

Product Passport

Window system in accordance to EN 14 351-1 +A1



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System	LK78 window
Product line	Fixed glazing Openable windows & ventilators
Materials	Aluminium: EN-AW 6063 T5 Thermal breaks: polyamide Gaskets: EPDM
Surface treatment	Anodizing Powder coating
Glass/ infill panel	thickness 18..61 mm
Frame depth	78 mm
Frame width	30..150 mm

Product standard (hEN):

EN 14 351-1:2006+A1:2010

Test reports:

VTT-S-01050-12
VTT-S-01051-12
VTT-S-01052-12
VTT-S-01312-12
VTT-S-01313-12
VTT-S-01314-12
VTT-S-04716-13
13-001564-PR01
13-001564-PR03
13-001564-PR04

Properties/ Class ^{*)}

Resistance to fire (E / EI) npd	Smoke leakage (S) npd	Resistance to wind load C3	Watertightness E1200	Dangerous substances npd
Load-bearing capacity of safety devices npd	Acoustic performance R_w (C; C _{tr}) ^{**) 44 (-1; -3) dB}	Thermal transmittance (U_w) ^{**) $\geq 0,76$ W/m²K}	Radiation properties (g_w / τ_v) ^{**) **)}	Air permeability 4

^{*)} Only tested/ calculated maximum values of the system for standard size window
(1230x 1480 mm)

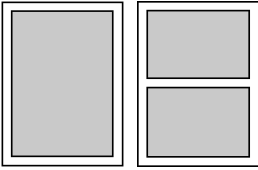
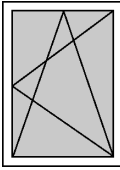
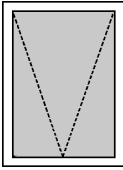
^{**)} Declared value according to project

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Summary of system properties:

ref No. for hEN-standard	Name:	LK78 Fixed window	LK78 Inward opening window	LK78 Outward opening window						
	Description:									
		Fixed glazing [glazing with transom]	Side, bottom and top hinged window, tilt and turn window	Side, bottom and top hinged window, smoke ventilators						
-	Resistance to fire (E / EI)	npd	npd	npd						
-	Smoke leakage (S)	npd	npd	npd						
4.2	Resistance to wind load ¹⁾	3 (1200 Pa)	C3 (≤1/300, 1200 Pa)	C3 (≤1/300, 1200 Pa)						
4.5	Watertightness ²⁾	E1200	E1200	E750						
4.6	Dangerous substances	npd	npd	npd						
4.8	Load-bearing capacity of safety devices ¹⁾	npd	npd	npd						
4.11	Acoustic performance ³⁾	R_w 44dB [41dB]	R_w+C 43dB [40dB]	R_w+C_{tr} 41dB [37dB]	R_w 40dB	R_w+C 39dB	R_w+C_{tr} 35dB	R_w 41dB	R_w+C 39dB	R_w+C_{tr} 36dB
4.12	Thermal transmittance ³⁾ (U_w)	≥ 0,76 W/m²K [≥ 0,85 W/m²K]			≥ 0,93 W/m²K			≥ 0,93 W/m²K		
4.13	Radiation properties ³⁾ (g_w / τ_v)	3)			3)			3)		
4.14	Air permeability ²⁾	4 (600 Pa)	4 (600 Pa)	4 (600 Pa)						

NOTE! Values in the table apply for standard size window (1230x 1480 mm)

¹⁾ Element size ≤ 1,8 m²

²⁾ Element size ≤ 2,7 m²

³⁾ Values according to project are declared separately

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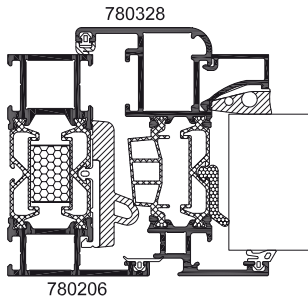
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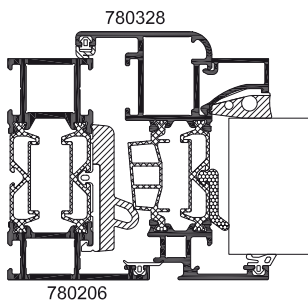
LK78 Inward opening window (1230 x1480 mm) U_w -values:

The thermal transmittance of the frames (U_f) are defined according to standard SFS-EN ISO 10077-2:2012

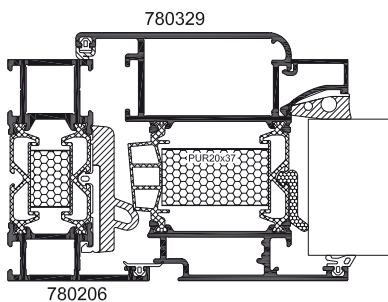
Tabulated U_w -values can be used, when total area of the window $\leq 2,3 \text{ m}^2$. Specific values according to project are declared separately.



