



Some new aspects of low-E glasses application

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Introduction – What is energy-efficient glazing?

Energy consumption for:

- ▶ heating →
- ▶ cooling → min per year
- ▶ illumination →



Factors to take into account:

Sanitary–hygienic norms:

- ▶ providing comfortable temperature
- ▶ insolation level
- ▶ natural illumination indoors



Glass types in use



Glass Type	Norm nomenclature for the glass type
Flat glass	ГОСТ (GOST) 111-2001, ГОСТ P (GOST R) 54170-2010
Patterned glass	ГОСТ (GOST) 5533-86
Wired glass	ГОСТ (GOST) 7481-78
Impact resistant laminated glass	ГОСТ P (GOST R) 51136-2008, ГОСТ P (GOST R) 54171-2010
Breakage resistant laminated glass	ГОСТ P (GOST R) 51136-2008, ГОСТ P (GOST R) 54171-2010
Bulletproof laminated glass	ГОСТ P (GOST R) 51136-2008, ГОСТ P (GOST R) 54171-2010
Laminated safety glass for building	ГОСТ (GOST) 30826-2001, ГОСТ P (GOST R) 54171-2010
Explosion-proof laminated glass	ГОСТ (GOST) 30826-2001, ГОСТ P (GOST R) 54171-2010
Fireproof laminated glass	ГОСТ (GOST) 30826-2001, ГОСТ P (GOST R) 54171-2010
Tinted glass	ГОСТ P (GOST R) 54169-2010
Tempered glass	ГОСТ (GOST) 30698-2000ГОСТ P (GOST R) 54162-2010
Heat-strengthened glass	ГОСТ P (GOST R) 54180-2010
Solar control or decorative hard-coated glass	ГОСТ P (GOST R) 54179-2010
Solar control or decorative soft-coated glass	ГОСТ P (GOST R) 54178-2010
Energy-efficient hard-coated glass	ГОСТ (GOST) 30733-2000, ГОСТ P (GOST R) 54177-2010
Energy-efficient soft-coated glass	ГОСТ (GOST) 31364-2007, ГОСТ P (GOST R) 54176-2010

