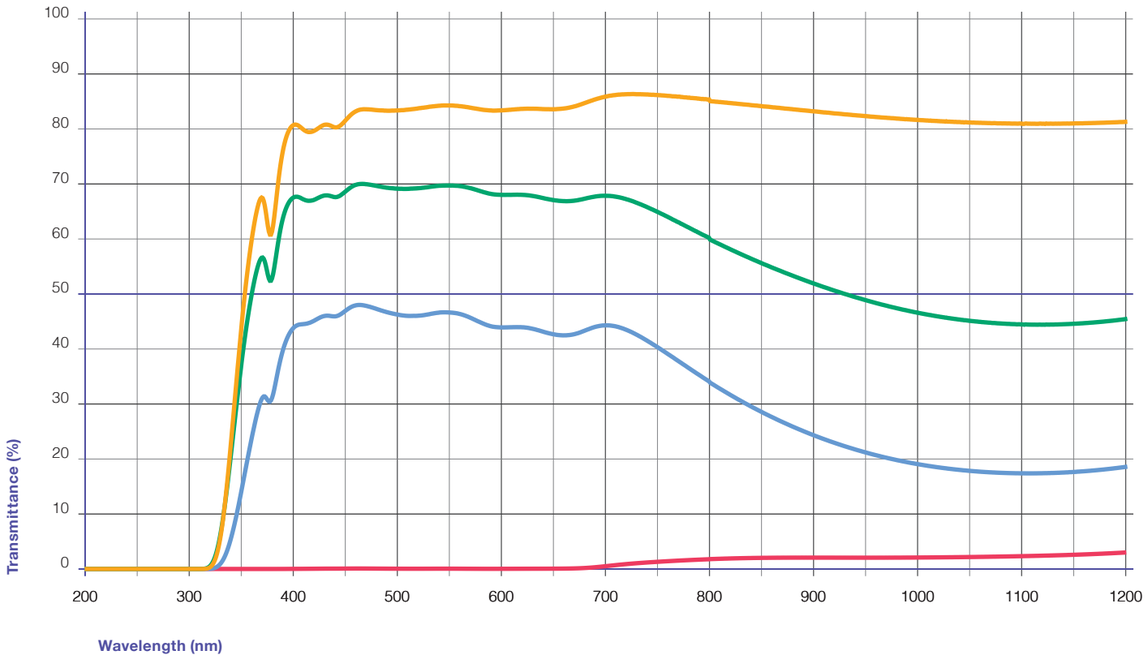
HEBO	Schott	Hoya
NF 01	≈ NG 1	≈ ND-0
NF 04	≈ NG 4	≈ ND-25
NF 05	≈ NG 5	≈ ND-50
NF 11	≈ NG 11	≈ ND-70

Glass Characteristics – Neutral Density

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
NF 01	1 mm	1.527	2.46	469	582	65	5	3	3	0	1
NF 04	1 mm	1.502	2.41	469	582	65	5	3	3	0	1
NF 05	1 mm	1.502	2.41	469	582	65	5	3	3	0	1
NF 11	1 mm	1.502	2.41	469	582	65	5	3	3	0	1

HEBO	Thickness	v (mired)	
		Standard	Range
NF 01	1 mm	1.0	0 - 4
NF 04	1 mm	50.0	43 - 57
NF 05	1 mm	68.0	61 - 75
NF 11	1 mm	81.0	74 - 88

