ScreenLine

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Pellini S.p.A. manufactures integral blinds and specially designed blinds for assembly within insulating glass units under the trademark ScreenLine®.
The components, the production standards, the inspection procedures, the equipment and the production plant are all designed to meet this requirement.
The ScreenLine® blinds operate through a patented rotational magnetic transmission system located within the unit's spacer frame system.
This ensures the integrity of the hermetic seal of the double-glazed unit and enables the insulating unit manufacturer to use their own manufacturing technology i.e. automatic lines etc.
Pellini S.p.A. appropriate international patents cover the magnetic transmission system, the assembly and electrically operated systems.

Main characteristics of ScreenLine® double-glazed unit with blind

1. seal integrity
2. magnetic transmission
3. ease of assembly
4. non-fogging components
5. warranty

Integrity

1. Integrity
The ScreenLine® kit is assembled within the double-glazed unit without compromising the unit characteristics, which are dependent on the sealing material and the technologies, used by the insulating unit manufacturer. The sealant, sealant depth, desiccant type etc must comply with EN 1279 part 2, which requires a 0.20 average moisture penetration index (MPI). This index is a measure of the moisture penetration properties and the adhesion of the edge seal. This evaluation is carried out in the laboratory using standard cycle procedures using 350 mm x 500 mm double-glazed unit samples.

Magnetic trasmission

2. Magnetic transmission
Two interfaced magnets, one located inside and the other outside the double-glazed unit, activate the blind movement. Because these two parts do not have any contact, the internal components last longer and the assembly of the system made easier.
The magnets used are in Neodymium N35H, permanent, high-temperature resistant (up to 120°C), and have a double surface covering in order to resist oxidation and locate easily in the support holder.

3. Assembly

Assembly

The ScreenLine® kits are designed to be directly assembled on automatic unit production lines, with few components and minimum assembly time using exclusive solutions (patented). See the chapter "Assembly instructions" of this handbook.
The product warranty (blinds and unit) is only valid provided that the manufacturing procedures described in the ScreenLine® handbook are complied with, namely:

- glass cleaning
- kit assembly
- sealing.

This handbook also suggests both transport and storage procedures for integral blind units.

4. Non-fogging components

Non-fogging

The components used in the production of the ScreenLine® kits for assembly inside the double-glazed unit have been specially designed to avoid the release of substances that can jeopardize the transparency of the glass (fogging effect), in compliance with EN 1279 regulation. External Institute Certification approval of this feature and Pellini's own laboratory testing and assessment control the incoming quality of materials in order to ensure compliance with agreed standards. All the coming materials are checked by the warehouse personnel and later by Quality Control.
The former verifies that the goods received are in accordance with the respective purchase order, and also inspects the materials and the packaging.
Quality control personnel follow the procedures in accordance with the internal control scheme (ISO 9000). Indeed, besides the usual size and visual controls, special laboratory tests are performed to verify that the materials are compatible with their use in the double-glazed unit.

5. Warranty

Warranty

All ScreenLine® blinds are guaranteed as follows:

- 10 years for tilt-only system
- 5 years for tilting-raising system
- 2 years for electric components.

Life tests are performed in the Pellini laboratory by establishing a minimum number of cycles to be carried out without any anomalies in the kit:

- 10.000 complete cycles of raising and lowering operations in the manual system
- 5.000 complete cycles of raising and lowering operations in the motorized system
- 20.000 complete cycles in the tilt-only system.

The components of the internal magnetic device (gears, worm gears etc) are C.N.C. machined and specially hardened.

Additional features of the ScreenLine® product

- Clean for life
- Protection against deformation and damage by encapsulation
- Maintenance free
- Pristine appearance of blinds at all time
- No UV degradation
- Improved Solar Control
- Improved U-values
- Ability to manufacturing the composite product (double-glazed unit with blind) in the factory at relatively low cost and with guaranteed quality.

Slats manufacture

Slats manufacture
The slats are carefully manufactured, as their appearance is an essential quality that ensures elegance and prestige to the product. For this reason the production cycle now includes processing systems with computerized control machines for the cambering and finishing of the slats.

Head rail

Aluminium head and bottom rails
Another feature of the ScreenLine® product is the availability of painted aluminium for both the head and the bottom rails.

Bottom rail

Smooth bottom rail
The absence of finishes or projections on the bottom rail ensures it is perfectly smooth. Its line is extremely clean and it is virtually impossible for components of the blind to become detached.

Trademark

Trademark
A raised trademark distinguishing the product with the ScreenLine® logo is applied on the bottom rail, assuring product originality.

Mono-control

Mono-control
Both raising and tilting functions are controlled by means of one cord. This represents simplicity of operation whilst maintaining an elegant appearance.

Cord tensioner

Cord tensioner
An important step in the product line has been achieved with the introduction of the cord tensioner which fixs the cord in a perfectly vertical position ensuring a clean appearance.

Versatility

Versatility

Versatility is ensured by the possibility of easily and immediately switching from the external manual control to the external motorized control, without modifying the system.

Removable Wand

Removable wand

The ScreenLine® recognise that there are special cases where a permanent visible external drive is not desirable on the internal glass surface for practical and aesthetic reasons.

Places such as hospitals (for hygiene reasons), schools, restaurants, swimming pools, detention centres or public places in general where authorised control is necessary.

ScreenLine® has therefore designed a removable wand, this allows the blind to be adjusted and then the wand removed.

Knob control

Knob control

The knob control system, in its hidden version, offers the same function but is limited to the tilting-only system.

Two cables for 16 blinds

Two cables

The movement of the ScreenLine® motorised system including the supply and control of all the blinds (up to 16) can be achieved using only two wires with the external motor solution.

With a channelled waves method it is possible to connect and control the system with only two cables linking the blinds to each other and with the control unit. This simplifies the electrical installation and optimises the space needed for the passage of the low voltage supply line.

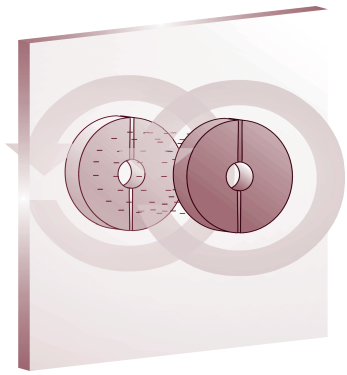
Colour Availability

Colour Availability

The available colour range of the slats and plissé fabrics is wide and carefully based on a number of elegant and sophisticated shades.

The external control mechanism is supplied in light grey as standard to harmonise with all the slat colours, however options of dark grey and white are also available on request. A transparent external mechanism is supplied as standard for all the plisse fabric colours.

Feasibility tables



The operation of the blind within a double-glazed unit using the magnetic system is dependent on the internal glass thickness and the unit size.
Depending on these parameters the feasibility table includes the size of those blinds that would function correctly.
Before proceeding with the order and manufacture of a blind system, it is important to confirm from the associated table whether it is possible to realise the proposed system.

These tables have been calculated for all systems incorporating different internal glass thicknesses between the two magnets. Many factors have been taken into account, such as the blind weight and friction etc, by dividing the maximum torque (magnets slipping) allowing for an appropriate factor of security.
For internal motorized models, the tables have been calculated dependant on the motor torque (with an appropriate coefficient of security) in order to define the size feasibility.
The feasibility tables (see price list and handbook) must be referred to before ordering.
These tables have been calculated assuming a situation of free movement of the blind inside the double-glazed unit. Therefore, no friction between the blind and the glass is envisaged regardless of eventual glass deflections.
Refer to the chapter about the glass deflections (page 10).

1. How to determine the glass thickness
The glass thickness is obtained as the sum of all the incorporated thickness values.
Please check the glass composition:

Glass types

MONOLITHIC
Thickness (mm) 4 - 5 - 6 - 8 - 10 - 12

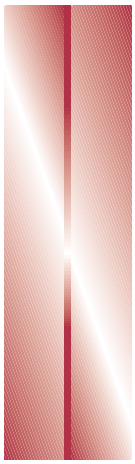
LAMINATED
Composed of two or more sheets of glass with an interposed sheet(s) of polyvinylbutyl (plastic P.V.B).

The total thickness is obtained by adding the sheets thickness to that of the plastic P.V.B., and rounding up.

Dependent on the glass composite resistance requirement, the P.V.B. can be:
0.38 mm (value 1)
0.76 mm (value 2)
1.52 mm (value 4)

The glass type is conventionally defined with a three-figure number (55,4). The first two figures indicate the glass thickness and the third one that of the P.V.B. (see above).

Monolithic glass



Laminated glass

2. Glass Deflection

Temperature and pressure variations (normal atmospheric changes) will cause glass surface to deflect in hermetically sealed double-glazed units. These variations, if significant, can restrict the normal function of the blind within the cavity.
The following table indicates the maximum permitted deflection for the sheets of glass, considering the dimensions of the blind components (slat, ladder tape, bottom rail etc.).

Model	Plissé slat	Terylene (both sides)	Bottoms rail with end caps	Total width	Internal cavity	Difference	Maximum deflection per side
SL18C plissé	14		15	15	18	3	1,5
SL20C plissé	14		15	15	20	5	2,5
SL20A	12,5	2	14	14,5	20	5,5	2,75
SL20C	12,5	3	14	15,5	20	4,5	2,25
SL22A	12,5	2	14	14,5	22	7,5	3,75
SL22C	12,5	3	14	15,5	22	6,5	3,25
SL24P	16	2	14	18	24	6	3
SL27A new	16	2	14	18	27	9	4,5
SL27C new	16	3	14	19	27	8	4
SL27M new	16	3	19,5	19,5	27	7,5	3,75
SL27MS	16	3	19,5	19,5	27	7,5	3,75

For the SL27C model, in a 27 mm cavity, for example, the maximum permitted internal deflection for each glass is 4 mm (i.e.a total of 8 mm deflection).
Deflections may also be subject to the temperature and pressure variations occurring between the time and place of manufacture and the site installation conditions and will also vary with the individual glass thickness.

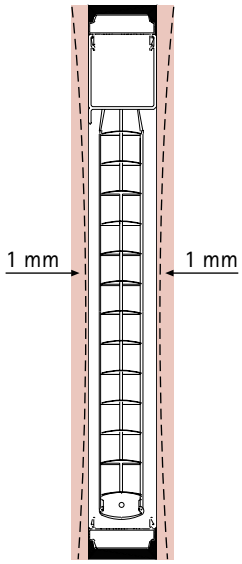
Calculations can be made using the Glass Manufacturers handbooks.

The table below, shows the temperature variation (ΔT) required to create a 1 mm surface deflection for a unit size 1000 mm x 1000 mm for a variety of glass combinations. For example, a 1,000 x 1,000 double-glazed unit comprising two 4 mm monolithic glasses and a 27 mm cavity, requires a 7.5°C difference of temperature to cause a 1mm deflection for each glass.
The EN 13471-1-2 document considers the temperature and barometric pressure parameters of the double-glazed unit during assembly and installation, and the respective procedures are used to assess the ensuing glass strains and deflections for these effects (refer to page 21 "Ideal environmental conditions").

Double-glazed unit composition	ΔT C°/mm
C4 18 C4	11.5
C4 20 C4	10.5
C4 24 C4	8.5
C4 27 C4	7.5
F33 18 F33	11.5
F33 20 F33	10.5
F33 24 F33	9.0
F33 27 F33	8.0
F44 18 F44	12.0
F44 20 F44	11.0
F44 24 F44	9.0
F44 27 F44	8.5
F55 18 F55	13.0
F55 20 F55	12.0
F55 24 F55	10.0
F55 27 F55	9.0

Double-glazed unit composition	ΔT C°/mm
T4 18 T4	12.5
T4 20 T4	11.0
T4 24 T4	9.5
T4 27 T4	8.5
T6 18 T6	15.0
T6 20 T6	14.0
T6 24 T6	12.5
T6 27 T6	11.5
T8 18 T8	21.0
T8 20 T8	20.0
T8 24 T8	18.0
T8 27 T8	17.5
T10 18 T10	31.5
T10 20 T10	30.0
T10 24 T10	28.5
T10 27 T10	26.5

Search: Thimochenko formula and law of the perfect gases



Caption

C4 float thickness 4 mm
T4 toughened thickness 4 mm
T8 toughened thickness 8 mm
T10 toughened thickness 10 mm
F33 laminated 3+3 mm
F55 laminated 5+5 mm
F44 laminated 4+4 mm
T6 toughened thickness 6 mm

Double-glazed unit Equalisation

Whenever the manufacturing location and the installation site are at different heights, significant deflections in the double-glazed unit can result, even breakage can occur.