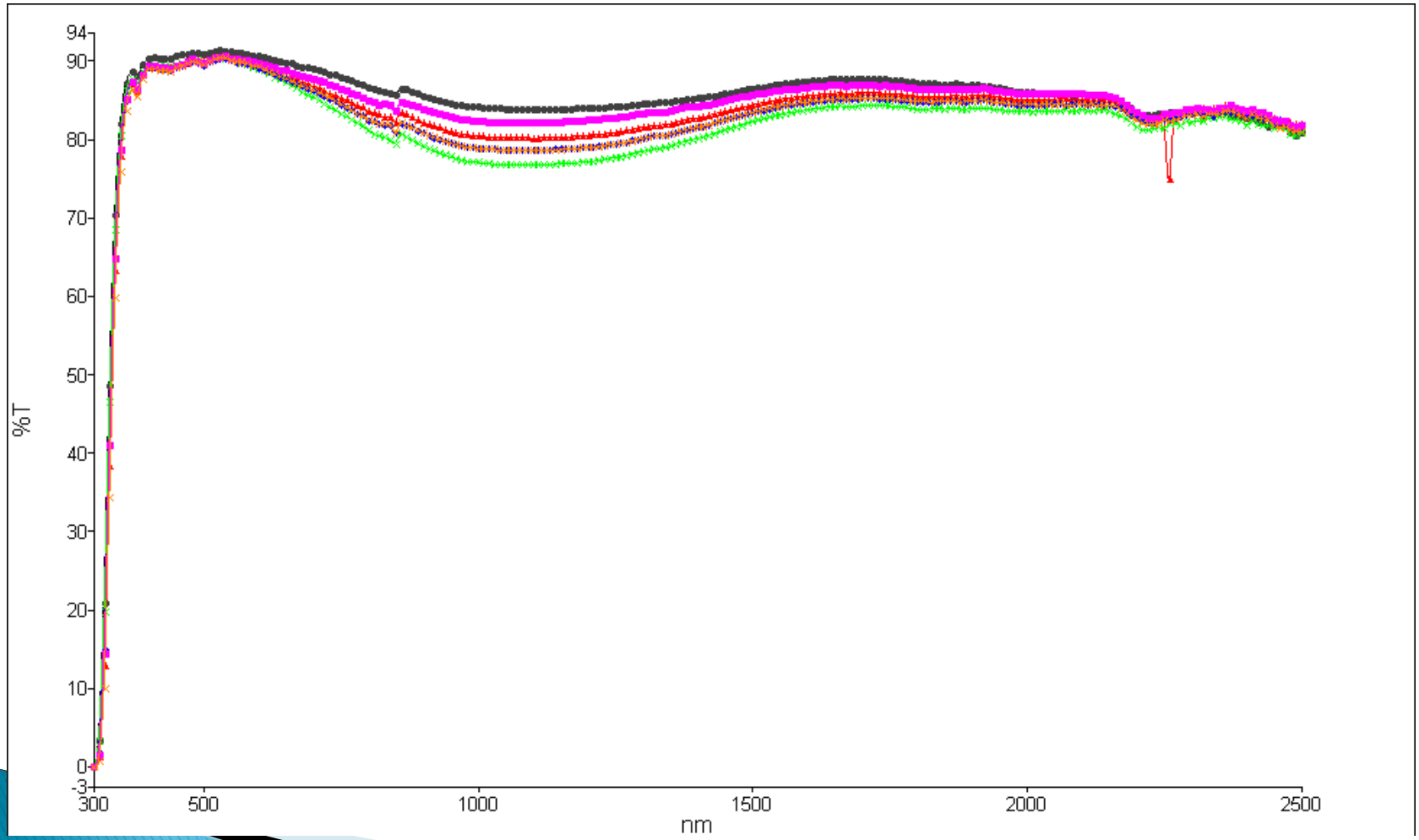


Testing method

- ▶ All measurements and calculations were carried out according to ГOCT P (GOST R) 54164–210 (ISO 9050:2003) «Glass and glass products. Optical characteristics determination methods. Determination of luminous and solar characteristics»