HEBO
NF 01
NF 04
NF 05
NF 11



Thickness	NF 01	NF 04	NF 05	NF 11
λ (nm)	1 mm	1 mm	1 mm	1 mm
190	0.0000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000	0.0000
220	0.0000	0.0000	0.0000	0.0000
230	0.0000	0.0000	0.0000	0.0000
240	0.0000	0.0000	0.0000	0.0000
250	0.0000	0.0000	0.0000	0.0000
260	0.0000	0.0000	0.0000	0.0000
270	0.0000	0.0000	0.0001	0.0000
280	0.0000	0.0000	0.0000	0.0000
290	0.0001	0.0000	0.0000	0.0001
300	0.0000	0.0000	0.0000	0.0000
310	0.0000	0.0000	0.0047	0.0014
320	0.0000	0.0416	0.6490	0.4083
330	0.0000	1.0900	6.9235	6.4650
340	0.0000	5.8951	21.5582	23.8830
350	0.0000	14.6111	37.9396	44.8023
360	0.0000	24.2870	50.4801	60.5394
370	0.0000	31.1992	56.6227	67.4175
380	0.0004	31.7317	53.5707	62.3812
390	0.0049	40.1159	64.1406	76.5498
400	0.0162	43.9055	67.5917	80.7464
410	0.0285	44.5416	67.1445	79.7771
420	0.0420	45.1909	67.1636	79.7226
430	0.0565	46.0180	67.9208	80.7796
440	0.0604	45.9369	67.6118	80.2943
450	0.0711	47.0059	68.7013	81.6512
460	0.0820	47.9569	69.8653	83.2574
470	0.0774	47.8160	69.9563	83.5846
480	0.0652	47.2469	69.6306	83.4246
490	0.0537	46.6726	69.3142	83.3209
500	0.0457	46.2396	69.1384	83.3775
510	0.0408	46.0141	69.1198	83.5261
520	0.0408	46.0581	69.2403	83.7715
530	0.0446	46.3149	69.4579	84.0360
540	0.0500	46.6338	69.6862	84.2309
550	0.0507	46.6307	69.7267	84.2825
560	0.0446	46.3451	69.6083	84.1454
570	0.0354	45.6440	69.2282	83.8656
580	0.0285	44.7785	68.6609	83.5443
590	0.0260	44.1028	68.1751	83.3643
600	0.0284	43.9220	68.0137	83.3871
610	0.0336	43.9568	68.0350	83.5359
620	0.0391	43.9426	68.0230	83.6598
630	0.0439	43.6454	67.8122	83.6857
640	0.0473	43.1149	67.4198	83.6153
650	0.0531	42.6551	67.0585	83.5936
660	0.0676	42.4834	66.8873	83.7448
670	0.1003	42.7186	66.9812	84.1294
680	0.1745	43.3701	67.3508	84.7535
690	0.3120	44.0393	67.7326	85.4077
700	0.5015	44.2976	67.8491	85.9038
710	0.7030	44.0766	67.6708	86.2076
720	0.8876	43.4493	67.2024	86.3257
730	1.0445	42.5443	66.5450	86.3208
740	1.1814	41.4440	65.7567	86.2824
750	1.3037	40.2664	64.8951	86.1675
760	1.4152	39.0113	63.9576	86.0226
770	1.5171	37.7501	63.0064	85.8835

Thickness	NF 01	NF 04	NF 05	NF 11
λ (nm)	1 mm	1 mm	1 mm	1 mm
780	1.6115	36.4685	62.0250	85.7073
790	1.6972	35.2209	61.0485	85.4897
800	1.7923	33.8820	59.8946	85.0743
810	1.8533	32.7195	58.9847	84.9028
820	1.9110	31.5902	58.0801	84.7056
830	1.9573	30.5179	57.2151	84.5195
840	1.9934	29.4839	56.3730	84.3224
850	2.0208	28.5072	55.5602	84.1323
900	2.0666	24.2865	51.8851	83.2082
950	2.0558	21.1607	48.8543	82.3377
1000	2.0842	19.0492	46.5896	81.6645
1050	2.1770	17.8312	45.1102	81.1878
1065	2.2150	17.6186	44.8384	81.0900
1100	2.3285	17.3769	44.4624	80.9624
1200	3.0005	18.5808	45.4599	81.3122
1300	4.6855	22.5375	49.2745	82.4762
1400	7.2733	28.6318	54.6825	83.6086
1500	9.8407	34.3480	59.5302	84.8692
1600	11.2568	37.1367	61.9485	85.3502
1700	11.2857	37.7342	62.7678	85.4657
1800	11.4966	38.3118	63.5165	85.6184
1900	12.6739	39.7963	64.7558	85.9437
2000	14.6308	41.9625	66.2342	86.2348
2100	17.1330	44.3923	67.6866	86.5403
2200	19.8919	46.4481	68.5031	86.0313
2300	22.9526	48.7110	69.7285	86.3119
2400	25.6452	50.2204	70.1421	85.5176
2500	28.0659	51.5915	70.4594	84.8124
2600	30.1402	52.8763	70.7880	84.2204
2700	31.2243	52.1810	68.8124	80.6333
2800	14.4555	21.4965	27.9104	30.2197
2900	14.4087	21.3635	26.9446	29.3524
3000	16.7515	24.9919	31.2527	34.2879
3100	19.3653	28.8311	35.9068	39.9441
3200	22.1946	32.6981	40.7488	45.9399