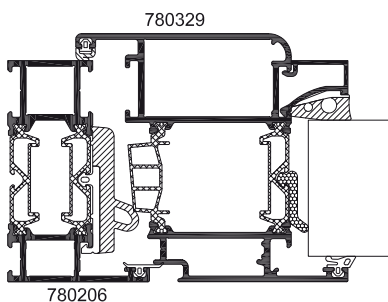
	Glass U_g -value (W/m ² K)					
	0,5	0,6	0,7	0,8	0,9	1,0
IGU spacer	Window U_w -value (W/m ² K)					
Aluminium t=0.3	1,1	1,2	1,3	1,3	1,4	1,5
Stainless steel t=0.18	1,0	1,1	1,1	1,2	1,3	1,4
TPS	0,94	1,0	1,1	1,2	1,2	1,3



	Glass U_g -value (W/m ² K)					
	0,5	0,6	0,7	0,8	0,9	1,0
IGU spacer	Window U_w -value (W/m ² K)					
Aluminium t=0.3	1,2	1,2	1,3	1,4	1,5	1,5
Stainless steel t=0.18	1,0	1,1	1,2	1,3	1,3	1,4
TPS	0,99	1,1	1,1	1,2	1,3	1,4



	Glass U_g -value (W/m ² K)					
	0,5	0,6	0,7	0,8	0,9	1,0
IGU spacer	Window U_w -value (W/m ² K)					
Aluminium t=0.3	1,1	1,2	1,2	1,3	1,4	1,4
Stainless steel t=0.18	0,98	1,1	1,1	1,2	1,3	1,3
TPS	0,93	0,99	1,1	1,1	1,2	1,3



	Glass U_g -value (W/m ² K)					
	0,5	0,6	0,7	0,8	0,9	1,0
IGU spacer	Window U_w -value (W/m ² K)					
Aluminium t=0.3	1,2	1,3	1,4	1,4	1,5	1,6
Stainless steel t=0.18	1,1	1,2	1,3	1,3	1,4	1,5
TPS	1,1	1,2	1,2	1,3	1,4	1,4

IGU = Insulating Glass Unit

Linear thermal transmittance ψ_g of the IGU spacers used in calculations		
Aluminium (t=0.3 mm)	0,106 W/mK	according to SFS-EN ISO 10077-2:2012
Stainless Steel (t=0.18 mm)	0,065 W/mK	BF Datasheet 01
TPS	0,042 W/mK	BF Datasheet 11

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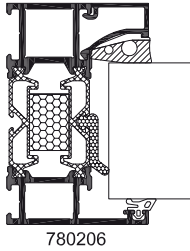
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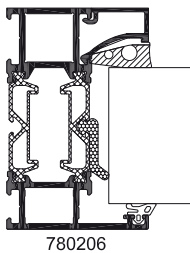
LK78 Fixed window (1230x 1480 mm) U_w -values:

The thermal transmittance of the frames (U_f) are defined according to standard SFS-EN ISO 10077-2:2012

Tabulated U_w -values can be used, when total area of the window $\leq 2,3 \text{ m}^2$. Specific values according to project are declared separately.

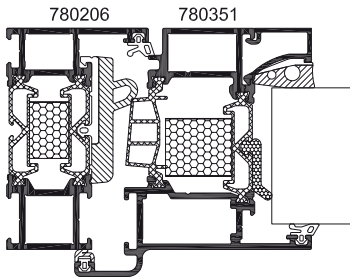


	Glass U_g -value (W/m ² K)					
	0,5	0,6	0,7	0,8	0,9	1,0
IGU spacer	Window U_w -value (W/m ² K)					
Aluminium t=0.3	0,94	1,0	1,1	1,2	1,3	1,4
Stainless steel t=0.18	0,82	0,91	0,99	1,1	1,2	1,3
TPS	0,76	0,84	0,93	1,0	1,1	1,2

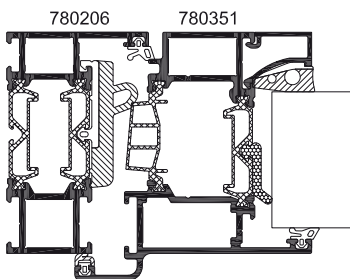


	Glass U_g -value (W/m ² K)					
	0,5	0,6	0,7	0,8	0,9	1,0
IGU spacer	Window U_w -value (W/m ² K)					
Aluminium t=0.3	0,99	1,1	1,2	1,2	1,3	1,4
Stainless steel t=0.18	0,88	0,97	1,1	1,1	1,2	1,3
TPS	0,82	0,90	0,99	1,1	1,2	1,2

LK78 Outward opening window (1230x 1480 mm) U_w -values:



