

UNOFFICIAL TRANSLATION

G/TBT/Notif.98.043

In the event of any doubt or misunderstanding arising from this translation, the standard in Thai will be held to be authoritative

**Notification of Ministry of Industry
No.2367 B.E. 2541 (1998)
issued under the Industrial Product Standards Act
B.E. 2511(1968)**

**Subject : Amendment to Thai Industrial Standard for
Tinted float glass (Amendment No. 1)**

Whereas it is deemed appropriate to modify the Thai Industrial Standard for Tinted float glass (TIS 1344-2539),

By virtue of Section 15 of the Industrial Product Standards Act B.E. 2511 (1968), the Minister of Industry hereby issues a notification amending the Thai Industrial Standard for Tinted float glass (TIS 1344-2539) which is attached to the Notification of Ministry of Industry No. 2132, B.E. 2539(1996) dated 11 April B.E. 2539(1996) as follows :

1. The number of the Standard is amended from "TIS 1344-2539" to "TIS 1344-2541".
2. Table 3 is withdrawn and replaced with the following table.

**Table 3 Solar radiation transmittance of tinted float glass
(Clause 4.1)**

Tinted float glass	Solar radiation transmittance at the thickness of 5 mm
Blue	70.0%
Gray	75.0%
Bronze	
Other	

Such Ministerial Notification shall come into force upon their publication in the Government Gazette.

Given on 28 January B.E.2541(1998)
Minister of Industry

Published in the Government Gazette Vol.115, Part 32 ngor., dated 21 April B.E.2541(1998)

Unofficial Translation

G/TBT/Notif.97.682

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TIS 1344-2539 (1996)
Thai Industrial Standard
for
Tinted Float Glass

1. Scope

- 1.1 This standard specifies sizes and tolerances, requirements, packaging, marking and labelling, sampling and criteria for conformity, and testing for tinted float glass.

2. Definition

For the purpose of this standard, the following definition apply :

- 2.1 TINTED FLOAT GLASS : One-layer glass with such tone of colours as blue, gray, bronze. Used to minimize solar heat glare and heat absorbing purposes. Made into sheet by floating glass on melted tin.

3. Sizes and tolerances

- 3.1 Thickness and tolerances shall be in accordance with those specified in Table 1. Compliance is checked by the test in accordance with clause 8.1.1.
- 3.2 Width and length shall be in accordance with those indicated on the label. Tolerances shall be as specified in Table 2. Compliance is checked by the test in accordance with clause 8.1.2.

Table 1 Thickness and tolerances
 (Clause 3.1)

Units in millimetre

Thickness	Tolerances
2 3 4 5 6	± 0.3
8 10	± 0.6
12 15	± 0.8

Table 2 Tolerances for width and length
(Clause 3.2)

Unit in millimeter

Thickness	Tolerances for width and length	
	width and length	
	Not exceed 3 000	Exceed 3 000 to 5 000
2	± 1.5	as agreeable between purchaser and seller
3		
4		
5	± 2.0	
6		
8	+ 2.0	+ 3.0
10	- 3.0	- 4.0
12	± 3.0	± 4.0
15		

4. Requirements

4.1 Solar radiation transmittance (τ_{eN})

Values of solar radiation transmittance of tinted float glass at the thickness of 5 mm. shall not exceed those specified in Table 3.
Compliance is checked in accordance with clause 8.2.

Table 3 Solar radiation transmittance of tinted float glass
(Clause 4.1)

Tinted float glass	Solar radiation transmittance at the thickness of 5 mm
Blue	70.0 %
Gray	75.0 %
Bronze	75.0 %

4.2 Other requirements

shall be in accordance with Table 4.

Table 4 : Other requirements of tinted float glass
(clause 4.2)