Heat Absorbing

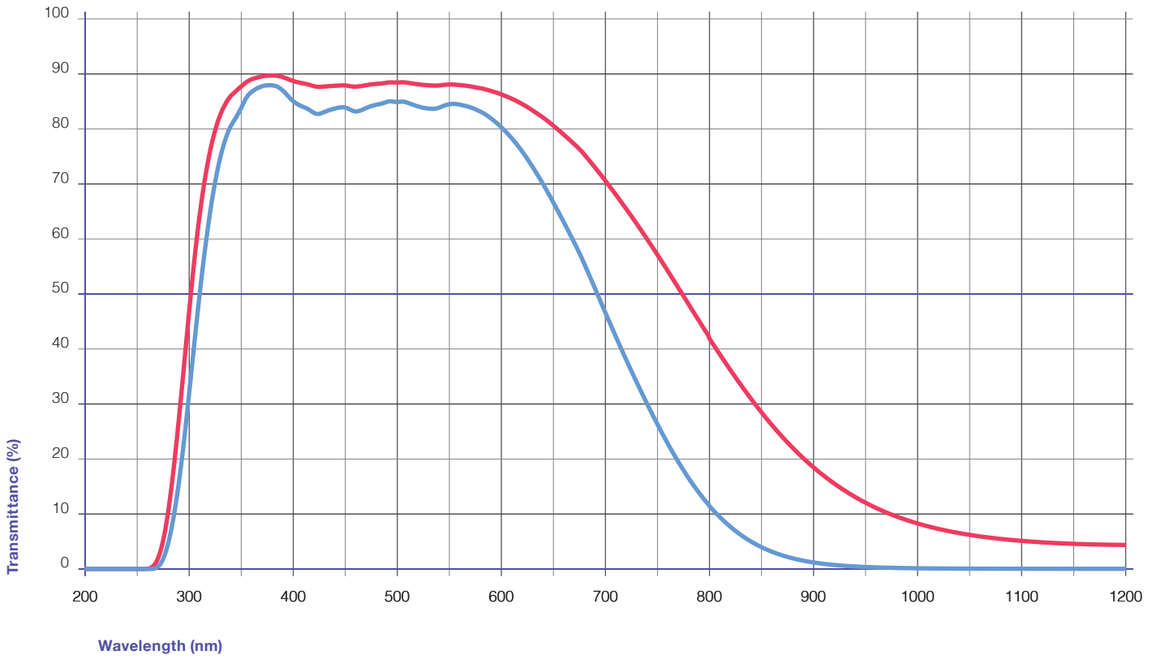
HEBO	Schott	Hoya
HA 02		
HA 03	≈ KG 3	≈ HA-30

Glass Characteristics – Heat Absorbing

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
HA 02	2 mm	1.51	2.54	587	656	59	3	2	4	0	1
HA 03	2 mm	1.512	2.55	587	656	59	2	3	4	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
HA 02	2 mm	0.440	0.441	93.9	0.331	0.331	92.9
HA 03	2 mm	0.440	0.413	86.5	0.311	0.334	87.4

