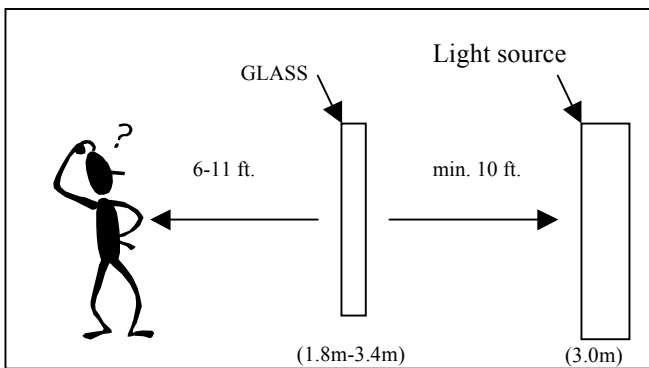
 201 Cardinal Road Waxahachie, TX 75165	Title: WXM 1.0- 44 ASTM Glass Quality Specification 701	Document Identification: WXM 1.0- 44 ASTM Glass Quality Specification 701
	Revision: 5 Issue Date: 07 February 2012	Written By: Dave Bunce, Adam Head Approved By: Erik Shoquist

GLASS INSPECTION

Ref: **ASTM C 1036-06 Glazing Select Quality (q3) for Flat and Tempered Glass**
ASTM C 1172-09 for Laminated Glass

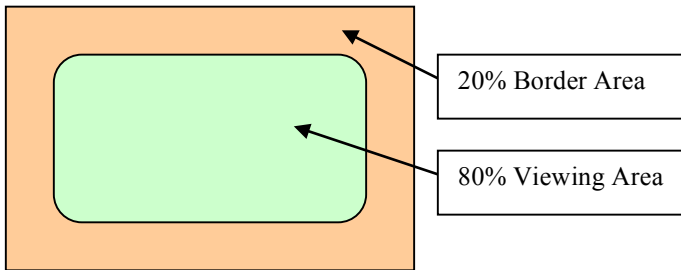
1. Prepare Glass for Inspection



Viewing Criteria	Viewing Distance	
	Cardinal Spec	ASTM Spec
Medium Intensity	6' (1.8m)	11' (3.4m)

Units are to be inspected in the vertical position at 90° +/- 10° with good light but not direct sunlight

2. Determine Central and Border Area



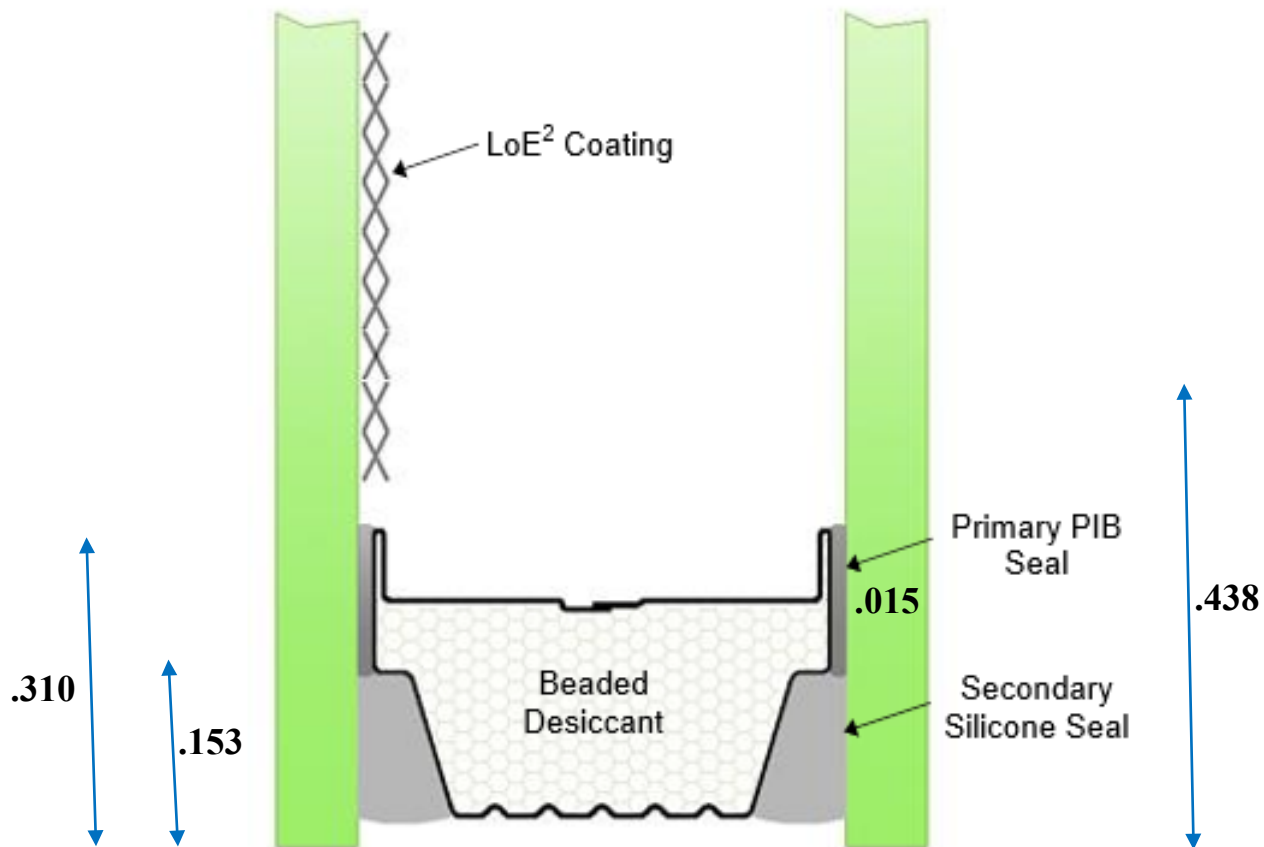
Cardinal IG uses the ASTM spec for the border area and our more restrictive spec for the central viewing area