The double-glazed unit adjustment (i.e. equalisation) must therefore be done following the same procedures as for a normal double-glazed unit, provided that the seal integrity is not jeopardized.

For further details refer to the section on unit assembly, unit sealing and internal atmospheric pressure in this handbook (see page 20).

3. Feasibility Assessment

To verify the system feasibility, refer to the tables on the unit size, cavity, and the internal glass thickness.

For laminated glass, refer to the table for the next highest the internal glass thickness (e.g. 9.5 becomes 10 mm).

Example of tables interpretation:

Width / Height

H \ L	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240
30	D	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R
40	D	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R
50	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R
60	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R
70	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R
80	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R
90	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
100	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
110	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
120	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
130	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
140	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
150	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
160	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
170	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
180	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
190	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R					
200	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R					
210	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R					
220	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R						

Feasible:

SL27C new — 6 mm internal glass

Size mm — 1,700 x 1,400 (W x H)

Feasible with reduced system (R).

Note: the box ringed identifies the blind height and width dimensions.

For example, the figure [40] indicates the size range from 400 mm to 499 mm.

Width

Height

H \ L	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	24
30	D	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R
40	D	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R
50	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R
60	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R
70	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R
80	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R
90	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
100	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
110	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
120	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
130	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
140	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
150	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
160	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
170	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
180	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R				
190	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R					
200	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R					
210	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R					

Nonfeasible:

SL27C new 6 mm internal glass

Size mm 2,200 x 2,000 (W x H)

Not feasible

Width

Height

H \ L	40	50	60	70	80	90	100	110	120	13	210	220	230	240	250	260	270	280	290	300
30	D	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R
40	D	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R
50	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R
60	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R
70	D	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R
80	D	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R
90	D	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R
100	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
110	D	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
120	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
130	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R	R	R			
140	D	D	D	D	R	R	R	R	R	R	R	R	R	R	R					
150	D	D	D	D	R	R	R	R	R	R	R	R	R	R						
160	D	D	D	R	R	R	R	R	R	R	R	R								
170	D	D	D	R	R	R	R	R	R	R	R									
180	D	D	D	R	R	R	R	R	R	R										
190	D	D	R	R	R	R	R	R	R	R										
200	D	D	R	R	R	R	R	R	R	R										
210	D	D	R	R	R	R	R	R	R	R										

Out of Warranty

SL27C new 6 mm internal glass

Size mm 2,815 x 550 (W x H)

Is possible, but cannot be warranted because it is outside recommended parameters.

An order form, to be found at the end of the ScreenLine® Price List brochure, should be completed as indicated.

cliente • *customer*

1

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info@pellini.net

Rif. *Your ref.*	Q.tà *Q.ty*	Tipo • *Type*										Vetro • *Glass*			Comando • *Control*			Colore *Colour* Lamella *Slat* Tessuto* *Fabrics**	Canalina** *Spacer*** mm		Note *Note*
		SL18C plissé	SL20C plissé	SL20A	SL20C	SL24P	SL27A new	SL27C new	SL27M new	SL27MS	Speciali • *Specials* / Motore est. • *Ext. motor*	Larghezza *Width* mm	Altezza *Height* mm	Spessore *Thickness* lato comando *control side* mm	Lunghezza *Lenght* cavo / corda *cable / cord* mm	Destra • *Right*	Sinistra • *Left*		6.5	8	
intercapedine • *spacer bar* >		18	20	20	20	24	27	27	27	27											
2	3					4						5			6			7	8		9

data • *date* firma • *signature*

* specificare qualità tessuto (816 - **316** / 812 - **312** / 875 - **976**) • **fabric quality is required*

solo in caso d'ordine del 18 o 20 mm • * it's only for 18 and 20 mm systems*

Instructions for filling in the ScreenLine® order form

1. Customer

Customer's business name, address, VAT registration number, telephone, fax, e-mail.

2. Ref.

Customer internal reference.

3. Q.ty

Specify the quantity.

4. Type

Tick the chosen system whether manual or external electric motor.

5. Glass
Specify the inner glass width, height and thickness in millimetres.
The glass thickness is essential to verify the system feasibility.

Important: it is important to verify that the unit when glazed in the window frame, will have sufficient clearance to allow the external magnet to be located correctly and so ensure the blind functions as specified. In order to ensure this clearance the internal gasket / glazing bead would normally align with the spacer sightline.

6. Control
Specify the position of the external magnet – viewed from inside – (right or left).
It is standard procedure to supply a cord system that is 65 mm less than the glass height.
If you require a different cord height please specify your requirement.
Note: the cord length is the loop height.

For the knob operated system (SL24P), the cable length (L) is shown in the ScreenLine® Price List brochure (p.10).
If you need a different height dimension, please specify the cable length required.

7. Colours
Slats colours
Specify the slat colour according to the catalogue or price list codes.
Note: for systems using 16 mm slats, all the colours are available.
For the 20/22 mm cavity systems using a 12.5 mm thick slat, a limited number of colours is available.

Fabrics colours
Specify the fabric colour according to the catalogue or price list codes.
Also specify the quality.
Three different qualities of fabric transparency are available:

316	transparent
312	semi-transparent
976	opaque

Important: the external surface is metallic / aluminium.
The internal surface will be the colour specified.

Colours of the Venetian blind external control
The standard colour for the external magnetic control, the cord loop, the cord ten-

sioner is light grey.
Available on request: white, anthracite, transparent.

Colours of the plissé blind external control
The standard colour for the external magnetic control and the cord tensioner supplied is transparent.
Cord loop: light grey.
Available on request: white, light grey, anthracite.

8. Spacer bar
For all the systems including the spacer bar supplied by ScreenLine®, standard 8 mm is used.
For 24 and 27 systems, 8 mm bar is supplied as part of the kit and is included in the price. For 18 and 20 systems spacer supply is optional. When using your own spacer, please specify its height (6.5 or 8 mm).

9. Note
Column for indicating special requests.

Important:
- For 8 mm spacer, the 2nd sealing is traditionally 4 mm. If you require a different seal thickness, please specify it in the notes. The blind size is determined by subtracting the spacer bar and seal depth from that of the glass dimensions.
- The ScreenLine® kit has an adhesive label on it with the nominal glass size indicated. The production department uses the above data to determine the correct blind size.

Check the packing

When the ScreenLine® kit is delivered, check the packing. Confirm that the Purchase Order and Delivery Note are as specified.

Where goods are damaged in transit, the replacement guarantee, covered by insurance on the slats, will only be honoured when the carriers delivery note is marked "subject to inspection".

When opening the packing, verify it contains all the component parts, as specified in the catalogue or in the price list. Only open the single component pack just prior to production.

Every package is identified with a label indicating:

- blind system
- size
- slat colour
- order number

VETRERIA CRISTALLINA snc		Descrizione
N. ordine	2002-OC-0002699	Tenda Veneziana ScreenLine SL20C S149 larg. 1113 x alt. 1180
Riferimento:		Comando Diretto H. Standard-Motore Esterno
N. ORP:	2002-ORP-0006471	
Data ordine:	27.03.2002	Data consegna: 17.04.2002

General precautions

The assembly area for integral blind production using the ScreenLine® kit and glass, must be clean and dust free.

The blind pack must be opened just before being assembled, in order to avoid a possible contamination or damage.

Handle the blinds and the accessories very carefully:

- Use cotton gloves.
- Do not twist or deform the slats.
- Avoid contact with butyl, oily substances, dust and solvents.

Accidental contamination should not be removed using solvent cleansers that can damage the blind and / or later cause 'fogging' within the cavity.

Glass cleaning and rinsing

Carefully wash the sheets of glass so that dirt (glass particles, chalk, fingerprints, etc) and cutting fluid are eliminated.

For normal float and low emission pyrolytics, use an alkaline detergent is permissible.

For cleaning low emission magnetronic glasses (soft coats), use a neutral detergent.

Please ensure that the glass sheets are rinsed and perfectly clean.

With time, any deposits that may be present, can cause spots / streaks on the glass, corresponding with the ladder tape (due to friction), therefore creating unacceptable contamination on the internal surface of the double-glazed unit.

Perfect washing and rinsing avoids such defects.

Do not use surface-active agents, as they are very difficult to eliminate in double-glazed unit washing systems.

Spacer bars preparation

Cut or bend the spacer bars (if not supplied by Pellini) allowing consideration of the fact that the blind components are supplied for a 12 mm sightline (unless otherwise requested).

Assemble the spacer bars as follows:

- Provide access vents for replacing the air with argon.
- Fill the spacer bars with the requisite amount of molecular sieve in accordance with the Manufacturer's Quality Scheme (see page 38). A 3A° molecular sieve is recommended to absorb only the humidity (and not the argon), thus reducing the possibility of additional glass deflections.
- Apply the butyl to the spacer bars, avoiding any flaws and in accordance with the quantity indicated in the regulations of the Manufacturer's Quality Scheme. For corner key systems, ensure that the butyl is continuous and that the corner key aperture is fully sealed with butyl on all the corners.

Component Assembly

Reference to the assembly manual corresponding to the system for the location of the spacer bars and the blind on the glass is essential.

The fin on the side spacer bars, in the SL27 system, must be to the same side as the low emission glass.

The fin of the L-side guide, in the SL20 system must be to the same side as the internal magnet; for SL22 systems it can face either way.

The head-rail fin (pelmet) must face the external part of the window glass.

Care must be taken with low emissivity glass not to damage the coating during handling or blind assembly.

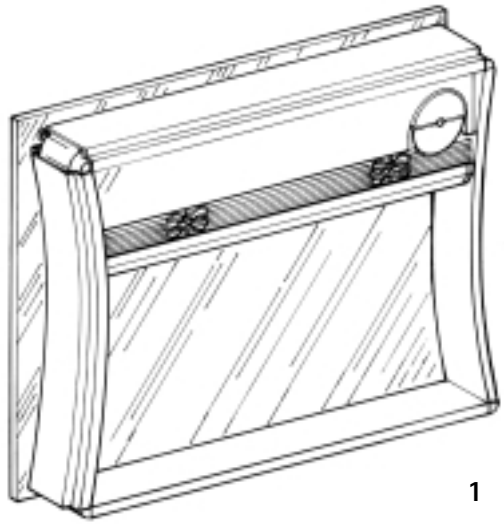
When applying the spacer bars to the glass ensure that they are perfectly parallel and square: inwards deflection would restrict the blind movement. 1 The use of 'check pegs' of the same thickness as the perimeter sealing (e.g. 4 mm) or a spacer bar the same dimension as the base spacer or the even the blind head-rail as control template are recommended methods.

Apply the blind to the spacer frame in accordance with the assembly instructions of the respective system ensuring that the spacer bars are firmly adhered to the glass.

A significantly heavy blind (area greater than 1,5 m^2), if positioned vertically, would possibly distort the lower spacer bar / corner key, we therefore recommend that a plastic shim as thick as the sealant depth but narrower than the spacer bar, is located underneath the spacer bar below the blind. 2 This shim will support the blind weight during the transfer to the press but must be taken away before the final perimeter seal is applied.

The minimum recommended butyl seal after being pressed in an appropriate machine is 3 mm, but must not project beyond the spacer edge otherwise slat contamination could occur.