HEBO
HA 02
HA 03



Thickness λ (nm)	HA 02 2 mm	HA 03 2 mm
190	0.0000	0.0000
200	0.0000	0.0000
210	0.0000	0.0000
220	0.0000	0.0000
230	0.0000	0.0000
240	0.0000	0.0000
250	0.0000	0.0000
260	0.0631	0.0003
270	2.1790	0.4886
280	11.3868	5.2218
290	28.1313	16.3477
300	47.9613	33.0141
310	65.0729	50.7931
320	76.4800	65.4369
330	83.0232	75.4293
340	86.2691	80.8396
350	87.9745	84.1700
360	89.2599	86.9936
370	89.7470	87.9579
380	89.9101	88.0993
390	89.5819	87.0876
400	88.8606	85.1599
410	88.4370	84.1178
420	87.9264	83.0364
430	87.8909	83.2872
440	88.0401	83.9014
450	88.0748	84.0461
460	87.8677	83.3536
470	88.1423	83.9991
480	88.3763	84.5906
490	88.6086	85.1147
500	88.6264	85.0919
510	88.5643	84.9148
520	88.3034	84.2639
530	88.0970	83.8660
540	88.1055	84.0542
550	88.2656	84.6822
560	88.1739	84.5907
570	87.9202	84.0969
580	87.5735	83.2962
590	87.0801	82.0711
600	86.4557	80.4452
610	85.6635	78.4275
620	84.6872	76.0222
630	83.5212	73.2140
640	82.2263	70.0999
650	80.7466	66.7118
660	79.1115	63.1397
670	77.3944	59.4381
680	75.4263	55.4291
690	73.1265	51.0692
700	70.7138	46.6604
710	68.1763	42.3047
720	65.5784	38.0889
730	62.9021	34.0235
740	60.1156	30.1112
750	57.2408	26.3633
760	54.2673	22.8168
770	51.2505	19.5335
780	48.2164	16.5513
790	45.2038	13.8777
800	41.9770	11.4785
810	39.1012	9.4566
820	36.2891	7.7126
830	33.5951	6.2402
840	31.0130	5.0055
850	28.5567	3.9853
900	18.5483	1.1925
950	12.0904	0.3601
1000	8.3039	0.1260
1050	6.2261	0.0614
1065	5.8157	0.0523
1100	5.1249	0.0381
1200	4.3763	0.0296
1300	4.5594	0.0360
1400	5.3985	0.0503
1500	7.0302	0.0930
1600	9.5971	0.2009
1700	12.2752	0.3890
1800	13.7154	0.5289
1900	13.5225	0.5038
2000	12.5387	0.3998
2100	11.7716	0.3284
2200	11.1333	0.3126
2300	11.9877	0.3790
2400	13.9596	0.5411
2500	15.7891	0.8480
2600	16.5329	1.3175
2700	16.8711	1.9371
2800	1.1472	1.3624
2900	0.1235	0.9477
3000	0.0904	0.9667
3100	0.1175	1.0536
3200	0.1905	1.1779

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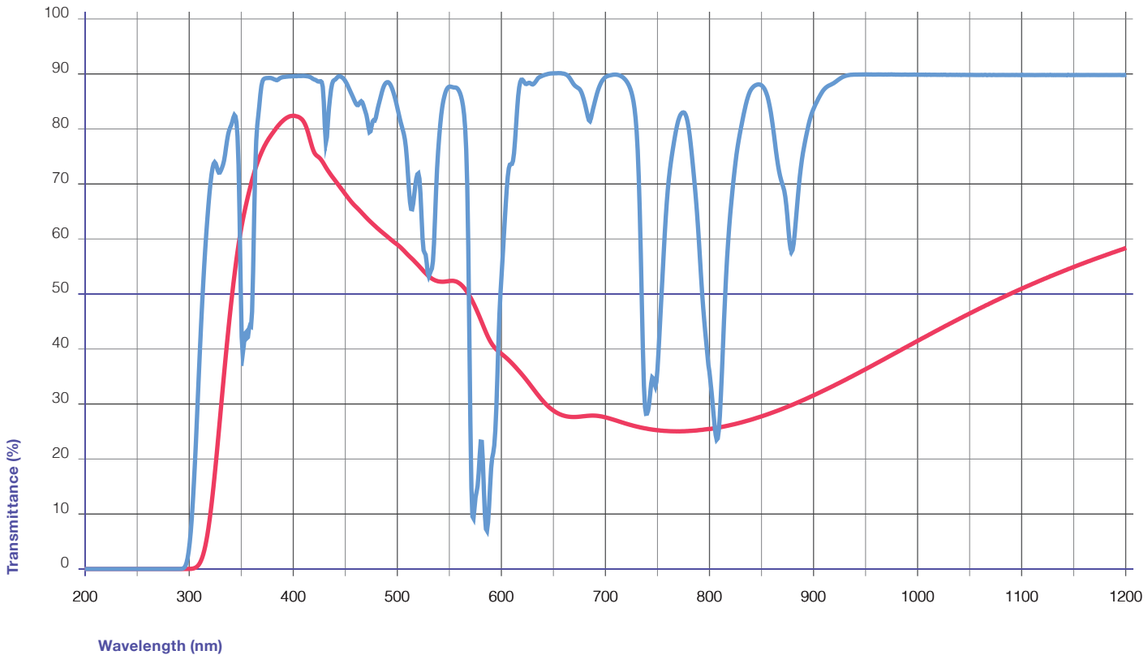
HEBO	Schott	Hoya
RC 01		
WL 01	≈ BG 20	≈ V-10