3. Determine if Imperfections are Defects

Imperfection Types	Imperfections bigger than sizes below are defects		
	Cardinal Spec	ASTM Spec	Distribution
A. Glass & Glass Coatings			
Seeds (or pin holes in coating)	1/16" (.063") or 1.6 mm	3/32" (.094") or 2.4 mm	Min 24" (610mm)Separation
Surface Debris	1/16" (.063") or 1.6 mm	3/32" (.094") or 2.4 mm	Min 24" (610mm)Separation
Digs (deep short scratch)	1/16" (.063") or 1.6 mm	3/32" (.094") or 2.4 mm	Min 24" (610mm)Separation
Laminated Interlayer Bubbles	1/16" (.063") or 1.6 mm	3/32" (.094") or 2.4 mm	N/A
Laminate Blow-in ⁽¹⁾	1/4" (.250") or 6.4 mm	1/4" (.250") or 6.4 mm	N/A
Medium Intensity Scratches, Hair and Lint	2" or 51 mm	75 mm or 3"	Min 24" (610mm)Separation

Notes: ⁽¹⁾ Blow-in is recessed interlayer at the edge of laminated glass

Typical Cardinal XL Edge® Construction



- .310 (7.9mm) = Nominal Spacer Height
- .153 (3.9mm) = Nominal Silicone Height
- .438 (11.1mm) = Max Sightline

General Requirements

- 3.0.1 3.0.1 Classification – Unless otherwise specified, all glazing shall be of Type I (transparent glass, flat), class 1 (clear), quality 3 (glazing select) per ASTM C1036 and ASTM C1048
- 3.0.2 Certification – Unit construction shall be certified to meet IGCC® and IGMA® requirements by the Insulating Glass Certification Council.
- 3.0.3 Edge thickness tolerance $\pm 0.031''$ (0.78 mm) from Target Thickness
- 3.0.4 Width and Height Tolerance: $\pm 1/16$ inch (1.6 mm)
- 3.0.5 Sightline: $7/16''$, $.438''$ (11.1 mm)
- 3.0.6 Sealants: Units shall be a dual seal construction utilizing compressed polyisobutylene as primary seal and silicone as secondary seal.
- 3.0.7 Frost Point: Units must pass a minus 70° F per ASTM E546 at the time they are manufactured.