Ensure that the butyl seal is continuous - particularly at the corners of the unit.



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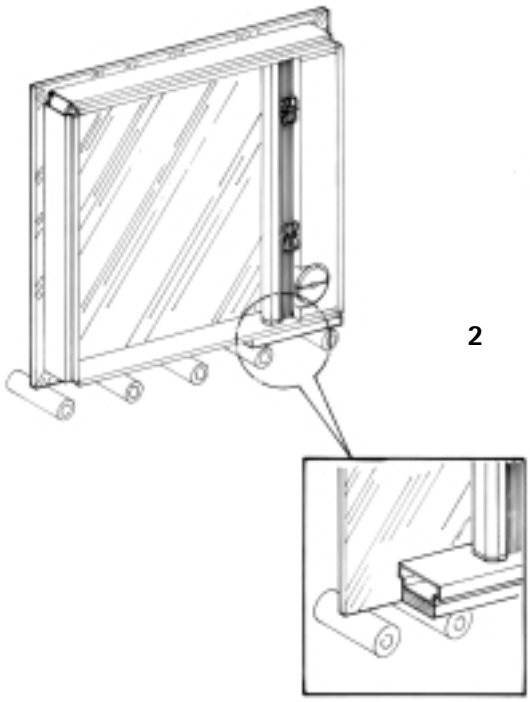

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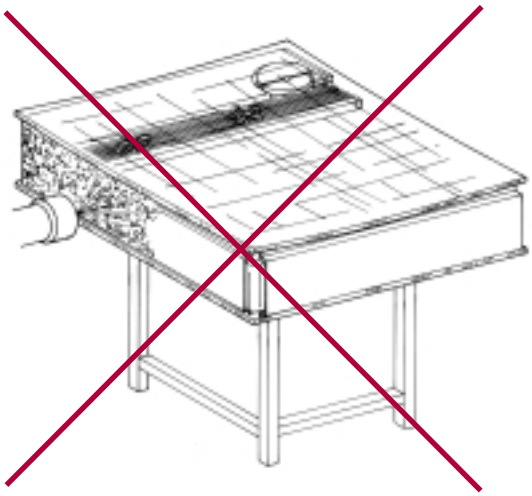

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Final Seal

Vertical sealing systems are preferred, in order to avoid any glass deflections due to its own weight.

Whenever the unit is sealed horizontally 1, a pressure compensation hole is pierced unobtrusively through the spacer. The compensation hole will be opened when the double-glazed unit is positioned vertically. It will then be closed and sealed, when the window glasses are perfectly parallel. Where glass deflection remains, the use of suction cups to restore a parallel position is recommended.

The seal depth i.e.the distance between the edge of the glass and the spacer bar must be not less than 3 mm around the unit perimeter. See Manufacturer's Quality Scheme (page 38).

Important: where one or both of the glasses comprising the double-glazed unit are distorted (toughened or laminated), we recommend that the convex surface is positioned to the external side of the cavity and not the internal one, as in the diagram. 2

Internal atmosphere of the double-glazed unit

To reduce the double-glazed unit deflection due to the absorption of both air and moisture, the use of argon gas, which is not absorbed by the molecular sieve, is recommended.

To manually fill a double-glazed unit with argon, drill two holes through the spacer into the unit cavity, using the recommended standard procedure for the replacement of the air with gas. Avoid any damage to the internal blind and any obvious spacer imperfections.

After filling, carefully seal the holes using a butyl plug followed by the same final sealant material.

We recommend the use argon for all units with an area of more than1 square metre.

For unit manufacture in warm climates with high humidity (low pressure) we recommend the use of argon for all units regardless of size.

The argon gas used to fill the double-glazed unit is supplied from a pressurised gas cylinder and as the gas is

released it cools, this temperature drop is lower than that of the production environment. Therefore in winter, there will be a smaller the temperature differential between the gas (argon) and the environment where the unit is glazed - this will result in fewer smaller deflections of the glass surface.
It is an advantage for an integral blind unit to have the cavity at a slightly higher pressure than the external environment. In order to achieve this using argon, close the outgoing vent first so that the gas still enters causing a slight pressure increase and then after a few seconds, close the incoming vent.

Gas leakage from the double-glazed unit

If the blind is correctly assembled in the double glazed unit which has been manufactured in accordance with prEN 1279/3, specifically concerning the 1° and 2° seal applications, the gas loss will be minimized due to the unit integrity. Investigation into the percentage gas loss in insulating units installed in 10-year-old buildings, resulted in moderate values which were ten times lower than equivalent unit values aged in accordance DIN 52293 and prEN 1279/3.
It therefore assumes that an insulating unit with a gas leakage rate lower than 1% per annum, after artificial ageing, will lose less than 5% of its gas over 25 years in a building. As result, assuming cautious values, the percentage gas loss in a building is thought to double every 10 years.

Ideal environmental conditions

The ideal environmental conditions for the assembly of the ScreenLine® kit into the double-glazed unit are:

- 15°C temperature
- relative humidity lower than 60%
- 760 mm Hg atmospheric pressure.

Different conditions (high temperature, high relative humidity, low atmospheric pressure) can, with time, cause excessive deflections within the double-glazed unit and failure of the molecular sieve.

Final Inspection

Testing

Before despatch of the integral blind unit, it is essential to ensure that it functions as specified in order to guarantee its quality.
We recommend the following control procedure:

- Hold the double-glazed unit vertically, as it would be positioned in the window.
- Check the cavity is uniform across the unit particularly the centre. This check should be repeated the next day for units without argon.
- With time the cavity uniformity should be maintained (see section "internal atmosphere of the double-glazed unit"). The deflection can be measured by placing a straight edge across the unit surface using a wedge gauge or it can be measured with an appropriate laser tool.
- Check the blind functions (tilting and raising) using the external magnet, verifying that the bottom rail and the blind are equidistant from the side spacer bars.
- Check that the glass, the blind slats, the spacer bars and the head rail are perfectly clean.
- Completely raise the blind before shipment. For tilt-only blinds (i.e. those with the bottom rail 'pinned' at the bottom), open the slats to the mid-position before the transport.
- For the SL27M new model, use the appropriate electrical test unit. Do not use batteries to carry out the test.

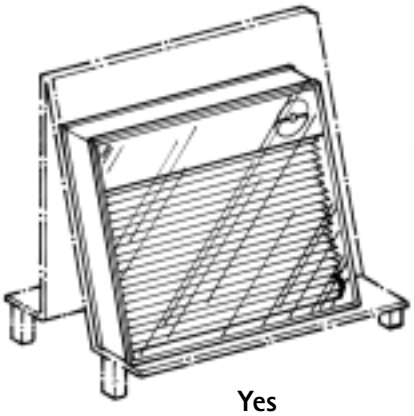
Important

If the blind is restricted during the blind lowering function, immediately stop the lowering in order to prevent damage to the internal mechanism or the cords. Raise the blind, identify and eliminate the source of restriction (glass deflections or non-parallel spacers) and then activate the blind again to ensure it functions correctly.

For transport of the insulating glass unit with integral blind, stack the unit vertically with the raised blind at the bottom of the double-glazed unit. 2
Where the unit size is greater than the permitted shipment height, the unit can be stacked on its longest side, however the blind slats must be raised (packed) to avoid any accidental damage. 2 For low emissivity units, place the non-coated glass to the underside in order to prevent to damage the coating.

For tilt-only blinds, the transport must be made with the blind head rail at the top and with the slats in the mid-position 1, in order to avoid the blind collapsing or being damaged.

For motorised blind units where there are electric cables present, it is important to protect the cables from damage on the pallet by placing them in a high position, and headlighting their presence.



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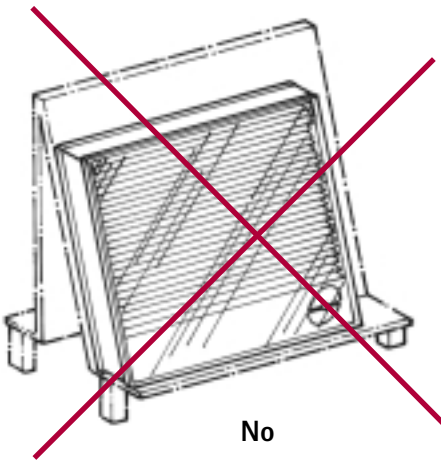

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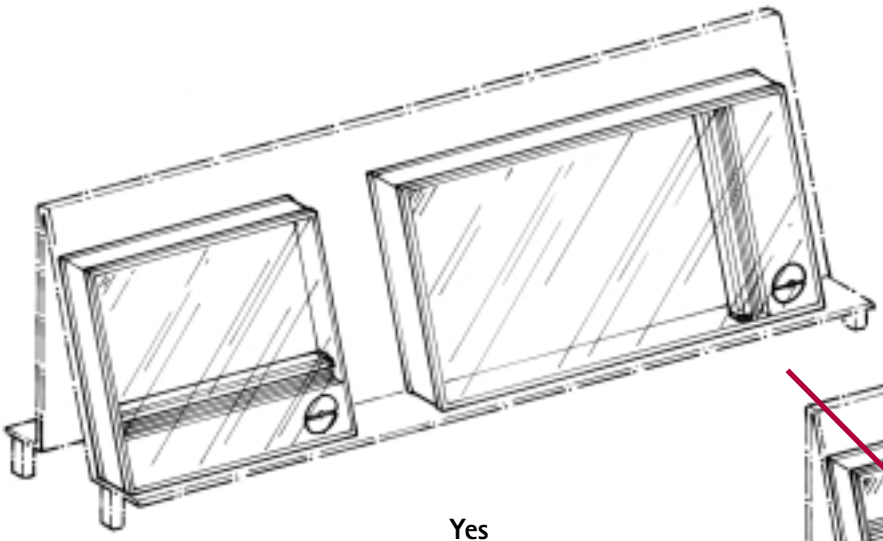

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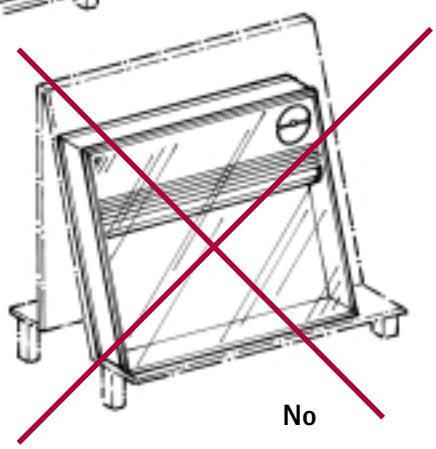

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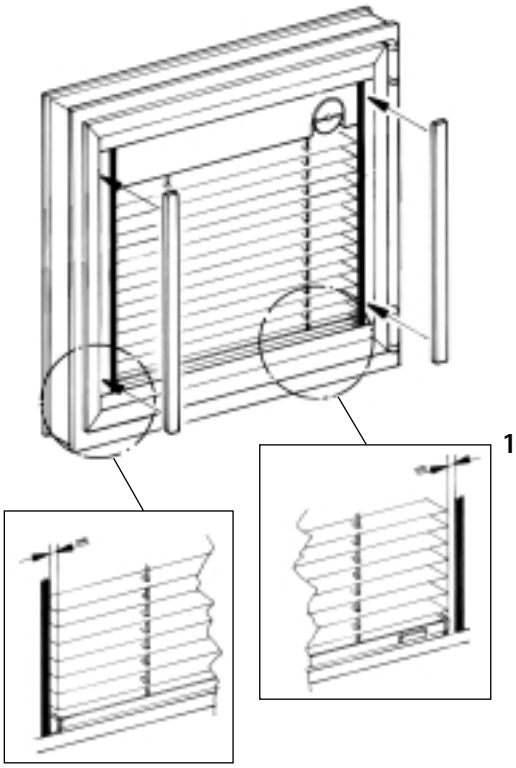
Transport and storage

Stack the finished units using appropriate cork or rubber distance pieces (pads) to avoid damaging the unit surface.
Where integral blind units are stored for some time prior to installation, care must be taken to ensure that the units are stored in a dry area and protected from excess humidity, solar radiation, dust, and harmful materials like concrete and lime. The units should be stored at approx. 6° from vertical on a uniform rigid support in an area away from main routes and passageways. Where the units are stored outside, cover the double-glazed units ensuring distance pieces or separators are used to allow air circulation between the individual units (pads of cork, rubber or any other material that will not damage the glass surface).
The units should not be stored in direct sunlight to avoid thermal shock.