Glass Characteristics – Rising Color

HEBO	Thickness	n (587.6 nm)	ρ (g/cm³)	T_g (°C)	T_s (°C)	α × 10⁻⁷(°C)	D_A	D_W	Bubbles	Homogeneity	Striae
RC 01	1 mm	1.521	2.57	602	672	102	2	4	3	0	1
WL 01	1 mm	1.537	2.81	598	669	90	2	1	4	0	1

HEBO	Thickness	A (2856 K)			D_{65}		
		x	y	Y (%)	x	y	Y (%)
RC 01	1 mm						
WL 01	1 mm	0.443	0.387	64.1	0.291	0.305	64.6

HEBO	
RC 01	
WL 01	



Thickness λ (nm)	RC 01 1 mm	WL 01 1 mm
190	0.0000	0.0000
200	0.0017	0.0004
210	0.0012	0.0005
220	0.0016	0.0007
230	0.0030	0.0012
240	0.0034	0.0017
250	0.0032	0.0020
260	0.0024	0.0023
270	0.0015	0.0028
280	0.0008	0.0029
290	0.0006	0.0052
300	0.0149	4.7852
310	1.1718	40.6391
320	10.2284	70.2965
330	29.2399	72.5928
340	48.6331	80.8930
350	62.5141	42.3135
360	70.8649	46.8607
370	76.2866	88.8562
380	79.4770	89.3218
390	81.7241	89.6220
400	82.5656	89.7714
410	81.3835	89.8245
420	75.8040	89.1577
430	73.4949	80.6110
440	70.7501	89.1659
450	68.2062	88.7835
460	65.9746	84.7489
470	63.9981	82.7004
480	62.1851	83.0937
490	60.5890	88.6866
500	59.0543	83.8135
510	57.2171	71.8068
520	55.3234	72.0587
530	53.3249	53.3250
540	52.3783	78.6554
550	52.4747	87.8815
560	51.9690	86.7289
570	49.5018	26.8064
580	45.3995	23.1986
590	41.2185	18.3560
600	39.1904	53.4126
610	37.4701	73.7948
620	35.3570	89.1418
630	32.9503	88.2770
640	30.5722	89.9020
650	28.8461	90.2977
660	27.9251	90.2356
670	27.6899	88.1740
680	27.8458	84.9161
690	27.9298	85.3054
700	27.6233	89.6160
710	27.0646	90.0694
720	26.4655	88.9307
730	25.9489	79.6515
740	25.5561	28.3038
750	25.2770	36.3143
760	25.1245	69.1961
770	25.0797	81.6650
780	25.1416	80.3851
790	25.2970	59.3971
800	25.4914	35.9152
810	25.8084	27.8473
820	26.2077	64.5974
830	26.6669	80.0267
840	27.1952	87.3387
850	27.7950	88.1282
900	31.6097	83.7545
950	36.3750	90.1005
1000	41.5305	90.0558
1050	46.5094	90.0102
1065	47.9321	90.0241
1100	51.0135	89.9450
1200	58.4375	90.0201
1300	64.7596	90.0226
1400	70.2723	89.9763
1500	73.6656	89.8833
1600	77.1471	87.1579
1700	79.3055	88.6804
1800	81.0506	89.5762
1900	83.0957	89.6726
2000	84.6062	89.5464
2100	85.6798	89.2758
2200	85.9349	88.3479
2300	86.4772	84.3640
2400	86.7096	73.8073
2500	86.3835	77.7529
2600	86.1856	80.6729
2700	84.8087	83.3860
2800	61.6763	58.8435
2900	57.6900	54.3258
3000	57.9770	51.9749
3100	55.8306	49.0855
3200	50.8834	45.4361

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Costumer Information

RoHS / EU directive 2011 / 65 / EU

Aalen, July 15, 2014

Dear Customer,

HEBO Spezialglas GbR is well aware of the EU directive 2011 / 65 / EU (RoHS).

We hereby certify, that all optical glass, colored glass and filter glass, fused silica and glass ceramic as well as all used packaging material are in conformance with the regulations of the EU-directive 2011 / 65 / EU (RoHS).

For any further questions, please contact us.

