

Ophthalmic Products Specifications

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Revision record:

Revision date	Page revised	Description
30/12/2003	4	<u>Scope</u> - Added Uppers Segments
	7	<u>Curvature</u> - Clarified definition
	10	<u>Segments</u> - Created specific paragraph
	10	<u>Birefringence</u> – Added Uppers Segments
	11	<u>Refractive Index</u> – Added Uppers Segments
	11	<u>Striae</u> – Clarified wording
	12	<u>Dimensions</u> – Added specifications for segments
	13	<u>Dimensions</u> – Added specifications for buttons
	14	<u>Gobs</u> – Added specifications for pressed or free gobs
07/10/2013	1	Plant Address and Name changed

INDEX

Ophthalmic Products Specifications..... **1**

1. SCOPE..... **4**

2. PRESSINGS..... **5**

2.1. Physical and optical properties..... **5**

 2.1.1. Residual stress – Birefringence..... 5

 2.1.2. Seal Compatibility (Multifocal Pressings)..... 5

 2.1.3. Refractive Index..... 5

2.2. Material quality..... **6**

 2.2.1. Solid or Gaseous Inclusions..... 6

 2.2.2. Striae..... 6

 2.2.3. Bloom..... 6

2.3. Dimensions..... **7**

 2.3.1. Curvature..... 7

 2.3.2. Warp-Rock..... 7

 2.3.3. Diameter..... 8

 2.3.4. Ovalization..... 8

 2.3.5. Thickness..... 8

 2.3.6. Mismatch..... 8

2.4. Visual aspect..... **9**

 2.4.1. Marks..... 9

 2.4.2. Fins..... 9

 2.4.3. Chips..... 9

3. SEGMENTS..... **10**

3.1. Physical and optical properties..... **10**

 3.1.1. Residual stress – Birefringence..... 10

 3.1.2. Seal Compatibility (Multifocal Pressings)..... 10

 3.1.3. Refractive Index..... 11

3.2. Material quality..... **11**

 3.2.1. Solid or Gaseous Inclusions..... 11

 3.2.2. Striae..... 11

 3.2.3. Visual Aspect..... 11

3.3. Dimensions (Segments)..... **12**

 3.3.1. Surface Flatness..... 12

 3.3.2. Thickness..... 12

 3.3.3. Warp..... 12

 3.3.4. Critical Edge Flatness or Clean Up..... 12

 3.3.5. Fins..... 13

3.4. Dimensions (Buttons)..... **13**

 3.4.1. Fins..... 13

 3.4.2. Flatness..... 13

4. GOBS : Pressed or Free Gobs..... **14**

4.1. Weight..... **14**

4.2. Diameter tolerance..... **14**

4.3. Material quality..... **14**

4.4. Usual aspect..... **14**

1. SCOPE.

Unless otherwise specified on the product drawings, this Product Specification shall apply to ophthalmic pressings and segments, manufactured by Corning SAS Ophthalmic Division.

This specification contains the following sections :

- *Optical and Physical properties*
- *Material quality*
- *Dimensions*
- *Visual aspect*

For the purpose of this document, the following product categories are used :

<i>Categories</i>	<i>Product type</i>
Standard	Non photochromic glasses with refractive index ≤ 1.65
High Index	Non photochromic glasses with refractive index > 1.65
Photochromic	Photochromic glasses with refractive index 1.5 to 1.6
Barium Segment	Lower barium segments glasses
Upper Segment	Upper segments glasses

2. PRESSINGS.

2.1. Physical and optical properties.

2.1.1. Residual stress – Birefringence.

The birefringence resulting from residual stresses shall not produce a relative retardation, or path difference greater than:

<i>Product Category</i>	<i>Maximum path difference</i>
Standards	100 nm/cm
High-index	100 nm/cm
Photochromics CT ≤ 12 mm	150 nm/cm
Photochromics CT > 12 mm	200 nm/cm

2.1.2. Seal Compatibility (Multifocal Pressings).

Seal compatibility of different glasses and barium segments is described in the corresponding technical data sheets.

2.1.3. Refractive Index.

The nominal value of the refractive index n_d , for the helium line ($\lambda = 587.6$ nm), is specified in the product technical data sheet. Tolerances are as follow :

<i>Product Category</i>	<i>Tolerances</i>
Single Vision Standards	+/- 0.00100
Photochromics	+/- 0.00100
High Index	+/- 0.00150
Multifocal Standards	+/- 0.00020
Photochromics	+/- 0.00025

For multifocal glasses, the refractive index value is determined for an annealing rate of 1°C/minute .

2.2. Material quality.

2.2.1. Solid or Gaseous Inclusions.

Solid or gaseous inclusions, larger than 0.06 mm, and located below the maximum penetration are not allowed.

