

**ENG**  
**2013\_00**

**velthec<sup>®</sup>**

# Guidelines for the Visual Quality Evaluation of Venetian Blinds Inside Insulating Glass Units

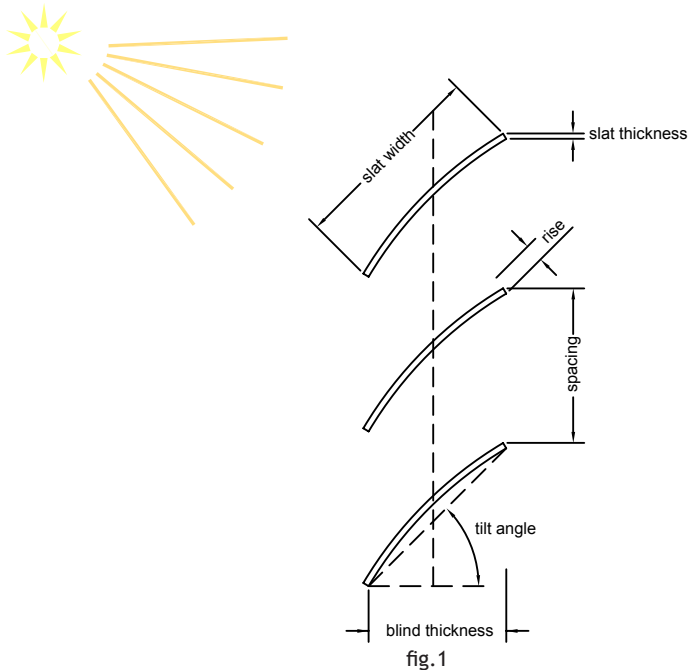
## 1.0 INTRODUCTION

These guidelines provide useful information to evaluate the visual quality of Venetian blinds inside insulating glass units.

It deals with technical requirements, recommendations, illustrations, tables, pictures explaining evaluation criteria and parameters. These guidelines are published in electronic format.

## 2.0 DEFINITIONS

Definitions are described hereunder (fig.1):



**Blind thickness** is the variable thickness given by slat width

**Tilt angle** is the slat rotation angle relative to the floor

**Spacing** is the distance between two slats having the same point of reference

**Slat width** refers to the slat highest linear dimension

**Slat thickness** is the total slat thickness

**Rise** is the perpendicular distance between the shaped slat and the centre of the cord joining slat ends

**Overlap** is the average overlap of two contiguous slats in the highest closing angle

SLAT PARAMETERS	12	16
Width	12.5mm	16.0mm
Thickness	0.20mm	0.20mm
Rise	1.0mm	1.2mm
Spacing	10mm	12mm
Overlap	2mm	4mm
Tilt angle	-75° +75°	-75° +75°

tab.1

## 3.0 APPLICATION FIELD

The following guidelines are to evaluate the visual quality of systems with tilting and fixed slats installed inside insulating glass units.

The analysis of insulating glass units refer to specific regulations and are not object of discussion.

Test conditions and evaluation fields may diverge or find no applications within the requirements of regulations for insulating glass units.

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## 4.0 PRINCIPLES OF TESTING

### 4.1 Preliminary remarks

Noises when opening windows, particularly tilt-turn windows, are not caused by technical problems and do not represent any defect.

Evaluation criteria are valid for door and window frames set vertically ( $90^\circ$  angle relative to the floor).

The distance between slats and spacer is not object of any visual quality criteria.

### 4.2 Venetian blind systems

Essential components of Venetian blind systems are visible surfaces of slats, head and bottom rails (if any), and the position of slats at top or bottom end-stops (intermediate positions are not considered).

As for side control systems (e.g. VC20 & VC27 with modular chain), slats are tested relative to the floor and side fixing.

## 5.0 EVALUATION CRITERIA

Appearance is to evaluate on significant surfaces, that is on key surfaces for blind appearance and functionality. Edges, recesses and secondary surfaces are not key surfaces.