Yours sincerely,
HEBO Spezialglas GbR

Frank Bock
Managing Director

REACH / EU directive 1907 / 2006 (REACH)

Aalen, July 14, 2010

Dear Customer,

HEBO Spezialglas GbR is well aware of the EU directive 1907 / 2006 (REACH).
We do not manufacture and we do not import chemical substances into the European Community.

HEBO Spezialglas GbR is supplying finished and semi-finished products to customers in Europe.

In accordance to REACH, the supplied products are “articles”, because an article is the term for any object that has been given a specific shape, surface or design which determines its function to a greater degree than does its chemical composition. Furthermore, in case of proper use of our products, there is no intend release of chemicals.

Under REACH only substances imported into the EU have to be registered, preparations or articles are not subject to register.

For any further questions, please contact us.

Yours sincerely,
HEBO Spezialglas GbR

Frank Bock
Managing Director

Delivery and Payment Conditions

1. Our deliveries are based exclusively on these General Conditions of sale. Adverse terms and conditions of the customers of the service department or of third parties are only valid if the service department expressly approves their validity in writing. If individual clauses of these General Conditions of Sale are entirely or partly invalid, this shall not affect the validity of the remaining clauses or remaining parts of the clause. **2.** Amounts are invoiced in Euros (€), unless otherwise indicated. The prices are ex works Aalen, invoices are due net within 30 days (unless otherwise agreed). All invoices shall become due for payment within 30 days net from date of invoice without discount. Payments made by the purchaser shall only be considered to have been made when the money is available to HEBO Spezialglas. For deliveries within Germany, VAT is charged additionally. Any cash discounts, if agreed upon, shall be permitted only in the amounts specified and in the specified period. If the payment deadline is exceeded all the legal consequences of default will become effective, without special warning. Calculation of arrears in the amount of general interest will be reserved by us. The total balance is then due for immediate payment. Based on the total order quantity, over- or under-supply of +/- 7 % are agreed. In the event of payment not being made on time, HEBO Spezialglas is entitled to charge the appropriate statutory rate of interest. Claims for any further compensation for delayed payment shall remain unaffected. **3.** Our delivery times are not binding due to the peculiarities of glass handling and unforeseeable events. Our contractual obligations exist with title on a timely delivery by our suppliers. **4.** Performance for deliveries and payments is Aalen. When shipped, the risk passes to the buyer as soon as we have handed over the goods to a carrier chosen by us. **5.** Rejecting the goods is only possible within 10 days of receipt of the goods by the buyer. Warranties for technical equipment and systems shall expire 24 months after delivery. Excluded are wear and tear parts, for which no guarantee is offered. If goods are returned, our consent must be obtained prior to any return shipment. If the delivered goods are faulty, or if they do not correspond to requirements expressly made, HEBO Spezialglas will provide replacement products or cancel the invoice. We are liable for secondary damages in the maximum amount of the invoice of each item delivered to the buyer. **6.** Drawings, dimensions and weights are not binding unless expressly mentioned. The Customer warrants that the submitted drawings do not interfere in the control of any third parties. In the case of rights of recourse we are to be held harmless. **7.** The delivered goods remain our property until full payment is made, even for resale to third parties. The goods may be processed and resold under the following terms: a) If the buyer meets the obligations of the business relationship in fully and on time. b) The retained goods shall remain our property, even after treatment and in combination with other goods. HEBO Spezialglas is the manufacturer and proprietor of the formed goods by § 950 BGB, the purchaser is merely the custodian. If the value of formed goods exceeds our claims by more than 90 %, the buyer may ask us for securities. c) Creating liens of the goods are not allowed. The buyer must notify us immediately if any third party shall have access to the reserved items. d) We commit ourselves to release the goods immediately after payment of the full amount has been made to HEBO Spezialglas. e) For sales abroad, the respective property law is valid. **8.** Our liability arises solely from these Conditions of Delivery and Payment. All non-listed claims are not valid. This does not apply if traded with intent or gross negligence.
9. Jurisdiction is Aalen. We are also entitled to take accusation at the residence of the buyer.