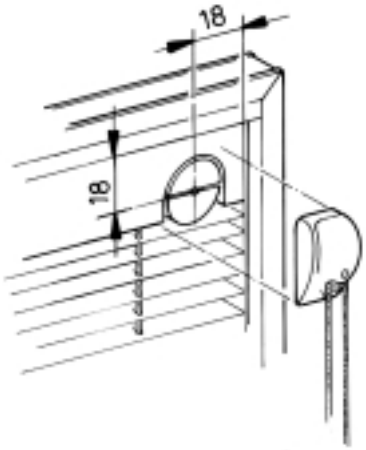
Important: **avoid leaving the blinds raised for long periods of time.**

The production of the double-glazed unit with the integral blind must allow the blind to function without restriction by glass deflections or side spacer bar distortion.
It is also important that the glass and unit comply with their respective manufacturing tolerances. When the units have been manufactured at a different elevation than that of the installation site, it is important to check for glass deflection. Use a straight edge on the external diagonal of the double-glazed unit, or a laser device.
Glaze the double-glazed unit vertically in the window so that the internal blind can slide freely. Minor changes can be made after checking the blind operation, which should allow the bottom rail to be equidistant from the side spacer bars when the blind is almost at the bottom. In the tilting-only blinds, the slats should be equidistant from the side spacer bars. 1



1

Blinds with manual external magnetic control
There should be sufficient clearance, after glazing, for the external magnet to interface correctly with the internal magnet. 2
For design clearance - please check the system specification in the relevant Handbook. Where the 'base plate' location device is fitted, the glazing bead / gasket must not cover it. 3



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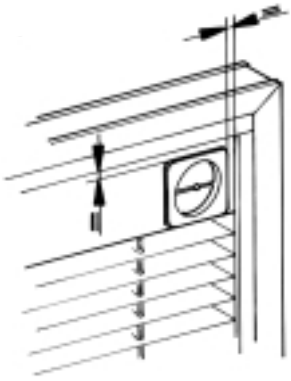

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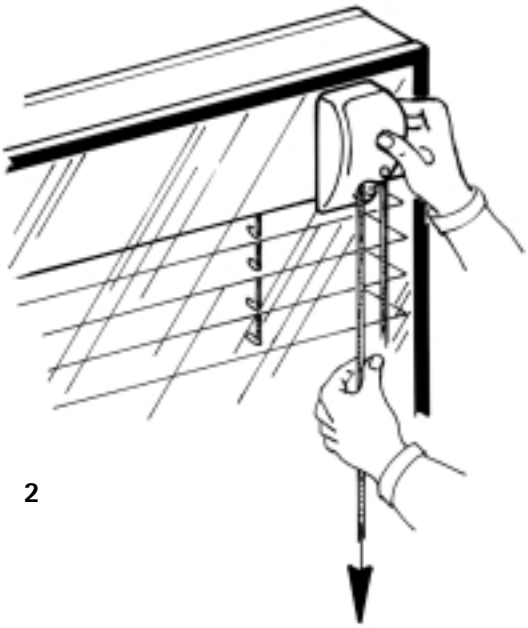

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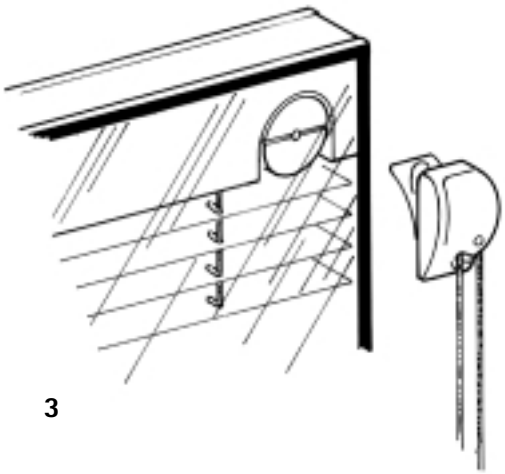

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Apply the external magnet after carefully cleaning its location on the glass with alcohol. 1

For correct operation, the external magnet must perfectly interface with the internal one. Therefore before removing the protective film from the adhesive check the blind works correctly using the external magnet. 2 If satisfactory, remove the protective film and adhere the external magnet using the attractive force as a guide. 3

Apply the cord tensioner, maintaining a slight tension on the cord (cord tensioner slider halfway).

For venetian blinds, e.g. SL27C system, the right cord lowers the blind and the left cord raises it.

The external cord movement must be uniform: sudden acceleration of the cord could damage the internal blind components, especially in SL18 and SL20 systems.

Blinds with knob control

In the kit with knob control, SL24P, leave enough room in the glazing pocket on the control side to accommodate the sheathing containing the flexible control cable.

Couple the flexible cable to the magnet control wire, using the brass tube to slide over them to lock them together.

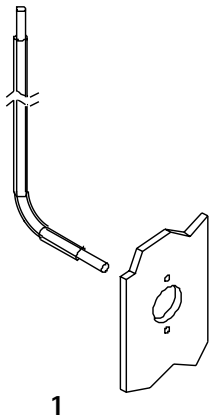
Drill a hole in the window frame 1 allowing the flexible cable / sheath to pass through. 2 Close the blind by turning the cable by hand, such that the convex side of the slat faces outside.

Cut the cable to the right size, (i.e. leaving more or less 5 cm projecting from the frame hole) remove 2 cm of the sheath from the wire cable, slide on the 'cable fixing pin" and tighten the grub screw. 3

Screw the 'fixing plate' onto the 'cable fixing pin' till it is up to the frame 4 and fix with the screws provided. 5

Fix the knob in position and gently tighten the grub screw. 6 Then activate the blind to check that the knob limit switch works properly [the blind must be completely close in both directions]. 7 If not, remove the knob, release the 'fixing plate' and rotate a full turn in the required direction. Re-fix and confirm operation is O.K.

Do not bend the sheathing excessively and do not trap it in the glazing pocket.



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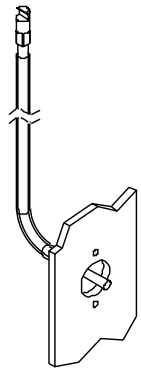

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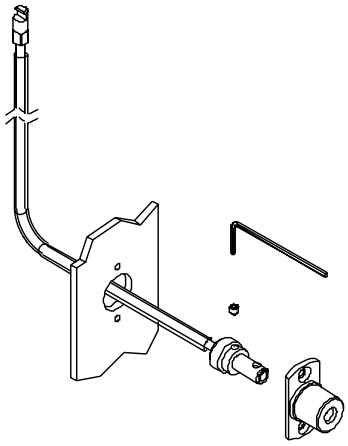

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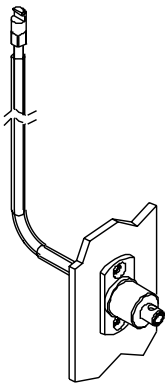

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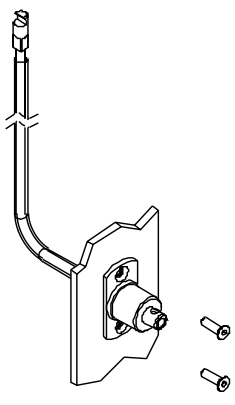

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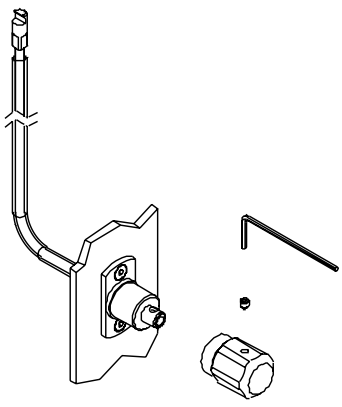

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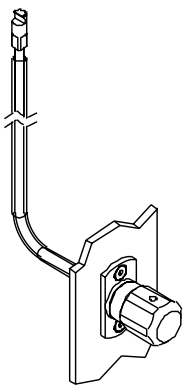

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Blinds with internal motor

To avoid bending the electric cable projecting from the unit edge seal a glazing pocket of 5 mm minimum is necessary.
The cables must not be stretched.
Insulate correctly all electrical connections avoiding soldering or brazing connections.
Do not trap or damage the cables by the unit, distance pieces or setting blocks.
Any holes drilled in metallic window frames for the passage of the electric cables must not have any cutting flaws or sharp edges that could damage the cables.
Make and break electrical connections systems used for opening window or door systems must not be accessible to water penetration, to avoid the possibility of short circuits when opening or closing. This is important for floor connections. It is advisable to assemble these connections on the window vertical jamb, for sliding, up-and-over and traditional windows and doors.
The connections must be placed so that they close simultaneously.
The blind guarantee is invalid whenever suggestions and schemes are not followed.

Blinds with external motor

Glaze the unit in the window frame allowing sufficient space for the external motor to interface correctly with the internal magnet. The base plate may be used as a template for this purpose.
Whenever a hole needs to be drilled in the frame to accommodate the electric cables, care should be taken not to leave flaws that could jeopardise the cable insulation.
Carefully clean the glass where the motor is to be located. Remove the motor unit from the motor base plate, remove the protective film and stick the motor base plate to the glass ensuring it correctly interfaces the internal magnet.
Correctly locate the motor unit on motor base plate and place the cables in the cavity between the double-glazed unit and the frame taking care not to crush or damage the cables.
The blind guarantee is invalid whenever suggestions and schemes are not followed.

Conditioning

After the unit has been glazed, the blind should be fully lowered in order for the internal environment including the blind components (slats, cords. ladder tape etc) to become completely dehydrated.
Blinds left packed (raised) for a long time can cause problems whereby the slats could stick together i.e. a suction cup effect.
Whenever the blind lowering function does not work properly, immediately stop lowering it, raise the blind and verify the cause in order to eliminate it.

Mechanics

The venetian blind is designed to constantly regulate a room's internal lighting condition and to darken it in the event of bright sunlight.

You cannot darken the room entirely because:

- the ladder tape is interposed between the slats
- the slats have small holes for the passage of the cord
- there must be clearance on either side of the slats for expansion purposes due to temperature.

The normal closed position for venetian blinds is for the convex side of the slat to be to the outside to reduce the amount of sunlight. Therefore the slats close more on this side.

When orienting the blind in the opposite direction, the slats are not closed completely and because the sunrays are parallel to the slats more lighting is allowed into the room.

The standard regulation prEN 13120 on Venetian blind use states "when the Venetian blind is closed, any observer outside the room and looking parallel inside the room through a 'closed' Venetian blind, must not see any object positioned inside the room within 1 mt. from the blind".

Sizes and tolerances

For the SL18, SL20 and SL27 models the nominal blind size is 24 mm less than the nominal glass size indicated on the kit label: the standard perimeter frame (sight-line) is normally 12 mm (8 mm spacer bar + 4 mm sealing).

For sight-line requirements different to the above (spacer bar + sealing) it must be highlighted and indicated in the appropriate order form, in order for the blind kit to be modified.

For the SL24P model, the nominal width is 28 mm less and the nominal height is 24 mm less than the nominal glass size. This is because the seal depth on the wire control side is 8 mm, whereas the other three sides have a 4 mm seal depth (assuming a 8 mm spacer).

Where bent spacer bars are used for SL18 and SL20 systems, the maximum permitted tolerance must not exceed 1 mm for the difference between spacer bar internal dimension and respective blind dimension.