	Glass U_g -value (W/m ² K)					
	0,5	0,6	0,7	0,8	0,9	1,0
IGU spacer	Window U_w -value (W/m ² K)					
Aluminium t=0.3	1,1	1,2	1,2	1,3	1,4	1,4
Stainless steel t=0.18	0,99	1,1	1,1	1,2	1,3	1,3
TPS	0,93	1,0	1,1	1,1	1,2	1,3



	Glass U_g -value (W/m ² K)					
	0,5	0,6	0,7	0,8	0,9	1,0
IGU spacer	Window U_w -value (W/m ² K)					
Aluminium t=0.3	1,2	1,3	1,4	1,4	1,5	1,6
Stainless steel t=0.18	1,1	1,2	1,2	1,3	1,4	1,5
TPS	1,1	1,1	1,2	1,3	1,3	1,4

IGU = Insulating Glass Unit

Linear thermal transmittance ψ_g of the IGU spacers used in calculations		
Aluminium (t=0.3 mm)	0,106 W/mK	according to SFS-EN ISO 10077-2:2012
Stainless Steel (t=0.18 mm)	0,065 W/mK	BF Datasheet 01
TPS	0,042 W/mK	BF Datasheet 11

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LK78 Windows, determination of sound insulation based on IGU data according to standard EN 14 351-1 annex B (for windows $R_w < 39$ dB or $R_w + C_{tr} < 35$ dB):

Terms:

R_w
 Sound reduction index (the higher the R_w number, the better the sound insulation)

$R_w + C$
 Jet aircraft noise, sounds of fast trains, industrial noise (high and mid frequency)

$R_w + C_{tr}$
 City traffic noise, sounds of slow trains, industrial noise (low and mid frequency)

	IGU R_w [dB]									
	27	28	29	30	32	34	36	38	40	
Total area of window	Window R_w [dB]									
$A \leq 2,7 \text{ m}^2$	30	31	32	33	34	35	36	37	38	
$2,7 \text{ m}^2 < A \leq 3,6 \text{ m}^2$	29	30	31	32	33	34	35	36	37	
$3,6 \text{ m}^2 < A \leq 4,6 \text{ m}^2$	28	29	30	31	32	33	34	35	36	
$4,6 \text{ m}^2 < A$	27	28	29	30	31	32	33	34	35	

Window $R_w + C =$ window $R_w - 1$ dB

	IGU $R_w + C_{tr}$ [dB]									
	24	25	26	27	28	30	32	34	36	
Total area of window	Window $R_w + C_{tr}$ [dB]									
$A \leq 2,7 \text{ m}^2$	26	27	28	29	30	31	32	33	34	
$2,7 \text{ m}^2 < A \leq 3,6 \text{ m}^2$	25	26	27	28	29	30	31	32	33	
$3,6 \text{ m}^2 < A \leq 4,6 \text{ m}^2$	24	25	26	27	28	29	30	31	32	
$4,6 \text{ m}^2 < A$	23	24	25	26	27	28	29	30	31	

CE-marking example:

Total area of window (A) 1,5 m x 2,0 m = 3,0 m², IGU $R_w = 36$ dB and $R_w + C_{tr} = 32$ dB.

From tabulated data:

Window: $R_w = 35$ dB

$R_w + C = 35$ dB - 1 dB = 34 dB

$R_w + C_{tr} = 31$ dB

CE-marking: $R_w (C; C_{tr})$

35 (-1; -4) dB

LK78 Windows, determination of sound insulation based on sound insulation testing (for windows $R_w \geq 39$ dB or $R_w + C_{tr} \geq 35$ dB):

Window type	Tested glazing	IGU performance		R_w [dB]	$R_w + C$ [dB]	$R_w + C_{tr}$ [dB]
		R_w	$R_w + C_{tr}$			
Inward opening	3k - 6/4/8.8Lp - 12/12	42 dB	35 dB	40	39	35
Outward opening	3k - 6/4/8.8Lp - 12/12	42 dB	35 dB	41	39	36
Fixed with transom	3k - 6/4/8.8Lp - 12/12	42 dB	35 dB	41	40	37
Fixed window	3k - 6/4/8.8Lp - 12/12	42 dB	35 dB	40	39	34
Fixed window	3k - 6/4/4 - 12/12	36 dB	30 dB	37	35	31
Fixed window	3k - 13.1Lp/6/9.1Lp - 12/12	49 dB	43 dB	44	43	41

Values obtained from the tests can be used for window elements with different glazing if the performance of the used IGU is equivalent or better than tested.

Extrapolation of the test results for different size windows:

Properties	Total area of window			
	$A \leq 2,7 \text{ m}^2$	$2,7 \text{ m}^2 < A \leq 3,6 \text{ m}^2$	$3,6 \text{ m}^2 < A \leq 4,6 \text{ m}^2$	$4,6 \text{ m}^2 < A$
$R_w, R_w + C$ and $R_w + C_{tr}$	- 0 dB	- 1 dB	- 2 dB	- 3 dB