 201 Cardinal Road Waxahachie, TX 75165	Title: Vision and Grille Between Glass (GBG) Quality Specification	Document Identification: WXM-1.0- 29 QAD-700
	Revision: 4 Issue Date: 11 September 2015	Written By: Angela Boyer Approved By: Erik Shoquist

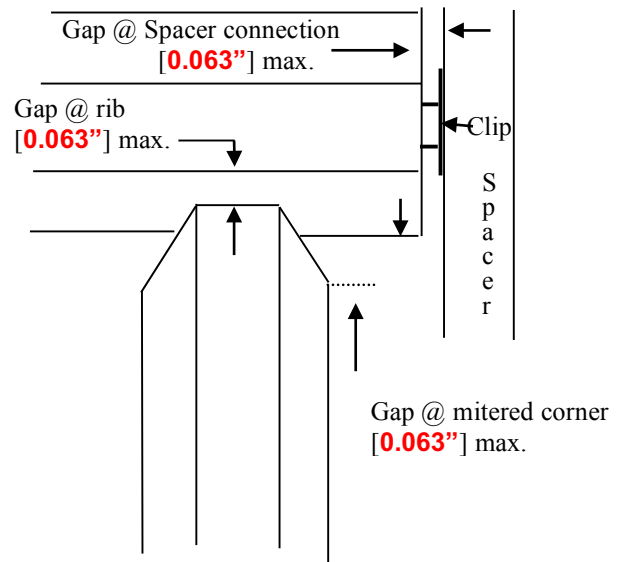
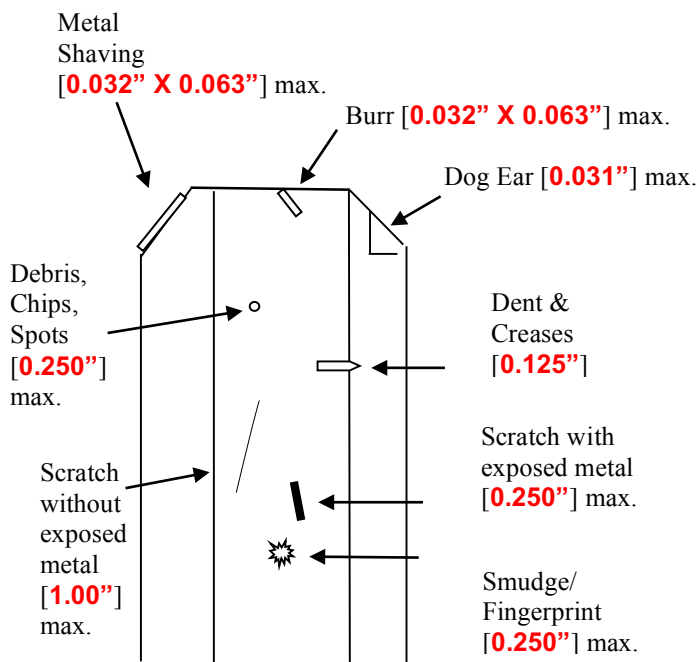
Contour Grille and Muntin Bar Appearance Criteria


Imperfections (Interior view only)	Maximum Allowable Dimensions	
	Decimal	Fraction
Burrs, and Metal Shavings	0.031" x 0.063"	(1/32" x 1/16")
Fold over or "Dog Ears" (any dimension)	0.031"	(1/32")
Gap @ intersecting grilles & bars	0.063"	(1/16")
Gap @ mitered corner intersection	0.063"	(1/16")
Gap @ Bar / Spacer Connection	0.063"	(1/16")
Dent (diameter) & Creases (length)	0.125"	(1/8")
Debris on bars (Chips, Spots, Etc)	0.031"	(1/32")
Scratch, without exposed metal	1.00"	(1")
Scratch, with exposed metal	0.250"	(1/4")
Finger Prints/Smudges (width or diameter)	0.250"	(1/4")

Notes:

1. Imperfections found on the interior side are allowed, if not visible at 6 feet from glass.
2. Imperfections found on the exterior side are allowed, if not visible at 10 feet from the glass.
3. Imperfections found at the connection of the grille to the IG spacer are allowed if below the sightline (.4375") of the IG unit.
4. Unpainted end cuts of the grilles are allowable.
5. View units in normal indoor lighting conditions at no more than a 10° angle. Visual inspection for glass shall be conducted with the lite at ≤ 10° off vertical by looking straight through the glass, in transmittance, using factory lighting or natural daylight, without direct sunlight or any direct back ground light.