The ScreenLine® blind have a 2.5 mm nominal clearance between slat width and the spacer bar for each side. This allows free movement of the system and for thermal expansion of the aluminium slats (aluminium linear expansion: 0.23 mm per metre of length every 10°C).

The production tolerance for the ScreenLine® blind is:

Width: +0 mm / -1 mm

Height: +8 mm/ -0 mm.

Important: slight differences in height may be caused by the ladder tape step.

Parallelism and position tolerances

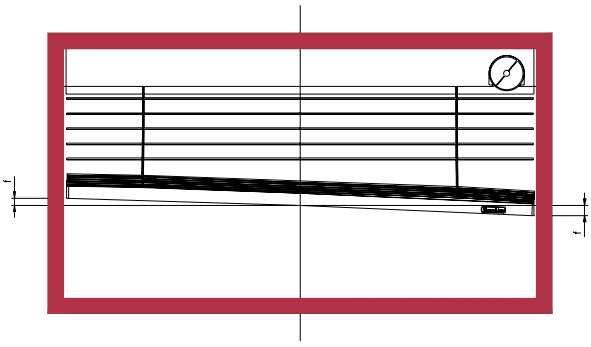
Due to the sum of the tolerances of the cord diameters and of the internal winding mechanism there could be a slight inclination of the bottom rail when raising the blind. This is more critical (greater) in tall and narrow blinds.

For this reason these critical sizes are not included in the price list.
Furthermore, because of the contraction of the raising cords and of the ladders in these tall narrow blinds, it is possible for the bottom rail to become detached from the spacer bar.
Also with these tall narrow blinds, the ladder tape packing coupled with the balance weight in the bottom rail can lead to bending of the bottom rail. Occasionally this bending of the bottom rail is possible in tilt only blinds for tall narrow blinds.
When raising the blind, the ladder tape does not packing a regular or constant way. This can cause some deviation on the horizontal alignment of the slats as they pack (raise). This is not an acceptable reason for complaint.
The maximum parallelism tolerance between the blind head-rail and bottom rail, indicated in the table for different positions of the blind, must be calculated against the bottom rail central point.

Tolerances table

Bottom rail parallelism

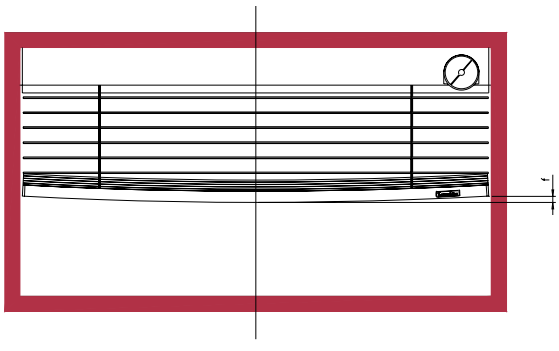
Low position	+/-2 mm
Medium position	+/-5 mm
High position	+/-7 mm



Bottom rail parallelism

Bottom rail distortion

Width less than 1.2 m	3 mm
Width more than 1.2 m	5 mm



Bottom rail distortion

Operating tolerances

Slat closing angle

The slat tilt function ensures the regulation and control of the room brightness.
This function is controlled by the ladder tape that allows the slats to tilt by movement.
The angle of the slat when closed must be not less than 60°, compared to the orthogonal axis of the internal glass.
The tolerance on this slat angle when closed is dependant blind height. Namely:

Ht.<1m:	+/-5°
Ht.>1m:	+/-10°

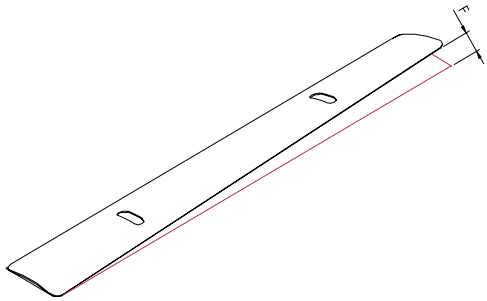
To check that the slats are closing correctly, an observer stood 1metre from the blind, should not see any object beyond the blind for at least 15 cm downwards on the perpendicular axis to the window glass (this approximates a 60° inclination of the slats) – see page 33.

Slat travel angle

In the orientation of the slats, there must be at least a 90° angle against the longitudinal slats axis (see drawing on page 36).

Slats overlapping

The slats must overlap for a width exceeding 1 mm with at the maximum 60° closing angle (see drawing on page 36).



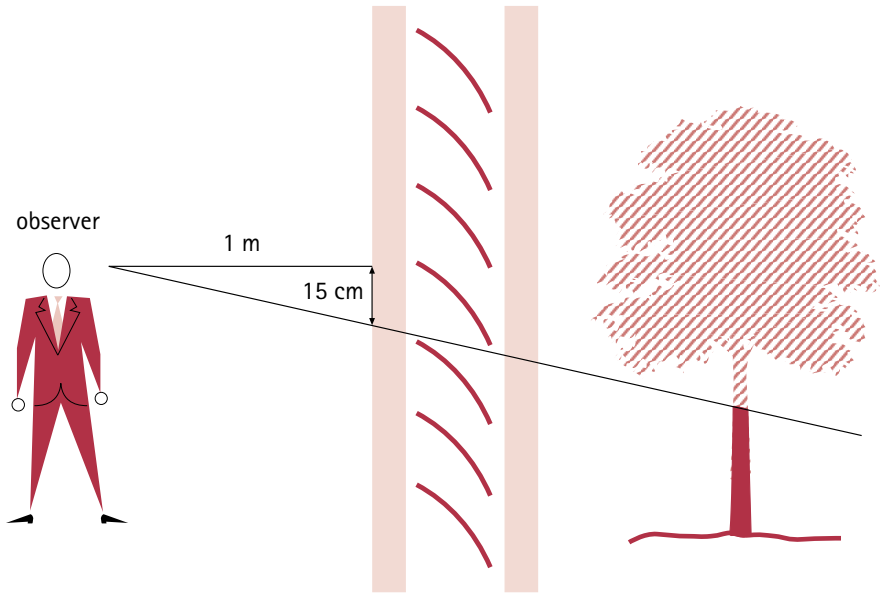
Slats parallelism

Slats parallelism

The maximum misalignment of each slat from the horizontal position must be less than 2 mm on one metre.
This measure is carried out in several points with the slats positioned horizontally (ref. PrEN 13120).

External controls tolerances

The nominal dimension of the external magnet cord is the nominal unit height dimension less 65 mm (excluding special request), and has a +10 mm / -20 mm tolerance. The removable wand, nominal dimension as catalogue, has a length tolerance of: +5 mm / -5 mm.



Non-conformity

To verify the possible anomalies or non-conformance of the ScreenLine® product, it is necessary to visually analyse the blind within the double-glazed unit.
This assessment is only relative to the visible blind parts (head rail, slats, bottom rail and spacer bars, if supplied as part of the ScreenLine® kit).
The glass / unit quality must be referred to the double-glazed unit manufacturer with reference to the normal UNI standards.

Assessment procedures

The assessment of the blind quality must comply with the following points:

- the double-glazed unit with incorporated blind must be positioned vertically, as in the final use
- the blind must be down with the slats at approximately a 45° orientation
- the observer must be 2 metres distance from the double-glazed unit – perpendicular to the double-glazed unit surface – on both sides (see page 36)
- prior to the assessment, any and all surface marks etc. should be removed
- the assessment must not be carried out in direct sunlight.

Acceptable Criteria

The double-glazed unit surface must be divided into two zones: the perimeter zone and the central zone (see page 36).

Perimeter Zone: this area corresponds to approximately a 5 cm band around the unit perimeter. This would normally comprise the blind head-rail, bottom rail, the slats ends and the side guides / spacer bars.
Centre Zone: this area corresponds to the remaining surface (excludes the perimeterzone). This area includes the central part of the blind, with the fewest defects.

For the blind components (head rail, slats and bottom rail etc) the following defects are acceptable. The double-glazed unit total surface must be rounded up to the next full number.

Perimeter Zone

Inclusions, spots, paint defects.
A maximum of 1 defect with a maximum size of 3 mm defect per square metre of unit area.

Slats deposits

A maximum of 1 defect with a maximum size of 3 mm defect per square metre of unit area.

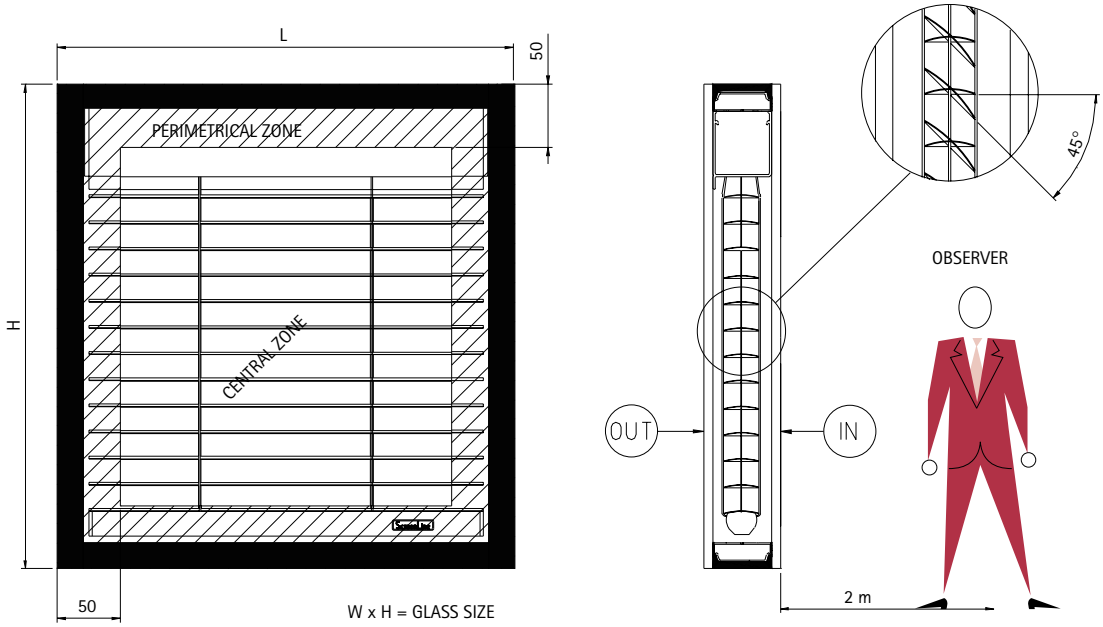
Scratches
Light scratches, which are not readily visible, are acceptable providing the sum total does not exceed 30 mm of length.
The maximum individual scratch length must not exceed 15 mm.

Central Zone
Inclusions, spots, paint defects.
A maximum of 1 defect with a maximum size of 2 mm defect per square metre of unit area.

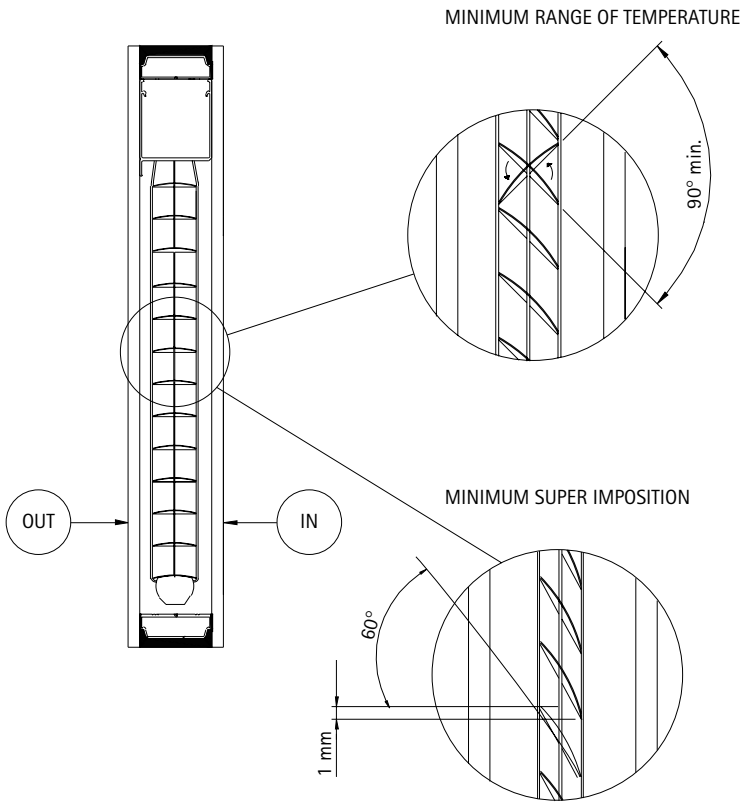
Slats deposits
A maximum of 1 defect with a maximum size of 2 mm defect per square metre of unit area.