Tests should be done according to the following guidelines (fig.2):

- Parallel with the ground observation angle and  $90^\circ$  relative to the floor Venetian blind
- Minimum observation distance: 2000 mm
- Neither direct sunlight (outside buildings) nor artificial light (inside buildings) are admitted, but subdued light is (e.g. in case of covered skies outside or diffuse illumination inside)
- Test conditions are valid for upper and lower end stops, but intermediate positions are not to be considered

### 5.1 Observation surfaces

The surfaces to analyze are divided in:

- peripheral area (about 10%, dashed area fig.3)
- major area (the remaining)

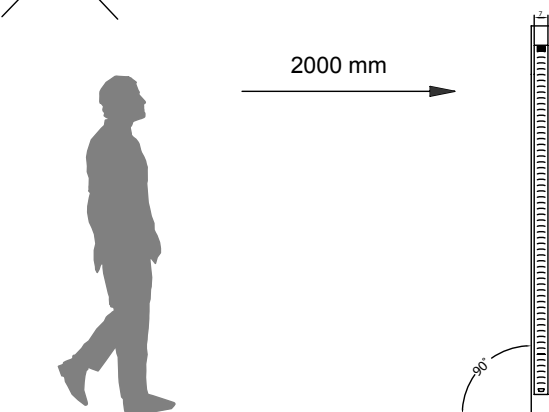


fig.2

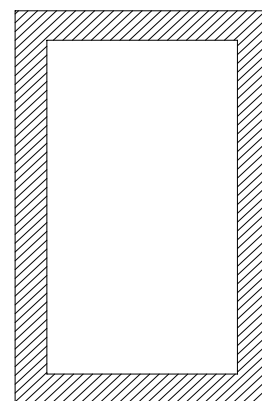


fig.3

## 6.0 VISUAL FIELD DEFECTS

Visual field defects are identified by the following guidelines. For a correct evaluation, observation distance, observation angle, closing and opening positions of Venetian blinds and evaluation criteria are essential requirements.

### 6.1 Evaluation criteria

Frictions of slats against fixed elements and deterioration of the part in contact with them during upward and downward movements are not to exclude.

No working scraps (e.g. butyl) are allowed.

Evaluation criteria are shown in the tables below: tab.3, tab.4, tab.5, fig.4

EVALUATION CRITERIA	EVALUATION
Deterioration of slat ends due to friction	According to tab.5
Wear signs in the peripheral area	Within allowed limits tab.5

tab.3

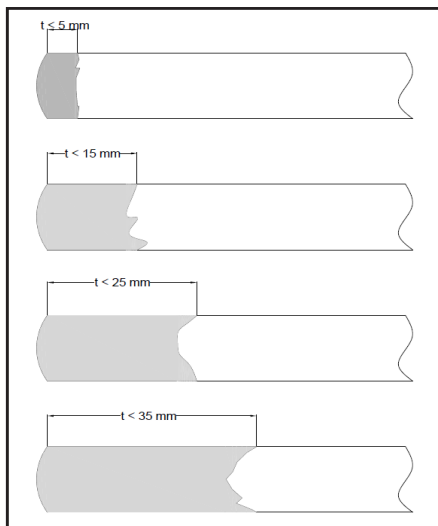


fig.4

Slat finish Dirt color	Contrast
	0-20%
	21-40%
	41-60%
	61-80%
	81-100%

tab.4

Discoloration intensity	Contrast				
	0-20%	21-40%	41-60%	61-80%	81-100%
$t \leq 5\text{mm}$	ok	ok	ok	ok	ok
$t \leq 15\text{mm}$	ok	ok	ok	ok	KO
$t \leq 25\text{mm}$	ok	ok	ok	KO	KO
$t \leq 35\text{mm}$	ok	ok	KO	KO	KO
$> 35\text{mm}$	KO	KO	KO	KO	KO

tab.5

#### 6.1.1 Defects

Defects classified as: dots, inclusions, marks, lamination defects, etc... are allowed as follows:

**PERIPHERAL AREA:** max 4 defects/m<sup>2</sup>,  $\Phi \leq 3\text{mm}$

**MAJOR AREA:** max 2 defects/m<sup>2</sup>,  $\Phi \leq 2\text{mm}$

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## 6.1.2 Scratches

Scratches in both areas (peripheral and major fig. 3) must be thin and not closed to each other. The total sum of single lengths must not be higher than 30 mm.