Flat glasses transmission spectrums





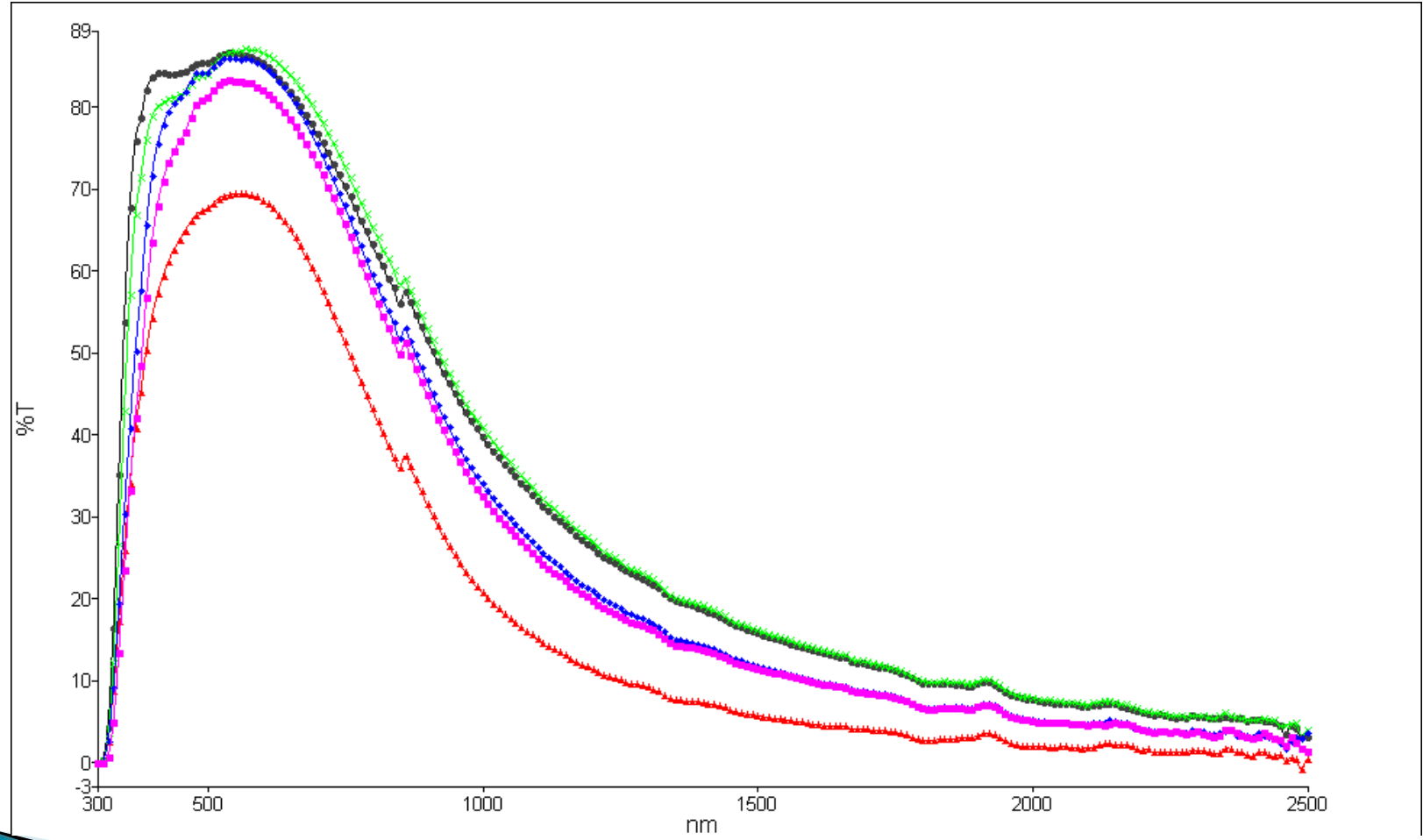
Optical characteristics of the 4-mm flat glasses



Producer's id. number	1	2	3	4	5	6	7	8	9	10
$\tau_V, \%$	90	91	91	91	90	90	91	90	90	90
$\tau_e, \%$	84	85	83	81	79	78	84	82	81	82
$\tau_{UV}, \%$	71	71	73	66	65	58	68	67	67	66