Scratches
Light scratches, which are not readily visible, are acceptable unless they are more than 3 and the maximum individual scratch length should not exceed 10 mm.

Defect observation



Slat Travel Angle



The ScreenLine® kit has been designed to be assembled inside rectangular units for vertical glazing applications.
Other special applications contained in the price list are also possible:

- inclined and horizontal double-glazed units
- shaped double-glazed units
- structurally glazed double-glazed units
- partition windows.

We recommend that special applications be referred to our technical department for approval and list below some considerations that should be observed.

- For windows systems that tilt the use of blinds with a raise function is not recommended. Friction of the slats on the glass can jeopardise their operation and possibly cause the ladder tape to fail.
- For up-and-over (i.e. rotational) window systems, the blind should not be operated when inclined and a restrictor used to prevent the window from rotating (in the 180° rotation systems). Before rotating the window, the blind should be fully 'stacked' (raised). For tilt only blind systems (bottom rail fixed on pins at the bottom), the window should only be rotated with the slats closed.
  For both above applications the specially designed inclined model with tilting-only system is recommended.
- For the units assembled in door systems, the constant slamming of the slats on the glass can cause ladder tape damage. It is recommended that door closers, floor springs or effective shock absorbers are part of the door design system.
  Important
- For the low emissivity units, hard-coated Low 'E' glass (pyrolitic) is recommended. For blind systems with raising function, as the blind is raised, the ladder tape stacks and can possibly touch the coating on the glass, which can be significant if a delicate soft coated glass is used (i.e.a magnetronic produced glass). In this instance a tilt only Venetian Blind system using the appropriate side guides is recommended, in order to preserve the coating with time.
  The fin on the side guides does not guarantee that there will be no contact between the low emission glass layer and the blind. It should be noted that with time, the constant friction of the slats on these fins might cause a slight detachment of aluminium dust that settles at the bottom.
  Such deposits are not to be considered as below standard if not readily visible during testing.

ACCORDING TO THE STANDARDS - UNI 10593 1 – 2 – 3 – 4 (prEN 1279)

GENERAL DESCRIPTION

The manufacturer must conform to the following standards and specifications. These standards and specifications refer both to the materials used in manufacture and to some production parameters for the insulating glass units.

1. THE MANUFACTURER MUST HAVE AN ORIGINAL COPY OF THE FOLLOWING UNI REGULATIONS

Uni 10593 sections 1-2-3-4 (pr EN 1279)
EN 572 sections 1-2-3-4-5-6
EN ISO 12543 sections 1-2-3-4-5-6 5
EN 356
EN 1061
EN 12150 section 1
EN 1863 section 1
UNI EN 1096

2. FEATURES AND DOCUMENTATION OF THE RAW MATERIALS

2.1 Glass

The used materials must comply with the following regulations:
- UNI EN 572 (1 to 6 sections): base glass*
- UNI EN 1096: glass with coating**
- UNI EN 150 12543 and classification for the envisaged use (EN 12600, 356, 1063): laminated glass**
- EN 12150: toughened glass**
- EN 1863: heat strengthened glass**

* Supplier declaration

** Certificate of conformity to the regulation (more recent than 5 years)

Such products must be branded with the relevant UNI standard whenever the respective certification scheme exists.

2.2 Spacers and insertions

The product must comply with the manufacturer specification. For the materials used the licencee must have the following documentation, supplied by the manufacturer and less than 5 (five) years old:

- Product specification
- Control and test procedures
- Material Safety card
- Fogging test verification under section C and measurement of the volatile substances quantity under section G (certificates for the same material consignment)
- Absorption capacity as specified under prEN 1279/2.

Furthermore, every consignment must indicate verification regarding:
Metallic Spacers:
a) dimensions
b) grease quantity
c) volatile content under section G
d) hole permeability
e) capacity of the electro-welding under section H.

2.3 Sealants

For the materials used, the licensee must have the following documentation, supplied by the manufacturer and less than 5 (five) years old:
- Product Specification
- Control and test procedures
- Appropriate tests by another laboratory under the UNI regulations:
  10593/2 for primary and secondary sealants
  10593/4 for secondary sealants (shear test and permeability for both humidity and gas)
  10593/3 for primary and secondary if used for units with gas
- Fogging test verification under section C and measurement of the volatile substances quantity under section G (certificates for the same consignment of material)
- Safety card.

Furthermore, every consignment must indicate verification of:
a) viscosity (external sealant)
b) hardness (internal sealant)
c) features of adhesion both to the glass and to the spacer (external sealant)
d) penetration (internal sealant)
e) volatile content under section G
f) expiry date.

2.4 Molecular Sieve

For the materials used the licensee must have the following documentation, supplied by the manufacturer and less than 5 (five) years old:
- Product Specification

- Control and test procedures
- Tc values and heat loss under UNI 10593/2 or corresponding procedures
- Material Safety card.

Furthermore, every consignment must indicate verification of:
a) absorption capacity (Tc)
b) activity (ΔT)
c) heat test
d) particle-size analysis
e) dust quantity.

Important: the above does not apply to systems using organic spacer incorporating desiccant material.

3. PRODUCTION SPECIFICATION

3.1 Minimum quantity of primary sealant:
- 1.5 g per linear metre on per side of the spacer.
- Sealant width not less than 3 mm after pressing.

3.2 Minimum quantity of secondary sealant:
- not less than 3 mm depth between the edge of the glass and the spacer along the whole perimeter of the unit.

3.3 Quantity of desiccant (molecular sieves and silica gel):
for spacers up to 10 mm width, min. of 3 sides to be filled; for spacers exceeding a 10 mm width, at least 50% of the total spacer volume must be filled.
Spacer section must be completely filled.

3.4 Spacers with corner keys:
the corner must be completely sealed.

3.5 Interruptions in the butyl seal, holes and/or interruptions in the external sealant: non permitted.

3.6 The licencee using gas systems (argon etc.) must have appropriate equipment for the measuring the gas concentration.

3.7 The licencee must seal the holes for gas filling with suitable systems to avoid a gas loss.

Certifications
The quality of the ScreenLine® system has been assessed by a number of recognised Institutes for a variety of tests over a period of time.

Certifying institute: **Istituto Giordano S.p.A.**
Issue date: 31.06.99 – 17.10.96
Test report N.: 128089 – 102702
Verification object: determination the optical properties of the double-glazed unit incorporating a ScreenLine® blind.

Certifying institute: **Istituto Giordano S.p.A.**
Test report N.: 102481 attachment A
Issue date: 10.10.96
Verification object: determination of the thermal transmittance "U" (defined as U value).

Certifying institute: **Giordano Institute S.p.A.**
Test report N.: 102481
Issue date: 10.10.96
Verification object: determination of the thermal conductivity "A" and of the specific thermal conductivity "Cs" of insulating materials with the method of the warm slab with guard ring according to UNI regulation 7745/77 with FA 112 April 1983.

Certifying institute: **Istituto Giordano S.p.A.**
Test report N.: 102487
Issue date: 11.10.96
Verification object: condensation test under UV radiation.

Certifying institute: **Istituto Giordano S.p.A.**
Verification report N.: 102773
Issue date: 21.10.96
Verification object: establishing the light transmission factor in accordance with ASTM E 972-88.

Certifying institute: **CSTB France**
Test report N.: 6/97 - 1154
Issue date: March 1998
Verification object: Avis Technique for insulating unit incorporating ScreenLine® SL27A.

Certifying institute: **CSTB France**
Verification report N.: 6/99 - 1256
Issue date: June 1999
Verification object: Avis Technique for insulating unit incorporating ScreenLine® SL27C.

Certifying institute: **IFT Rosenheim Germany**
Test report N.: 601 17056/1
Issue date: May 1996
Verification object: Humidity test on an insulating glass incorporating ScreenLine® blinds in accordance with DIN 1286 standard, section 1.

Certifying institute: **IFT Rosenheim Germany**
Test report N.: 410 21286/1 – 410 21286/2
Issue date: March 1999
Verification object: determination of the Solar Factor and the energy characteristics of an insulating unit incorporating ScreenLine® blinds.

Certifying institute: **Stazione Sperimentale del Vetro di Murano**
Test report N.: 60589
Issue date: August 2001
Verification object: verification report according to the attachments "C" (Fogging Test) and "G" (volatile content) of standard pr EN 1279/6.

Certifying institute: **Stazione Sperimentale del Vetro di Murano**
Test report N.: 60955
Issue date: October 2001
Verification object: verification report according to the procedure envisaged by the UNI 10593 section 2 (prEN 1279) standard. Ageing test, measurement of the moisture vapour etc. (SL20C system).

Certifying institute: **Stazione Sperimentale del Vetro di Murano**
Test report N.: 61184
Issue date: November 2001
Verification object: verification report according to the procedure envisaged by the UNI 10593 section 2 (prEN 1279) standard. Ageing test, measurement of the moisture vapour etc. (SL27MS system).

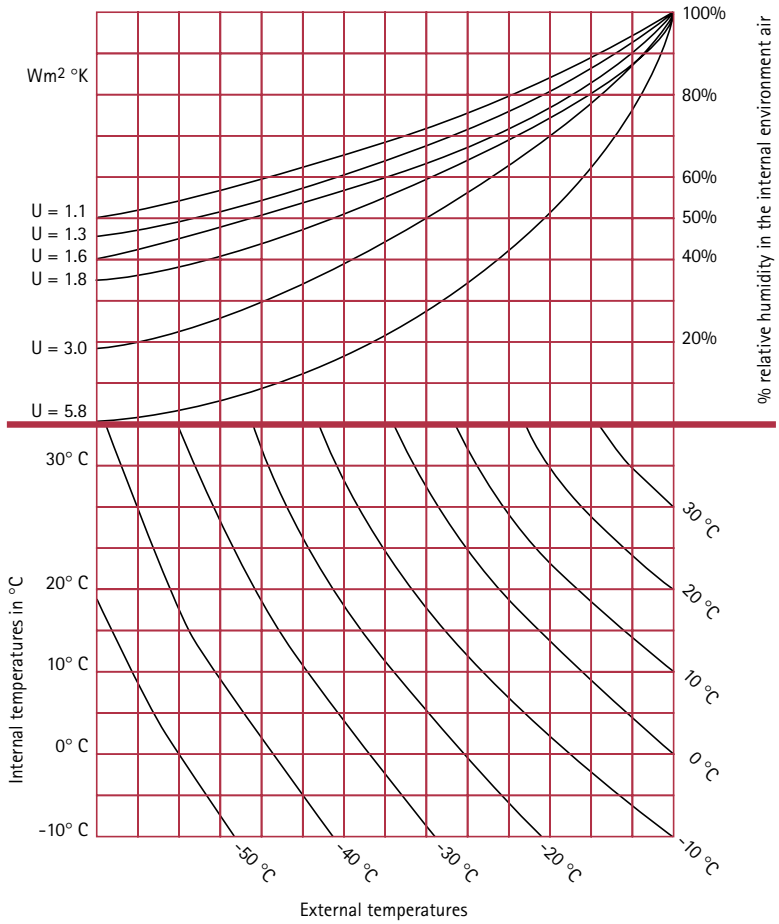
Certifying institute: **TNO Holland**
Test report N.: 006.06465/01.02
Issue date: April 2000
Verification object: establishing the optical properties of the double-glazed unit incorporating a ScreenLine® blind.