Maximum length of a single scratch  $\leq 15$  mm

## 6.2 Slat misalignments

Slat misalignment  $M$  (fig.5) is considered for both sides and corresponds to the maximum movement. The following considerations can be applied to a single glass pane. Slat misalignments cannot be summed in different glass panes of a single window frame or in glass panes of contiguous window frames. Table 6 shows the maximum slat misalignment ( $M$ ) relative to glass pane width.

Glass pane width (mm)		$M$ = Maximum slat misalignment (mm)
from	to	
0	1000	< 6
1001	2000	6
2001		6

tab.6

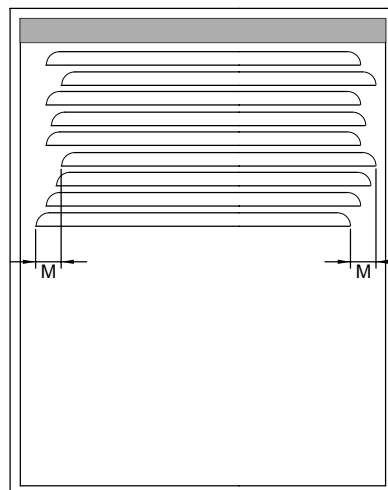


fig.5

## 6.3 Slat inclination

The inclination relative to the horizontal plane ( $D$ ) is taken into consideration only when the Venetian blind is at the end stop (complete blind packing or total unpacking), fig.6.

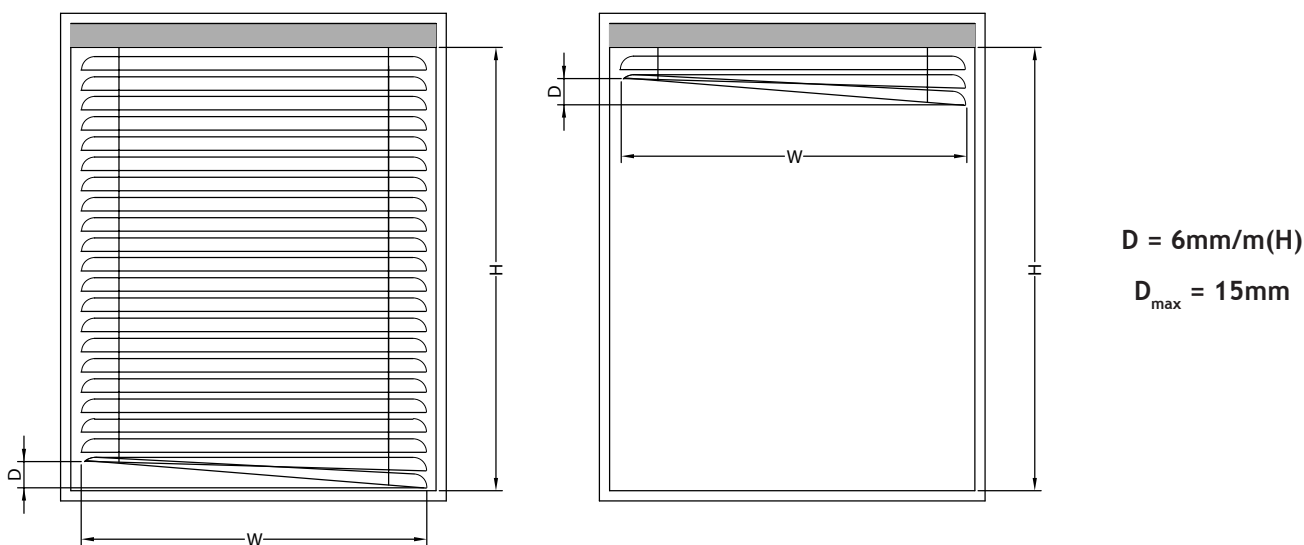
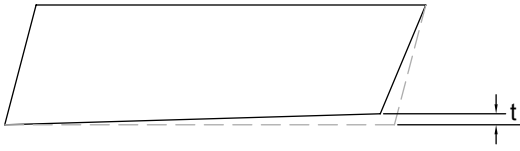