Liefer- und Zahlungsbedingungen

1. Unseren Lieferungen liegen ausschließlich diese allgemeinen Verkaufsbedingungen zugrunde, auch dann, wenn wir entgegenstehenden Einkaufsbedingungen nicht ausdrücklich widersprechen. Sollten einzelne Klauseln dieser Allgemeinen Verkaufsbedingungen ganz oder teilweise ungültig sein, so berührt das die Wirksamkeit der übrigen Klauseln bzw. der übrigen Teile solcher Klauseln nicht. **2.** Rechnungen werden in Euro (€) ausgestellt, sofern nicht anders angegeben. Die Preise gelten ab Werk Aalen, Rechnungsbeträge sind (falls nicht ausdrücklich anders vereinbart) innerhalb von 30 Tagen rein netto fällig. Bei Lieferungen innerhalb Deutschlands wird die Mehrwertsteuer zusätzlich berechnet. Allfällige Skontoabzüge, wenn ausdrücklich vereinbart, sind nur in der angegebenen Höhe und in der angegebenen Frist zulässig. Bei Überschreitung der Zahlungsfrist treten alle gesetzlichen Verzugsfolgen ohne besondere Mahnung ein. Berechnung von Verzugszins in Höhe des allgemeinen Zinssatzes wird von uns vorbehalten. Der Gesamtsaldo wird danach zur sofortigen Zahlung fällig. Bezogen auf die Gesamtbestellmenge gilt eine Über- bzw. Unterlieferung von +/- 7 % als vereinbart. **3.** Unsere Lieferfristen sind, durch die Eigenarten des Glashandlings und unvorhersehbare Ereignisse, unverbindlich. Unsere vertraglichen Pflichten bestehen mit Vorbehalt auf rechtzeitige Anlieferung durch unsere Lieferanten. **4.** Erfüllungsort für Lieferungen und Zahlungen ist Aalen. Bei Versand geht die Gefahr auf den Käufer über, sobald wir die Ware einem von uns gewählten Beförderungsunternehmen übergeben haben. **5.** Beanstandung der Ware ist nur innerhalb von 10 Tagen nach Eingang bei dem Käufer möglich. Garantieansprüche für techn. Geräte und Systeme verjähren 24 Monate nach Anlieferung. Ausgenommen sind Verschleißteile, wofür keine Garantie übernommen wird. Sofern Ware zurückgesendet wird, ist davor unsere Zustimmung einzuholen. Sollte angelieferte Ware fehlerhaft sein, oder ausdrücklich abgemachten Bestimmungen nicht entsprechen, wird von uns Ersatzware angeliefert oder die Rechnung storniert bzw. rückbezahlt. Für Folgeschäden haften wir maximal in der Höhe des Rechnungsbetrages des jeweiligen an den Käufer gelieferten Artikels. **6.** Zeichnungen, Maße und Gewichte sind unverbindlich, sofern nicht ausdrücklich erwähnt. Der Besteller garantiert, dass von ihm vorgelegte Zeichnungen nicht in Schutzrechte Dritter eingreifen. Bei Regressansprüchen sind wir schadlos zu halten. **7.** Die gelieferte Ware bleibt bis zur vollständigen Bezahlung unser Eigentum, auch bei Weiterverkauf an Dritte. Die Ware darf unter folgenden Bestimmungen bearbeitet und weiterveräußert werden: a) Sofern der Käufer den Verpflichtungen der Geschäftsverbindung in vollem Maße und rechtzeitig nachkommt. b) Die Vorbehaltsware bleibt, auch nach Bearbeitung und in Verbindung mit anderen Waren, unser Eigentum. Wir gelten als Hersteller und Miteigentümer der Umformungsware gem. § 950 BGB, der Käufer ist nur Verwahrer. Übersteigt der Wert der Umformungsware um mehr als 90 % unsere Forderungen, so kann der Käufer von uns Sicherheiten verlangen. c) Verpfändungen oder Sicherheitsüberweisungen der Vorbehaltsware sind unzulässig. Der Käufer muß uns etwaigen Zugriff Dritter auf die Vorbehaltsware sofort mitteilen. d) Wir verpflichten uns, die Ware sofort nach Begleichung der gesamten Schuld gegenüber uns freizugeben. e) Bei Verkäufen ins Ausland findet das jeweilig geltende Eigentumsrecht Anwendung. **8.** Unsere Haftung ergibt sich ausschließlich aus diesen Liefer- und Zahlungsbedingungen. Alle hier nicht aufgeführten Ansprüche finden keine Geltung. Dies gilt nicht, falls mit Vorsatz oder grober Fahrlässigkeit gehandelt wurde.
9. Gerichtsstand ist Aalen. Wir sind berechtigt, auch am Sitz des Käufers Klage zu erheben.

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