TNO Technische Menskunde
This test is based on how much an average user accepts the contrast on his/her computer screen, in respect of the more recent regulations of the E.E.C. countries that envisage a ratio of environmental light factor of 100/10/1.
100% is the value of external light, 10% of the minimum environmental light, 1% of the desk light.
This assessment takes into account some features of the screens (monochromatic units, coloured units, coloured units with non-reflective screens), exposure side (north, east, west, south elevation), direct or reflected light, user position in relation to the source of light and screen position.
The data has been applied to different types of work input, such as cad, word processor, date input.

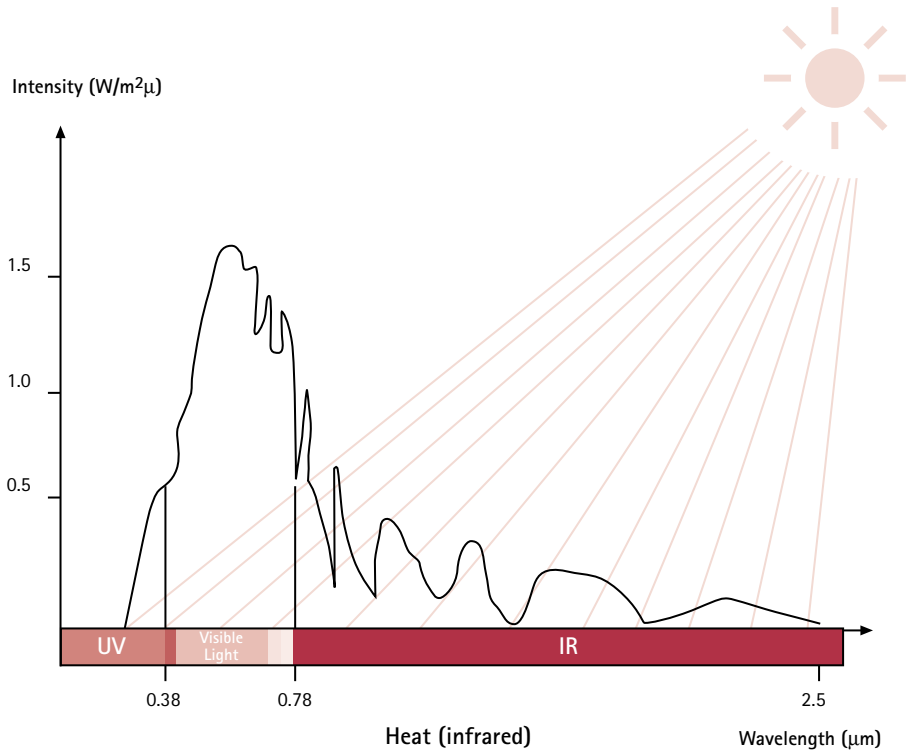
Internal condensation

The condensation appears on the "cold" surfaces, in rooms, these surfaces are traditionally the frames and the glass.
When insulating units are installed in high humidity and low temperature environments (low temperature on face 4 and high relative humidity of the internal air of the room), condensation can appear on face 4.
To limit this effect, it is necessary during the planning / design stage, to consider the temperature effects on the building as a whole (frame + unit).
The use of thermal break frames and low thermal conductivity materials (wood, PVC, etc.) and units with a low U-value (low emissivity glass, gas filling, etc.) are solutions to this problem.
This chart, taken from of Saint Gobain Glass Handbook, is used to calculate the dew point, that is the point at which condensation occurs, in relationship to the transmittance value (U-value), the internal and external temperatures and the relative humidity of the room.

Dew point



A IG unit with an integrated ScreenLine® blind is an excellent screen against solar radiation, and offers the ability to quickly and easily regulate the internal environmental lighting level whilst maintaining good thermal insulation.
By comparing conventional D.G. units with integral blind units, a better understanding of the cocept can be clearly demonstrated.
The following chart represents the total solar radiation spectrum, comprising the ultra-violet, the visible (light) and infrared.
Ultra-violet radiation has a wavelength from 0.28 µm and 0.38 µm and represents roughly 3% of the incident solar energy.
Visible light radiation has a wavelength from 0.38 µm to 0.78 µm and represents roughly 42% of the incident solar energy.
Infrared has a wavelength from 0.78 µm to 2.5 µm and represents roughly 55% of the incident solar energy.
A surface subjected to solar radiation (sunrays) will reflect, absorb and transmit the solar energy according to the characteristic of the material composition of that structure.

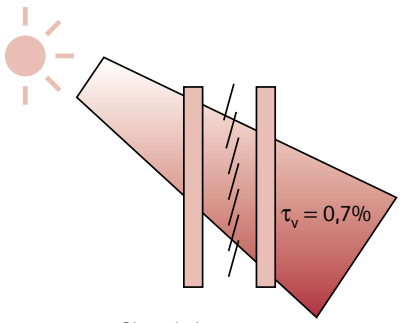


Light transmission

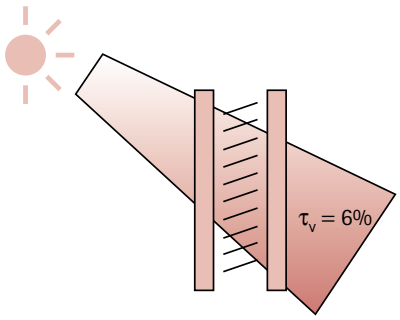
The light transmission indicates the percentage of light passing into a room compared to the total incident light. The venetian blind slats reduce the light passing through according to the slat orientation. In case of pleated blinds, the light trasmission varies according to the fabric density and the colour.

IG unit with integral venetian blind

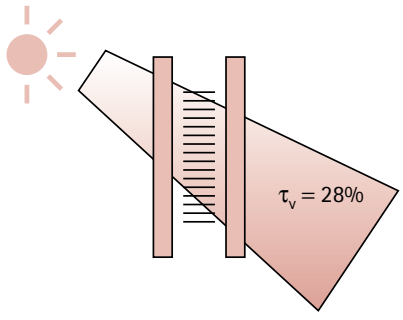
The drawings below represent the effect of the slat orientation on the light transmission for 5 different slat positions within a double-glazed unit.
These values were determined using 16 mm black slats, in a unit comprising 2 x 5 mm thick clear glass with a 27 mm cavity.



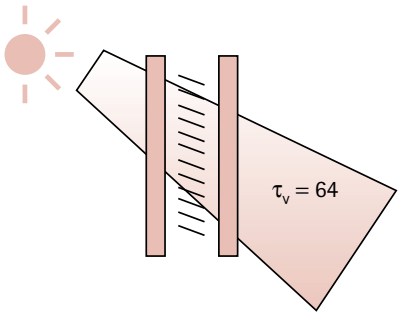
Closed slats



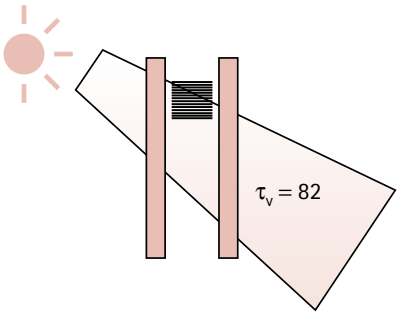
Slat -30° to the horizontal



Open slats



Slat +30° to the horizontal



Blind raised

Important: the values above represent a simplistic approach and may vary in reality due to such influences as indirect light diffusion and reflection from the external environment, slat colour, etc.

I.G. unit with a pleated blind

The table below indicates the light transmission characteristics for the three different qualities of the ScreenLine® pleated fabrics.

The values were determined using a unit comprising 2 x 5 mm thick clear glass with a 18 mm cavity.

Blind type	Colour	Light transmission factor τ_V (%)
SL18C plissé **316** transparent	000	19.7
	936	16.2
	741	17.6
	773	17.3
	273	18.2
	278	16.2
	441	17.0
	536	16.0
SL18C plissé **312** semi-transparent	000	6.3
	936	3.4
	741	5.4
	273	5.0
	278	2.9
	441	5.1
	536	2.5
SL18C plissé **976** opaque	000	4.8
	936	3.0
	741	4.1
	773	3.7
	273	3.4
	278	2.3
	441	3.5
	536	1.3

Test Report:

Test report by Istituto Giordano n°102773 dated 21st October 1996 and n°108089 dated 31st June 1999.

Energy transmission from the external to the internal environment

Document **EN410** for monolithic and double-glazed units for various glass compositions, indicates the procedure for the calculation of all parameters regarding the determination for transmission, reflection and absorption coefficients for both light and energy.
For an integrated blind system the various coefficients are dependent on a number of other additional factors. These factors range from: glass type, slat or fabric colour, cavities width (18 to 27 mm) inert gas or air filled, etc.

The calculations are complex and need to be supported by laboratory tests. One of the most significant factors, used to calculate the amount of energy transmitted to the internal environment, is the **absorption coefficient** (quantity of energy absorbed by the slats of the venetian blind or the fabric of the pleated blind). The absorption is dependent on colour and can vary from 20% (white) to as much as 60%, (grey) – see chart shown below for ScreenLine® Clarion Slats.

Slat colour	S102	S155	S142	S130	S106	S149	S150	S180	S114	S157	S606	S724	S125
Absorption	0,26	0,55	0,36	0,43	0,41	0,32	0,5	0,59	0,37	0,58	0,5	0,55	0,42

Important: it is possible to achieve higher absorption values greater than 60%: i.e. dark grey (81%), red (89%) dark green (93%) and black (98%). These colours are not available in the ScreenLine® product range because this higher absorption during strong radiation (summer) could lead to higher temperatures within the D.G. cavity. This can significantly increase the internal pressure and consequently lead to sealant failure or even thermal breakage. Additionally the slats would reach higher temperatures.
Theoretical studies and lab tests (CSTB) indicate that the temperature within the cavity should be less than 60°C to avoid such possibility. This can be achieved using clear glass and a blind colour with coefficient of absorption of less than than 40%. Alternatively for reflective external glass it is possible to use a venetian blind with a max coefficient of absorption of 55%.
Absorption coefficients over 60% are not recommended.

Solar factor

This factor is the percentage value of the amount of heat passing into a room, through a double-glazed unit, in relation to the total amount of external incident heat.
It is therefore the index of the protection from sunrays of an insulating unit.
For double-glazed units with integral blind, this coefficient has an average value of 60%, depending on the type of glass: this means that 60% of the incident heat passes into the room. Obviously this value will vary according to the type of glass, slat colour, fabric etc (i.e. different absorption coefficients).

Spectro-photometric properties of the double-glazed unit

A. Pleated blind

The table indicates the energy transmission; energy reflection and solar factor values for the range of ScreenLine® pleated fabrics. The values were determined using 2 x 5 mm thick clear glass with a 18 mm cavity.