Transmission spectrums of the soft Low-E glasses



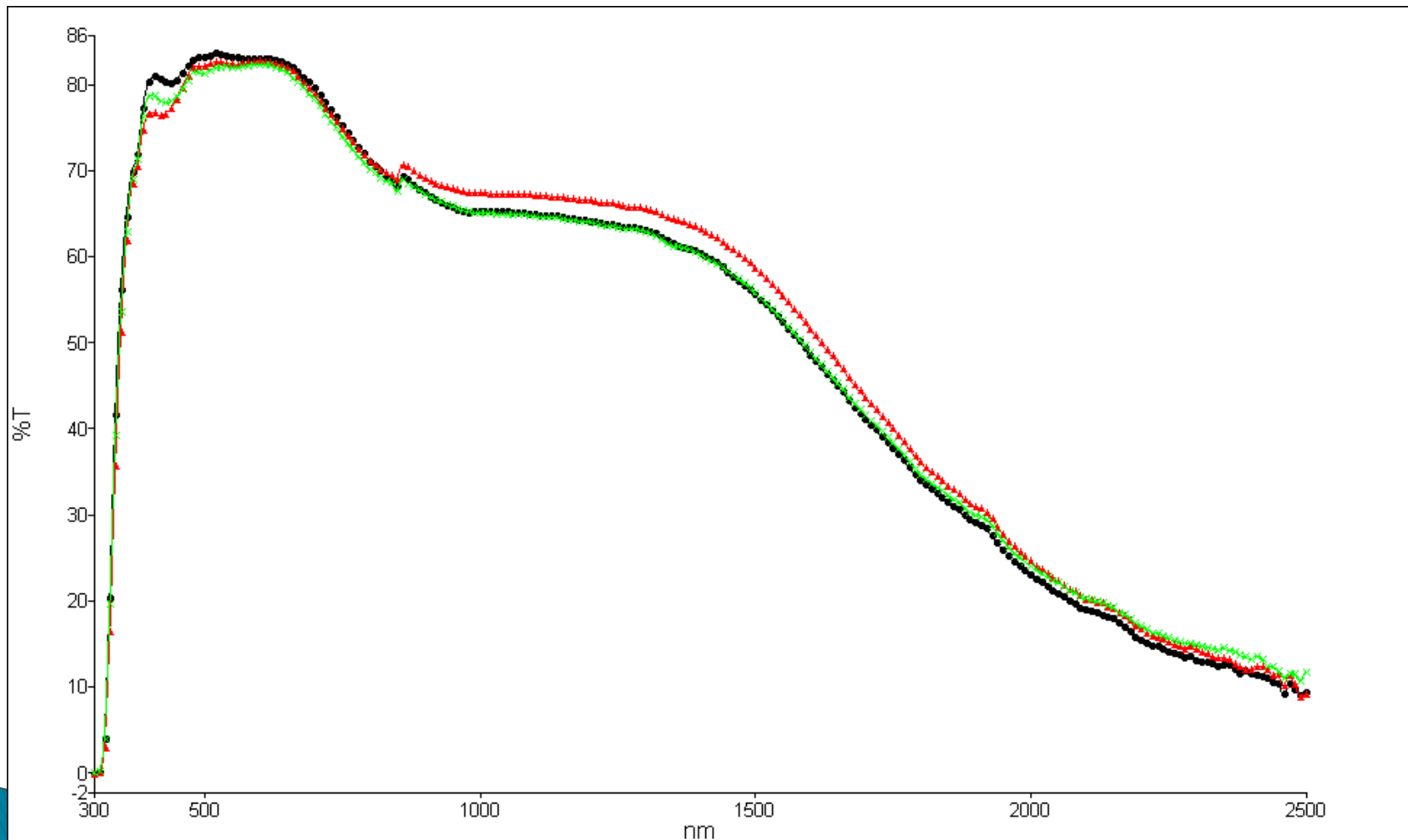


Optical characteristics of the 4-mm soft Low-E glasses

Producer's id. number	11	12	13	14	15	16	17	18
$\tau_{vl}, \%$	86	80	86	67	84	85	82	83
$\tau_e, \%$	61	54	59	43	57	60	52	56
$\tau_{UV}, \%$	31	38	40	32	15	25	49	22