Type of defects	Size of tinted float glass mm ²	Permissible number of bubbles per 300 mm x 300 mm area					Test method In accordance with
		Length of bubble (mm)					
		0.5 to less than 1.5	1.5 to less than 3.0	3.0 to less than 5.0	5.0 to less than 10.0	10.0 or over	
Bubble	-	0.5	0.1	0.04	0.02	0	clause 8.3
		Permissible number of foreign materials per 300 mm x 300 mm area					
		Size of foreign materials (mm)					
		0.5 to less than 1.0	1.0 to less than 2.0	2.0 or over			
Foreign materials	-	0.2	0.04	0			clause 8.4
		Requirements					
Seam and body non-conformity	under 0.5	There shall be none 50 or over in width					clause 8.5
	0.5 to less than 1.0	There shall be none 100 or over in width					
	1.0 to less than 2.0	There shall be none 200 or over in width					
	2.0 to less than 4.0	There shall be none 300 or over in width					
	4.0 or over	There shall be none 500 or over in width					
Hair line	under 0.5	There shall be none 60 or over in width					
	0.5 to less than 1.0	There shall be none 120 or over in width					
	1.0 to less than 2.0	There shall be none 240 or over in width					
	2.0 to less than 4.0	There shall be none 360 or over in width					
	4.0 or over	There shall be none 480 or over in width					
Face hazing	There shall be none to be distinguished visually						
Crazing	There shall be none to be distinguished visually						
Waving	Not to give distorted vision of straight stripe pattern					clause 8.6	
Cripping and protrusion	There shall be none with width or length exceeding the thickness					clause 8.3	
Warpage	0.5 % max					clause 8.7	
Concentration of decepts	Concentration of individually permissible defects, such as bubbles, foreign materials, seams and body non-uniformity is not permitted						

5. Packaging

5.1 Tinted float glass shall be packaged in tight and strong package with shock-absorbing material

6. Marking and labelling

- 6.1 Every container of tinted float glass shall at least bear number, letter or mark indicating legibly and clearly the following information:
- (1) The term "Tinted float glass"
 - (2) Tone of colour
 - (3) Sizes (Width x Length x Thickness) in millimeter
 - (4) Number of glass in sheet
 - (5) Month and year of manufacture
 - (6) Name of manufacturer or factory or registered trade-mark

In case foreign language is used, the meaning shall correspond to that in Thai specified above.

- 6.2 Any person who manufactures products comply with this standard may use the Standards Mark in connection with his products only after having received a license from the Industrial Products Standards Council.

7. Sampling and criteria for conformity

- 7.1 Lot : Tinted float glass of the same type and thickness made by the same process which are manufactured, delivered or purchased at the same time.

- 7.2 Sampling and acceptance shall comply with the sampling plan below or other technically equivalent plan.

- 7.2.1 Sampling and acceptance for testing on packaging, marking and labelling at container

7.2.1.1 Samples shall be taken at random from the same lot as specified in Table 5.

7.2.1.2 Provided that all samples failing to comply with each of the requirements of clauses 3 and 4.2 does not exceed the acceptance number specified in Table 5, that lot shall be deemed as conforming to the requirements in Table 6.

Table 5: Sampling plan for testing on packaging, marking and labelling
(clause 7.2.1)

Lot size sheets	Sample size sheets	Acceptance number
Up to 500	8	1
Over 500	13	2

- 7.2.2 Sampling and acceptance for testing on solar radiation transmittance

7.2.2.1 Three samples complying with clause 7.2.1 shall be taken at random.

7.2.2.2 Provided that all samples meet the requirements of clauses 7.2.1.2 and 7.2.2.2, that lot of tinted float glass shall be deemed to comply with the requirements.

- 7.3 Criteria for conformity

Provided that the samples of tinted float glass meet the requirements of clauses 7.2.1.2 and 7.2.2.2, that lot shall be deemed to comply with the requirements.

8. Testing

8.1 Size

8.1.1 Thickness

By means of a measuring device accurate to 0.01 mm, measure the thickness of the sample at four points of intersection between the diagonal and the parallel line spaced at not less than 15 mm from edge. The average thickness value of each sample shall be reported.

8.1.2 Width and length

By means of a measuring device accurate to 1 mm, measure the width and length of the sample at points parallel to and spaced at 15 mm from edge. The average thickness value of each sample shall be reported.

8.2 Solar radiation transmittance

8.2.1 Test method

shall be in accordance with JIS R 3106.

8.2.2 Calculated

The solar radiation transmittance of tinted float glass at the thickness of 5 mm shall be calculated on the basis of the following formula:

$$\tau_{eN} = \left(\frac{\tau_e}{92} \right)^{s/d} \times 92$$

τ_{eN} : values of solar radiation transmittance of tinted float glass at the thickness of 5 mm, %

τ_e : values of solar radiation transmittance, %

d : thickness of sample, mm

8.3 Bubbles, chipping and protrusion

Bubbles, chipping and protrusion shall be measured with a microscope, graduated to 0.5 mm.

8.4 Foreign materials

Foreign materials shall be measured with a microscope, graduated to 0.1 mm.