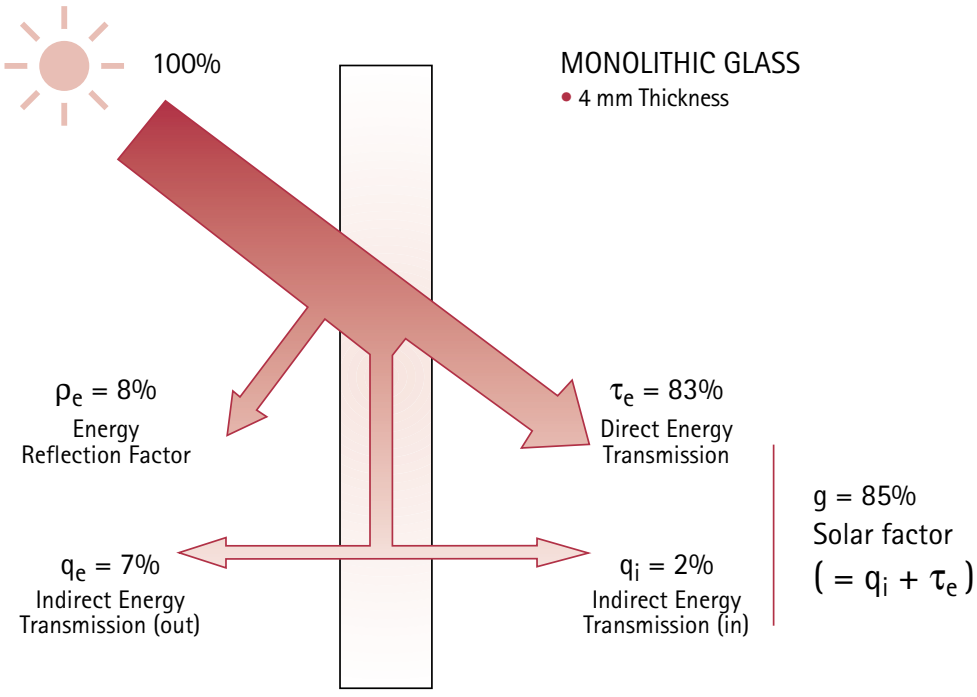
Blind type	Colour	Energy transmission factor τ_e (%)	Energy reflection factor ρ_e (%)	Solar factor g (%)
SL18C plissé **316** transparent	000	16.4	41.2	29.7
	936	14.5	41.4	28.5
	741	14.8	41.4	28.7
	773	14.7	41.0	28.8
	273	15.7	41.1	29.3
	278	15.1	40.9	29.1
	441	15.1	40.9	29.1
	536	15.0	39.6	29.7
SL18C plissé **312** semi-transparent	000	5.4	49.0	19.3
	936	3.7	47.9	19.4
	741	4.7	47.9	18.5
	273	4.6	48.2	19.2
	278	3.5	49.2	18.0
	441	4.7	48.8	19.0
	536	3.5	49.2	18.0
SL18C plissé **976** opaque	000	4.0	53.6	16.3
	936	3.5	52.0	16.7
	741	3.7	55.9	15.0
	773	3.5	53.0	16.3
	273	3.4	56.5	14.6
	278	3.1	53.3	15.8
	441	3.3	56.7	14.5
	536	2.6	52.9	15.8

B. Venetian blind

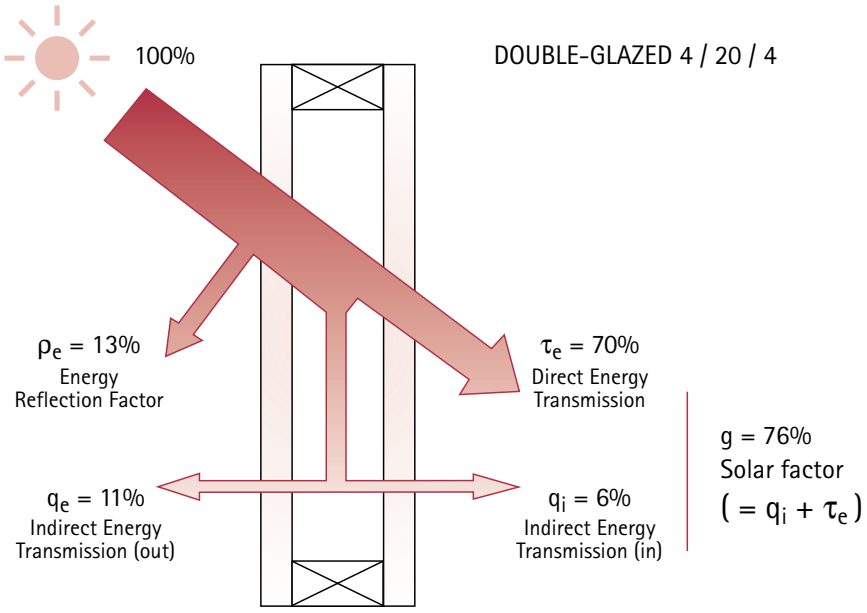
The table indicates the energy reflection factor and solar factor for 4 different coloured slats. The values were determined using 2 x 4 mm thick clear glass with a 27 mm air cavity.

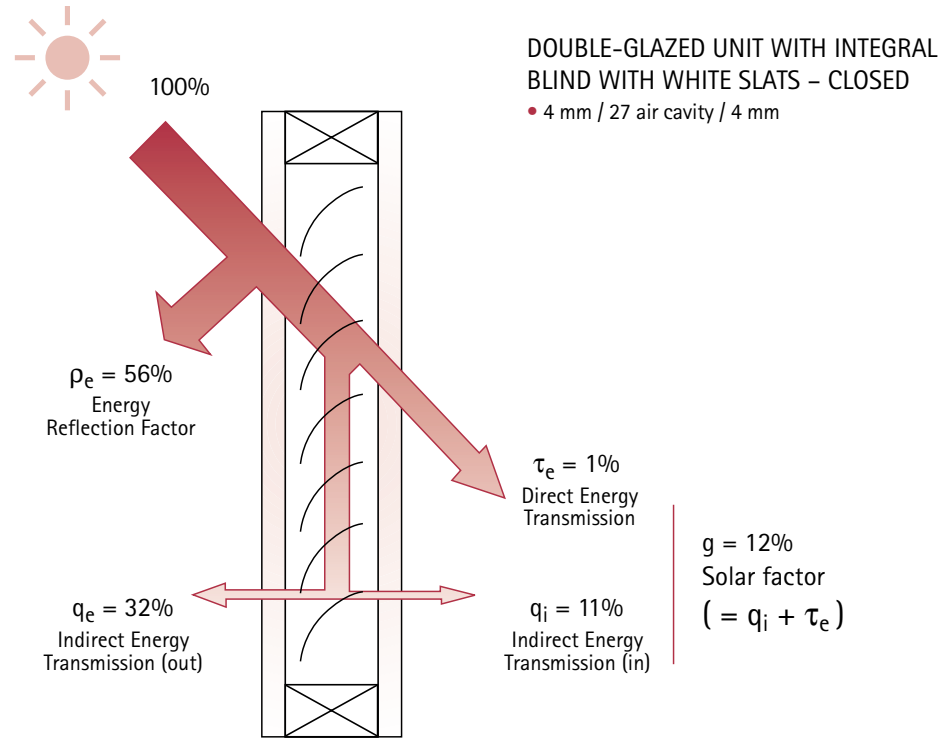
Slat colours	Energy reflexion factor	Solar factor
S 102 (white)	56%	12%
S 125 (grey)	45%	17%
S 149 (beige)	48%	15%
S 157 (silver)	39%	19%

To more clearly understand the distribution of energy, let us consider the following 3 systems: (1) a clear monolithic glass, (2) a double-glazed unit with clear glass unit a (3) a D.G. unit with a white integral blind with the slats closed.



Spectro-photometric properties of the double-glazed unit





Conclusion: The use of an D.G. unit with an integrated blind is an excellent screen against solar radiation and offers a sensible method of reducing the heat gain within the building.

Heat transmission – integrated blinds I.G. Unit

The coefficient U indicates the amount of heat in Watts passing through a 1-m2 surface where there is a 1°C difference of temperature between the two surfaces.
Current energy saving regulations require that the U-value should be reduced and therefore recommend low thermal conductivity material for this purpose.
For D.G. unit, the U values may be reduced by inserting inside a noble gas such as Argon or Krypton or incorporating a blind or by using a low emissivity glass (Low "E").
Framing systems can have their U-value reduced by using thermal break frames, such as wood, U-PVC or Aluminium. For the calculation of the total thermal characteristics of the window, we need to consider all the separate U-values that constitute the window (glass + frame) according with the following formula:

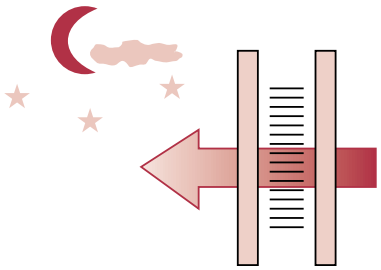
$Uw = (Af\ Uf + Ag\ Ug + Lg\ \psi) / (Af + Ag)$ EN ISO Standard N° 10077-1

Terminology
Uw = Total Energy Transmission
Uf = Energy Transmission of frame
Ug = Energy Transmission of Glass
Af = Surface area of frame
Ag = Surface area of Glass
Lg = Perimeter of the Glass
ψ = Energy Transmission for the perimeter dimension

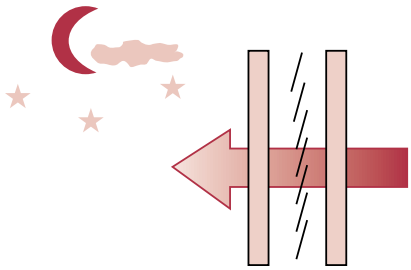
Spectro-photometric properties of the double-glazed unit

As indication of the thermal transmission value (U-value) is shown below for various systems:

D.G. unit with integral blind, comprising 2 x 4 mm with a 27 mm cavity (air).

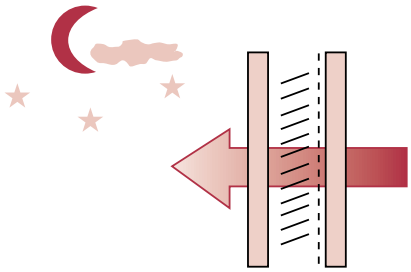


Open slats U = 2,78 W/m²K°

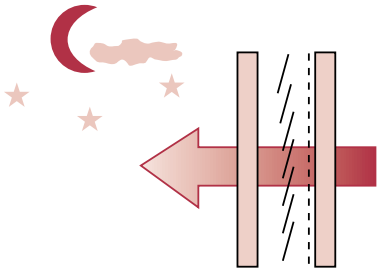


Closed slats U = 2,18 W/m²K°

Double-glazed unit with integral blind comprising 2 x 6 mm with 27 mm cavity (air) and low "E" coating surface 3.



Slats 45° U = 2,39 W/m²K°



Closed slats U = 1,7 W/m²K°

Spectro-photometric properties of the double-glazed unit

The following table indicates the transmittance values for various I.G. systems, calculated in accordance with Standard prEN 673.

Glass composition	External Glass	Cavity	Content	Internal Glass	Transmittance [W/m2K°]
4 / 27 / 4	Float 4 mm	Air	None	Float 4 mm	2,70
4 / 27 / 4	Float 4 mm	Air	Venetian blind	Float 4 mm	2,00
4 / 27 / 4	Float 4 mm	Argon	None	Float 4 mm	2,60
4 / 27 / 4	Float 4 mm	Argon	Venetian blind	Float 4 mm	1,80
4 / 27 / 4	Float 4 mm	Air	None	4 mm Low "E"	1,25
4 / 27 / 4	Float 4 mm	Air	Venetian blind	4 mm Low "E"	1,22
4 / 27 / 4	Float 4 mm	Argon	None	4 mm Low "E"	1,10
4 / 27 / 4	Float 4 mm	Argon	Venetian blind	4 mm Low "E"	1,07
4 / 27 / 4	4 mm Low "E"	Air	None	Float 4 mm	1,33
4 / 27 / 4	4 mm Low "E"	Air	Venetian blind	Float 4 mm	1,32
4 / 27 / 4	4 mm Low "E"	Argon	None	Float 4 mm	1,05
4 / 27 / 4	4 mm Low "E"	Argon	Venetian blind	Float 4 mm	1,03

Conclusion: For a standard D.G. unit the use of an integral blind will improve the U-value. In Low "E" units the use of an integral blind does not significantly affect the U-value, however the blind will greatly reduce the heat gain from solar radiation as well as controlling the light intensity within the room.