In a given lot, the maximum allowed percentage of defective units for inclusions is 1.5 %.

2.2.2. Striae.

Glass heterogeneity caused by a rapid change of refractive index are not allowed.

2.2.3. Bloom.

Definition : White or blue-tinted bloom located on the concave side.

Penetration is measured : at the centre for plano or plus pressings.
at the edge for minus pressings.

Specification :

<i>Plano or Plus Pressings</i>		<i>Minus Pressings</i>	
Center Thickness mm	Allowed penetration mm	Center Thickness mm	Allowed penetration mm
$T \leq 4.5$	0.20	$T \leq 4.0$	0.25
$4.5 < T \leq 6.0$	0.20	$4.0 < T \leq 5.0$	0.30
$6.0 < T \leq 8.5$	0.40	$5.0 < T \leq 7.0$	0.35
$8.5 < T \leq 11.0$	0.60	$7.0 < T \leq 9.0$	0.40
$11.0 < T \leq 14.0$	0.60	$9.0 < T \leq 12.0$	0.45
$14.0 < T$	0.60	$12.0 < T \leq 16.0$	0.50
		$16.0 < T$	0.50

2.3. Dimensions.

2.3.1. Curvature.

Definition : The “clean up” value is the amount of material removed starting from initial contact, to completely true a surface to a specified radius.

Measuring technique: Gauges and calibrated wires as appropriate.

Specification :

Plano and Plus Pressings	Minus Pressings	Maximum allowed value for clean up mm					
		Center thickness mm	Edge thickness mm	Standards and photochromics		High index	
				Convex	Concave	Convex	Concave
T ≤ 4.5	T ≤ 4.0	0.20	0.25	0.30	0.40		
4.5 < T ≤ 6.0	4.0 < T ≤ 5.0	0.25	0.30	0.35	0.45		
6.0 < T ≤ 8.5	5.0 < T ≤ 7.0	0.25	0.35	0.35	0.50		
8.5 < T ≤ 11.0	7.0 < T ≤ 9.0	0.30	0.40	0.40	0.55		
11.0 < T ≤ 14.0	9.0 < T ≤ 12.0	0.35	0.45	0.45	0.60		
14.0 < T ≤ 17.0	12.0 < T ≤ 16.0	0.40	0.50	0.50	0.70		
17.0 < T ≤ 19.5	16.0 < T ≤ 18.5	0.40	0.60	0.50	0.70		
19.5 < T ≤ 21.0	18.5 < T ≤ 20.0	0.50	0.70	0.60	0.80		
21.0 < T ≤ 22.0	20.0 < T ≤ 21.5	0.50	0.80	0.60	0.80		

Prepressed countersink area : 0.30mm max.

2.3.2. Warp-Rock.

Definition : Deformation of the periphery of the concave side that causes the pressing not to lie uniformly on a flat surface.

Measuring techniques: Flat plate and feeler gauges.

Specification :

Nominal diameter Mm	Allowed deformation (mm)	
	Standards / Photochromics	High index
50 < Ø ≤ 55	0.20	0.25
55 < Ø ≤ 60	0.20	0.25
60 < Ø ≤ 65	0.25	0.30
65 < Ø ≤ 70	0.30	0.35
70 < Ø ≤ 75	0.30	0.35

2.3.3. Diameter.

Specification :

<i>Maximum Allowed Deviation from the Specified Value (mm)</i>	
Standards and Photochromics	High Index
+ 0.10	+ 0.10
- 0.40	- 0.50

2.3.4. Ovalization.

Definition : Difference between the minimum and maximum diameters of the pieces.

Specification :

<i>Maximum Allowed Difference</i>	
Standards and Photochromics	High Index
0.5 mm	0.6 mm

2.3.5. Thickness.

Measuring techniques : Dial gauge.

Specification : Tolerances depend upon pressing weight :

<i>Pressing weight (in gr)</i>	<i>Center Thickness Tolerance</i>
$W \leq 40$	- 0 / + 0.4 mm
$40 < W \leq 70$	- 0 / + 0.5 mm
$70 < W$	- 0 / + 0.6 mm

2.3.6. Mismatch.

The off center of the concave surface from the convex surface is controlled by the change in the edge profile.



Accept



Accept



Reject

2.4. Visual aspect.

2.4.1. Marks.

Accidental marks or surface defects shall be eliminated after the removal of an amount of glass corresponding to the *clean-up value plus 0.2 mm*.