fig.6

Inclination  $D$  is maximum 6 mm per height meter ( $H$ ) of the glass pane and in any case not higher than 15 mm ( $D_{\text{max}}$ ). Where present, the bottom rail is taken as point of reference.

## 6.4 Admitted deformations

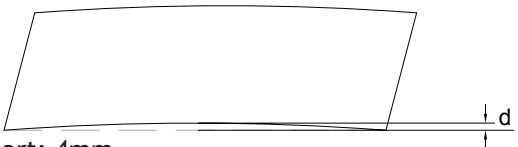

### 6.4.1 Torque

TORQUE (EN 13120)	
 <p>Angular deviation 't' between slat ends</p>	2mm/m
Local deformation	Admitted around punching

tab.7

### 6.4.2 Curvature

Curvature evaluation takes place when the Venetian blind is completely closed.

CURVATURE (EN 13120)	Slat length 's' (m)	Maximum curvature value 'd' (mm)
 <p>End part: 4mm Slat (measured when the Venetian blind is closed)</p>	$s \leq 1.5$	5
	$1.5 < s \leq 2.5$	10
	$2.5 < s \leq 3.5$	15
	$s > 3.5$	20
 <p>Saber-shaped slat 'c'</p>	$c = 0.5 s^2$  $s = \text{slat length}$	

tab.8

### 6.4.3 Tolerance admitted by slat incomplete rotation

The maximum admitted tolerance is 2% of the total quantity of blind slats.

Slats can remain suspended or attached to each other at starting point; however, they must not remain suspended nor attached to each other for a long time (e.g. after a complete cycle).

### 6.4.4 Minimum closing angle

Closing angle of any Venetian blind system must be in line with the description of the system and minimum 45° (unless otherwise specified).

### 6.4.5 Irregular light transparencies

They are admitted in the course of time on condition that they are within slat tolerances (torque and curvature) or that the other tolerances are met.

Irregular light transparencies may happen in case of irregular curvature of single slats or within the tolerance of closing angle.

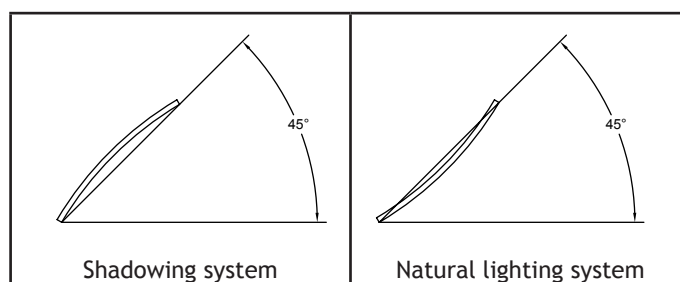


fig.7

## 6.4.6 Tolleranze dell'angolo di chiusura sul piano

It is recommended to consider:

- average value of three subsequent slats
- blind heights of 90%, 50% (central position), 10%

The maximum angular deviation relative to the central position is specified in the following table:

System	Height H (mm)	Tolerance
shadowing	$\leq 1000$	$\pm 8\%$
	$> 1000$	$\pm 12\%$
natural lighting	$\leq 1000$	$\pm 10\%$
	$> 1000$	$\pm 12\%$

tab.9

## 6.4.7 Precision of opening angles of Venetian blind systems

The opening angle parameter (fig.8) is applied to systems with a single side closure.

Depending on the maximum opening of the system, slats may depart from the central position as per table10.