Transmission spectrums of the hard Low-E glasses



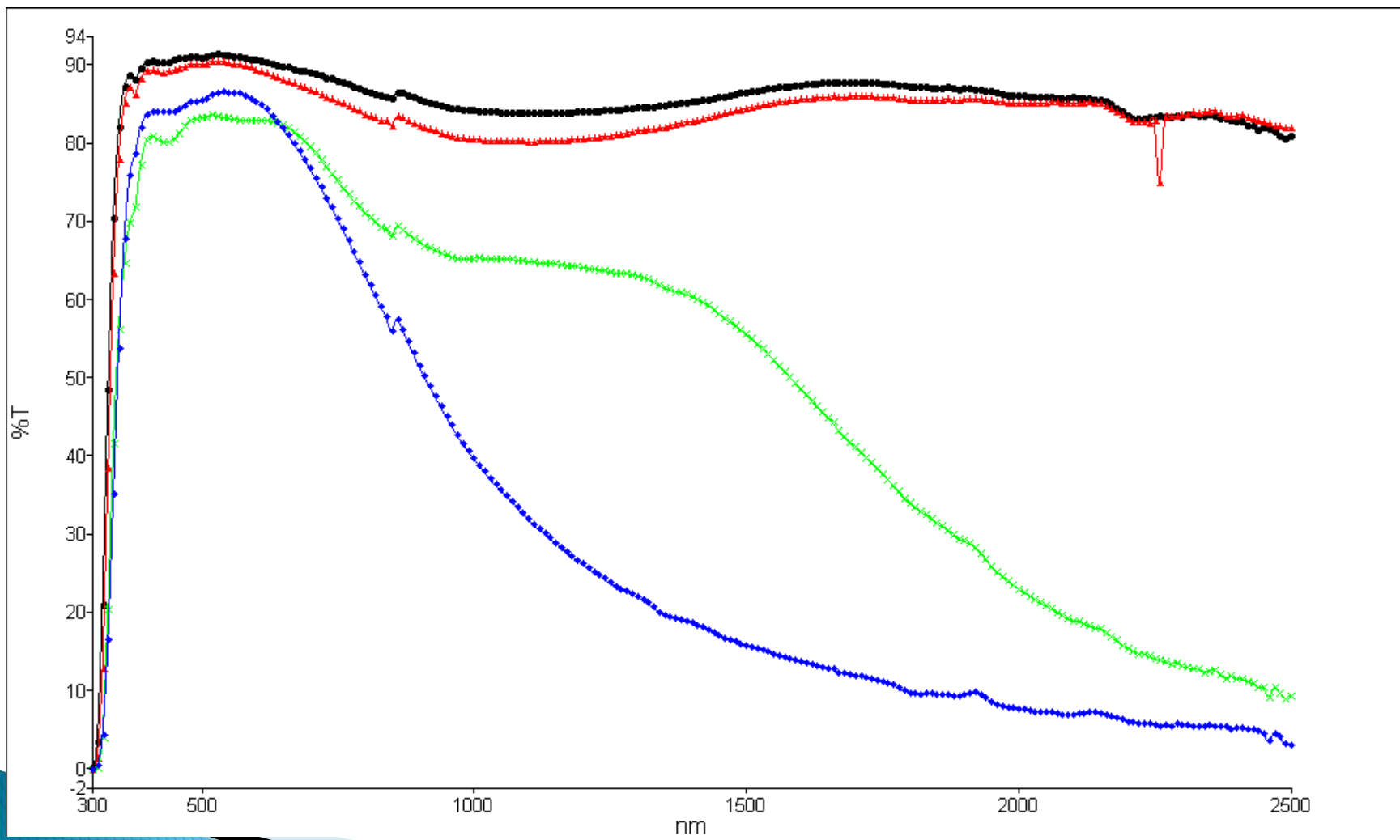


Optical characteristics of the 4-mm hard Low-E glasses

Producer's id. number	19	20	21
$\tau_V, \%$	85	84	84
$\tau_e, \%$	71	70	69
$\tau_{UV}, \%$	54	53	56



Transmission spectrums (composed)





Insulated glass units optical properties



	M1		S		H		M1+M1		M1+S		M1+H	
	max	min	max	min	max	min	max	min	max	min	max	min
τ_V , %	91	90	86	67	85	84	83	82	79	61	78	76
τ_e , %	85	78	61	43	71	69	73	61	52	34	61	54
τ_{UV} , %	73	58	49	15	56	53	54	34	36	9	41	31

SOURCE: www.gpd.fi

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Conclusions

- ▶ It is necessary to know optical characteristics of the applied glasses on the glazing design step.
- ▶ Glass producers have to guarantee compliance of the product optical properties to the marketing materials.
- ▶ It is important to include optical properties requirements and their tolerances in the standards for glass products.



Thank you for
attention!



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