Example : For a standard or photochromic, plano or convex pressing, with a center thickness < 4.5 mm, the quantity of material to be removed will be:

- Convex side : $0.20 + 0.20 = 0.40$ mm
- Concave side: $0.25 + 0.20 = 0.45$ mm

2.4.2. Fins.

2.4.2.1. Horizontal Fins :

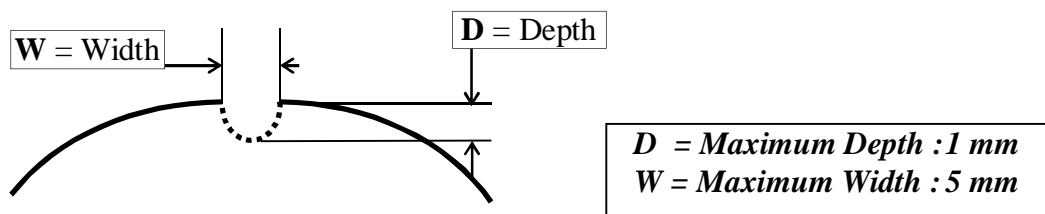
0.10 mm max, included in the maximum diameter tolerance.

2.4.2.2. Vertical Fins :

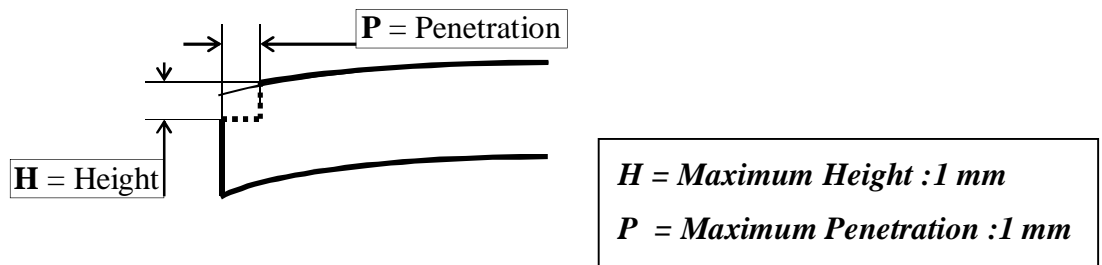
0.30 mm max.

2.4.3. Chips.

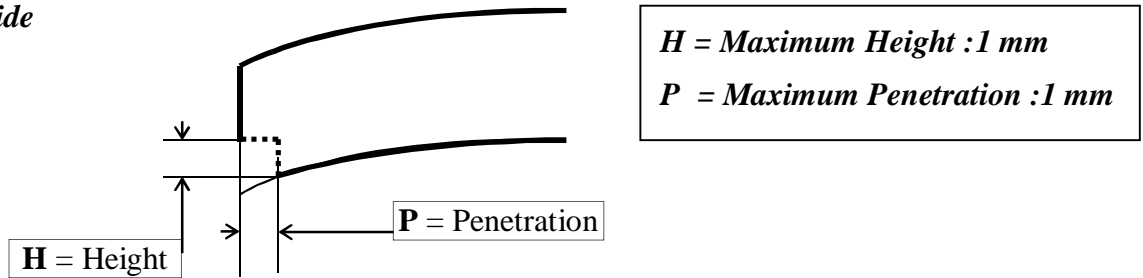
2.4.3.1. Chips on the edge :



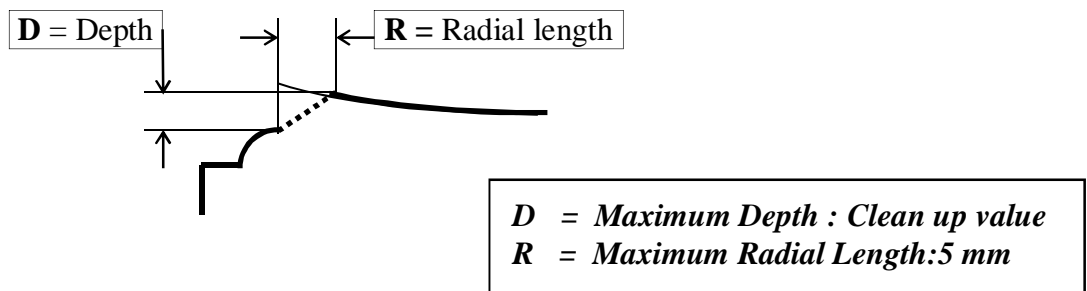
Convex side



Concave side



2.4.3.2. Chips on the side :



3. SEGMENTS.

3.1. Physical and optical properties.

3.1.1. Residual stress – Birefringence.

The birefringence resulting from residual stresses shall not produce a relative retardation, or path difference greater than:

<i>Product Category</i>	<i>Maximum path difference</i>
Barium Segments	100 nm/cm
Uppers Segments	100 nm/cm

3.1.2. Seal Compatibility (Multifocal Pressings).

Seal compatibility of different glasses and barium segments, is described in the corresponding technical data sheets.