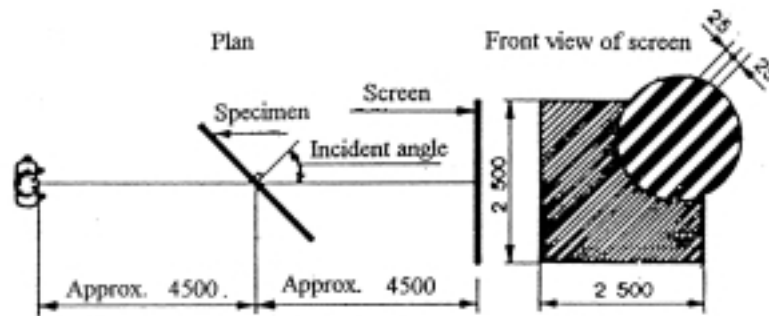
8.5 Seam, body non-uniformity, hairline, face hazing and crazing

Erect the sample at a place with a 300 lux light source and observe in perpendicular line at a point 500 mm from the sample, seam, body non-uniformity and hairline shall be measured with a rule or a measuring tape accurate to 0.5 mm.

8.6 Waving

8.6.1 Apparatus

A square screen of about 2 500 mm with parallel black and white stripes, each 25 mm wide, is forming 45° to the vertical (see figure 1).



Unit in millimetre

Figure 1 Waving test
(clauses 8.6.1 and 8.6.2)

8.6.2 Procedure

Erect the sample of adequate size to cover the screen when rotated to the angle given in Table 6, at mid point between the screen and the inspector, i.e. at about 4 500 mm from each. The inspector shall look through the middle line along the entire width of the sample such that the direction of viewing is at right angle to the screen and forms an incident angle to the sample as given in Table 6 (see Figure 1). Appearance shall be reported.

Note Erection of the sample for this test shall be such that the drawing direction as in the plate manufacturing process is set in vertical plane. When the drawing direction in the plate manufacturing process is not clear, observation shall be made for two directions to assume the direction in which stranger waves are shown as the direction of drawing.

Table 6
Degrees of incident angle for waving test
(clause 8.6.2)

Thickness mm	Incident angle (degree)
2	40
3	45
4 and over	50

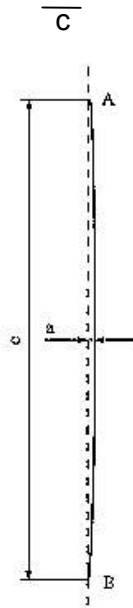
8.7 Warpage

8.7.1 Warpage measurement for single bow

Place the sample in an upright position so that no external deforming force is given to it, by contacting a straight edge to the distance from one head to another. The height of the arc (a) and the length of the cord (c) shall be measured with a feeler gauge.

Calculate the warpage from the following formula.

$$\text{Warpage, \%} = a \times 100$$



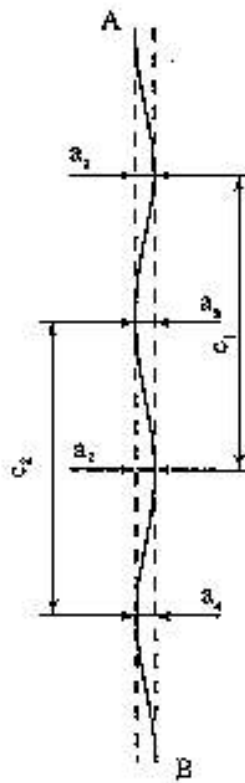
- AB : the sample
 a : height of the arc, mm
 c : length of the cord, mm

Figure 2 : Warp measurement for single bow
 (clause 8.7.1)

8.7.2 Warp measurement for wavy bow

The sample shall be made as clause 8.7.1 and apply a straight edge to the distance from one head to another. The height of the head (a) and the distance from one head to another (c) shall be measured with a feeler gauge. Calculate the warp from the following formula.

$$\begin{aligned} \text{Warp, \%} &= \frac{(a_1 + a_2)}{2} \times \frac{100}{C_1} \quad \text{or} \\ &= \frac{(a_3 + a_4)}{2} \times \frac{100}{C_2} \quad \text{or} \end{aligned}$$



- AB : the sample
 a_1 and a_2 : height of the head
 a_3 and a_4 : depth of the valley
 c_1 : distance from one head to another
 c_2 : distance from one valley to another

Figure 3 : Warpage measurement for wavy bow
(clause 8.7.2)