Height H (mm)		Tolerance
from	to	
0	1000	$\pm 7^\circ$
1001	2000	$\pm 8^\circ$
2001	3000	$\pm 9^\circ$
3001		$\pm 10^\circ$

tab.10

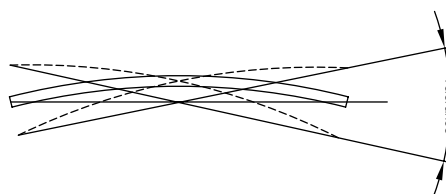


fig.8

## 6.4.8 Tilting in systems closing on both sides

In systems closing on both sides, slats should comply with DIN 18073 and be tilting at least  $90^\circ$  relative to the longitudinal axis (fig.9).

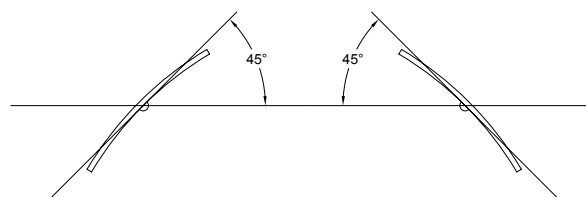


fig.9

## 6.4.9 Tilting in systems closing on one side with central position on two sides

Slat tilting is evaluated considering one closing side and must be at least  $45^\circ$  relative to the longitudinal axis (fig.10).

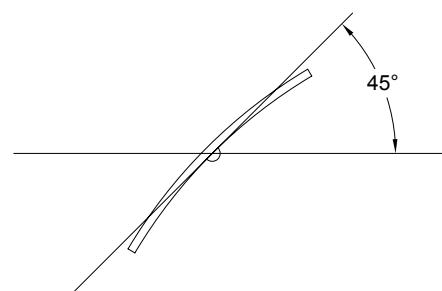


fig.10

#### 6.4.10 Slat overlap

Single slats must have minimum overlap of 1 mm in the maximum closing angle (fig.11).

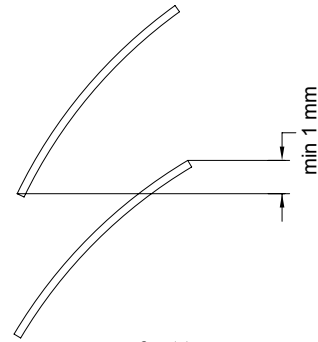


fig.11

#### 6.4.11 Slat closure

Following all evaluation criteria (ph.5.0) at Venetian blind completely packed, no direct sight through the blind is admitted.

## 7.0 GENERAL GUIDELINES

These guidelines represent an evaluation scale for the analysis of the visual quality of **VELTHEC®** Venetian blinds inside insulating glass units.

From the analysis, it should come out that, except for visual quality, the essential features of the product should not be considered in the same way when performing their functions.

For example, a synchronism of more elements (apart from **VM27** whose self-learning system allows synchronism among elements) cannot be guaranteed.

As a matter of fact, synchrony is not a parameter of visual quality.

## 8.0 SPECIFIC GUIDELINES

All systems may undergo a visible rupture of the rail for technical reasons. The consequences of length variations because of temperature changes cannot be definitely excluded and are not reasons to complain.

The single slats are fixed in their position by the so-called cords. The position of these cords may change according to the system. Besides, the bending of these cords is irregular, the same for the position of slats controlled by cords.

The systems having glasses with coating, like enamels, etc. are not object of evaluation in this guideline and must be considered otherwise.



## SOURCES AND REFERENCES

1. Richtlinie zur Beurteilung der visuellen Qualität für Systeme im Mehrscheiben-Isolierglas; Bundesverband Flachglas
2. DIN 18073: Roller Shutters, Awnings, Rolling Doors And Other Blinds And Shutters In Buildings - Terms And Requirements
3. UNI EN 13120: Internal blinds - performance requirements including safety
4. QUALICOAT® - Specifications for a Quality Label for Liquid and Powder Organic Coatings on Aluminium for Architectural Applications
5. VELTHEC® - Venetian blinds technical specifications

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