3.1.3. Refractive Index.

The nominal value of the refractive index n_d , for the helium line, ($\lambda = 587.6$ nm), is specified in the product technical data sheet. Tolerances are as follow :

<i>Product Category</i>	<i>Tolerances</i>
Upper Segment Standard	+/- 0.00020
Upper Segment Photochromic	+/- 0.00025
Barium Segments	+/- 0.00150

For Segment glasses, the refractive index value is determined for an annealing rate of 1°C/minute.

3.2. Material quality.

3.2.1. Solid or Gaseous Inclusions.

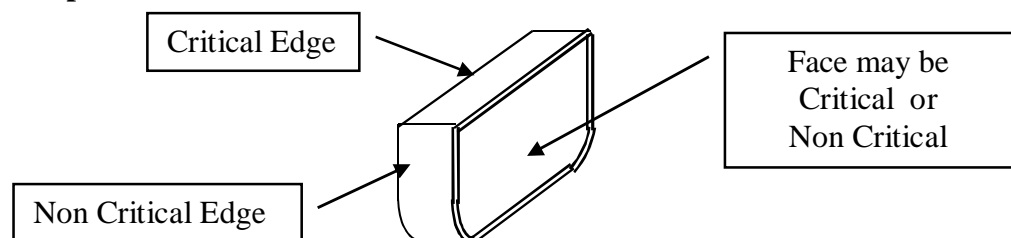
Solid or gaseous inclusions, larger than 0.06 mm, and located below the maximum penetration are not allowed.

In a given lot, the maximum allowed percentage of defective units for inclusions, is 1.5 %.

3.2.2. Striae.

Glass heterogeneity caused by a rapid change of refractive index are not allowed when inspected through the direction of use.

3.2.3. Visual Aspect



Defect types :
 - chips
 - checks
 - incrustations
 - folds

	<i>Maximum penetration</i>
Critical Edges and Faces	0.4 mm
Non Critical Edges	1.0 mm

3.3. Dimensions (Segments).

3.3.1. Surface Flatness.

No bump allowed

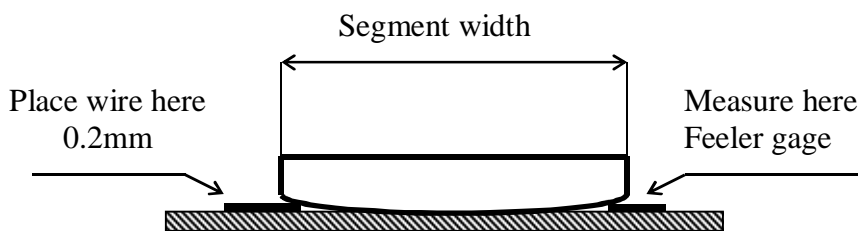
3.3.2. Thickness.

Tolerance applied to edge thickness is: - 0.0/+ 0.5 mm.

The minimum thickness at any point of the segment must not be less than 0.5 mm, below the minimum specified edge thickness. This does not apply to the area for recessed marking.

3.3.3. Warp.

Warp is measured by placing a feeler gage equal to the limit allowed on one side. The amount of warp is the value measured on the other side.



Specification : 0.20 mm max.

3.3.4. Critical Edge Flatness or Clean Up.

Maximum value shall be ≤ 0.4 mm

3.3.5. Fins.

3.3.5.1. Vertical Fins

0.15 mm Maxi

3.3.5.2. Horizontal Fins

Allowed 0.1 mm Max.

3.4. Dimensions (Buttons).

3.4.1. Fins.

3.4.1.1. Vertical Fins

Fins over the faces are allowed up to 0.15 mm.

Allowed
0.15 mm Max



3.4.1.2. Horizontal Fins

Allowed 0.10 mm Max.

0.10 mm Max



3.4.2. Flatness.

0.30 mm

4. GOBS : Pressed or Free Gobs.

4.1.Weight.

WEIGHT	
Gobs weight (gr)	Weight tolerance (gr)
$P \leq 30$	± 0.50
$30 < P \leq 40$	± 1.00
$40 < P \leq 70$	± 1.50
$70 < P \leq 110$	± 1.75
$110 < P \leq 180$	± 2.00
$180 < P \leq 215$	± 2.50
$215 < P \leq 250$	± 3.00
$250 < P$	± 3.50

4.2.Diameter tolerance

See drawings

4.3.Material quality

See pressings : §2.2.

4.4.Usual aspect

Chips : accepted if in the weight tolerance.