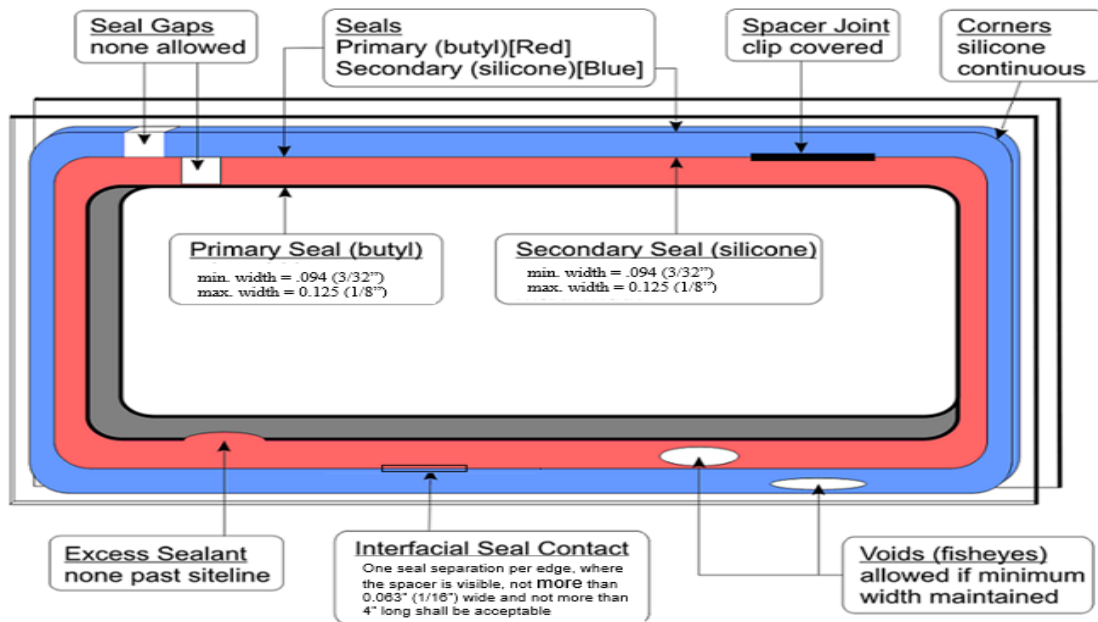
Contour Grille & Muntin Bar Imperfections



 201 Cardinal Road Waxahachie, TX 75165	Title: WXM 1.0-28 Edge Sealant & Sight Line Specifications	Document Identification: WXM-1.0-28 Edge Sealant & Sight Line Specifications
	Issue Date: 3/2/17 Review Date: 3/2/18	Initial Reviewer: Angela Boyer/Brittany Mahoney Approved By: Jimmy Tay
Current Issue: 5	Review Schedule: Annual	

Dual Seal Criteria

Edge Seal/Spacer Attributes	Target	Minimum	Maximum
Primary Seal width (Butyl)	0.150"	.125 (1/8") (.094 (3/32") allowed up to 8")	0.175"
Secondary Seal width (Silicone)	0.150"	.125 (1/8") (.094 (3/32") allowed up to 8")	0.20"
Gaps in Seals	None	No gaps allowed	No gaps allowed
Spacer Joint & Tape	Covered	Min coverage 0.063" (1/16) for 1/2" either side of tape	
Corners – silicone coverage	Continuous	Silicone at corners must be continuous	
Voids (Fisheyes)	None	Allowed as long as minimum width requirements are met	
Interfacial contact of Seals	No separations	One seal separation per edge, where the spacer is visible, not more than 0.063" (1/16") wide and not more than 4" long shall be acceptable	
Excess primary sealant (butyl)	None	Excess butyl sealant not to exceed siteline	
Spacer	None	Joints shall employ a straight key with a maximum visible gap of 0.125" and foil tape covering back of joint	



WXIG Sightline Requirements

(not to be measured within 1.125" of corner due to radius bend of spacer.)

- Standard Unit 3/8 (0.375") ±1/16" (0.0625") Max of 7/16" (0.4375")
- Shape Max of 5/8 (0.625")