

5. PREPARATION FOR DELIVERY

This section is not applicable to this specification.

6. NOTES

6.1 Intended Use. This process is intended to verify the quality of opaque composite parts by visual inspection.

6.2 Definitions.

- (a) Blisters. Small bubbles of resin on the outer ply of the laminate.
- (b) Burr. A rough protrusion on the exterior surface of a laminate.
- (c) Delamination. A separation between plies in the laminate.
- (d) Depressions. Indentations in the laminate. A depression shall not result in broken reinforcing fibers.
- (e) Disbond. A separation between two bonded surfaces (i.e. laminate skin and core).
- (f) Faying Surface. The surfaces of parts which are to be mated in a subsequent assembly. This shall not include those surfaces which are common to system support brackets.
- (g) Fill Yarns. Yarns running the width of the fabric, perpendicular to the warp yarns.
- (h) Foreign Material. Any material different from the composite reinforcing fibers, resin, filler, core, bondable Tedlar, adhesive, or core splices.
- (i) Fractures. Broken reinforcing fibers and/or cracks in the resin matrix of a laminate.
- (j) Frayed. Loose fibers on the exterior surface of a laminate.
- (k) Out of Contour. Irregularities in the contour, as fit checked in the tooling.
- (l) Ply Distortion. A skewing of warp and/or fill yarns in fabric or irregularities in tape fibers.
- (m) Ply Folds. Reinforcing fibers that are laid back over themselves creating a raised area.
- (n) Resin Rich Areas. A local accumulation or build-up of resin on the exterior surface of the laminate.

Definitions. (Continued)

- (o) Resin Ridges. A linear build-up of resin on the exterior surfaces of the laminate.
- (p) Roughness Average,  $R_a$ . Roughness average is defined in ANSI B46.1.
- (q) Scratches. A linear flaw in the laminate surface resulting in broken reinforcing fibers.
- (r) Scorched. A slightly burned area, normally around drilled holes.
- (s) Splintered. The breaking out of a fiber or fibers on the exterior surface of the laminate.
- (t) Supplier. An organization contracted to perform certain functions and/or processing of components for the total end item.
- (u) Surface Porosity. Pinholes or small cavities on the exterior surface of the laminate.
- (v) Void. Air pockets in a laminate.
- (w) Warped. A bent or twisted shape differing from the intended shape, as fit checked in the tooling.
- (x) Warp Yarns. The lengthwise yarns of the fabric which run parallel to the selvage.
- (y) Wrinkles. Any out-of-plane, i.e. normal to surface as shown in Figure 2, ply distortion occurring internally or externally.

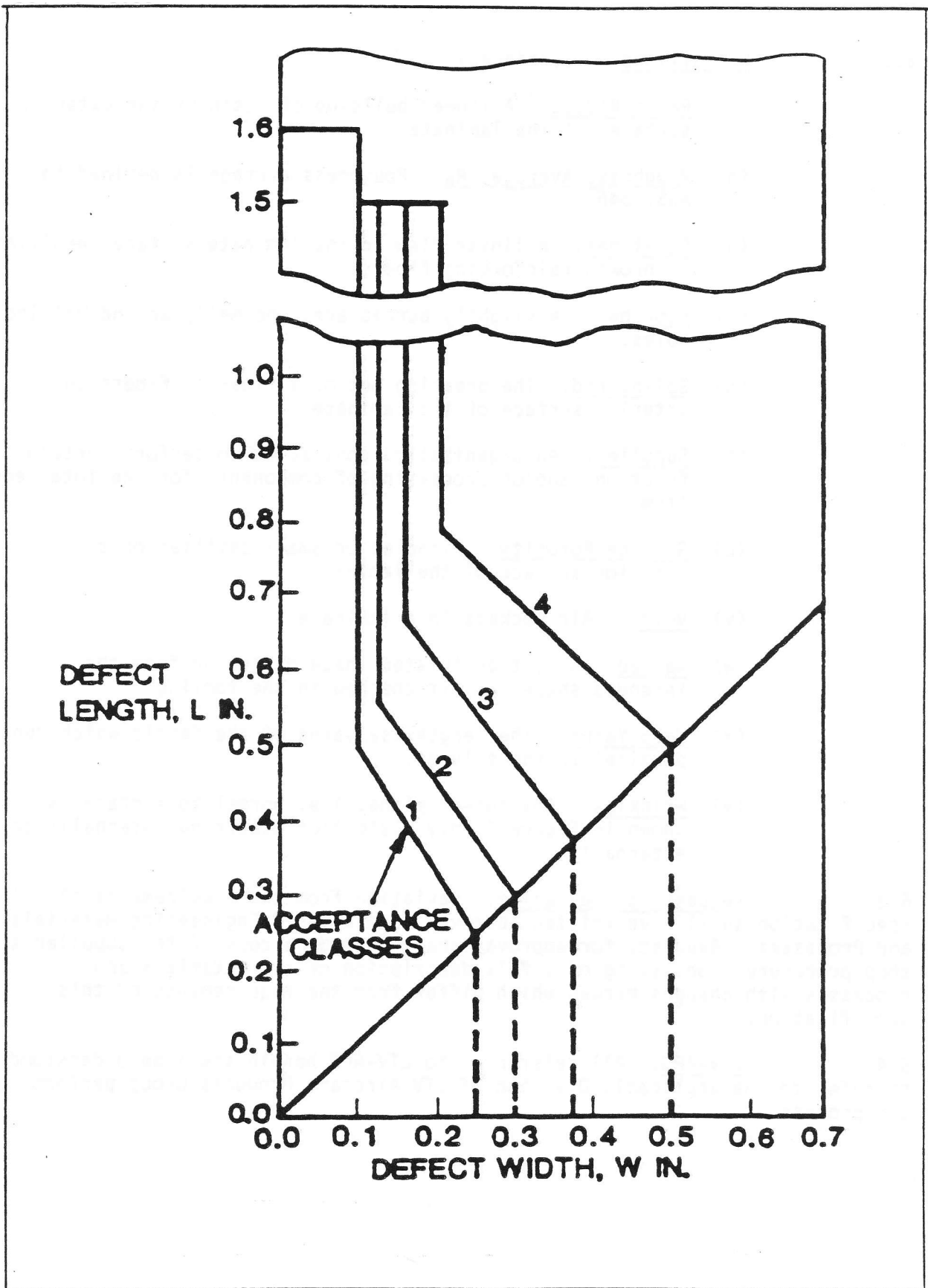
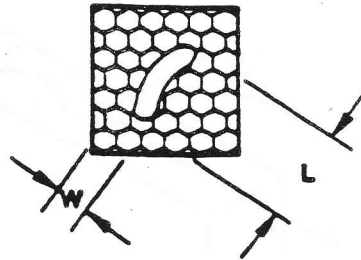


Figure 1. Definition of Acceptance Classes (Sheet 1 of 2)



Minimum Single Rejectable  
Defect Size

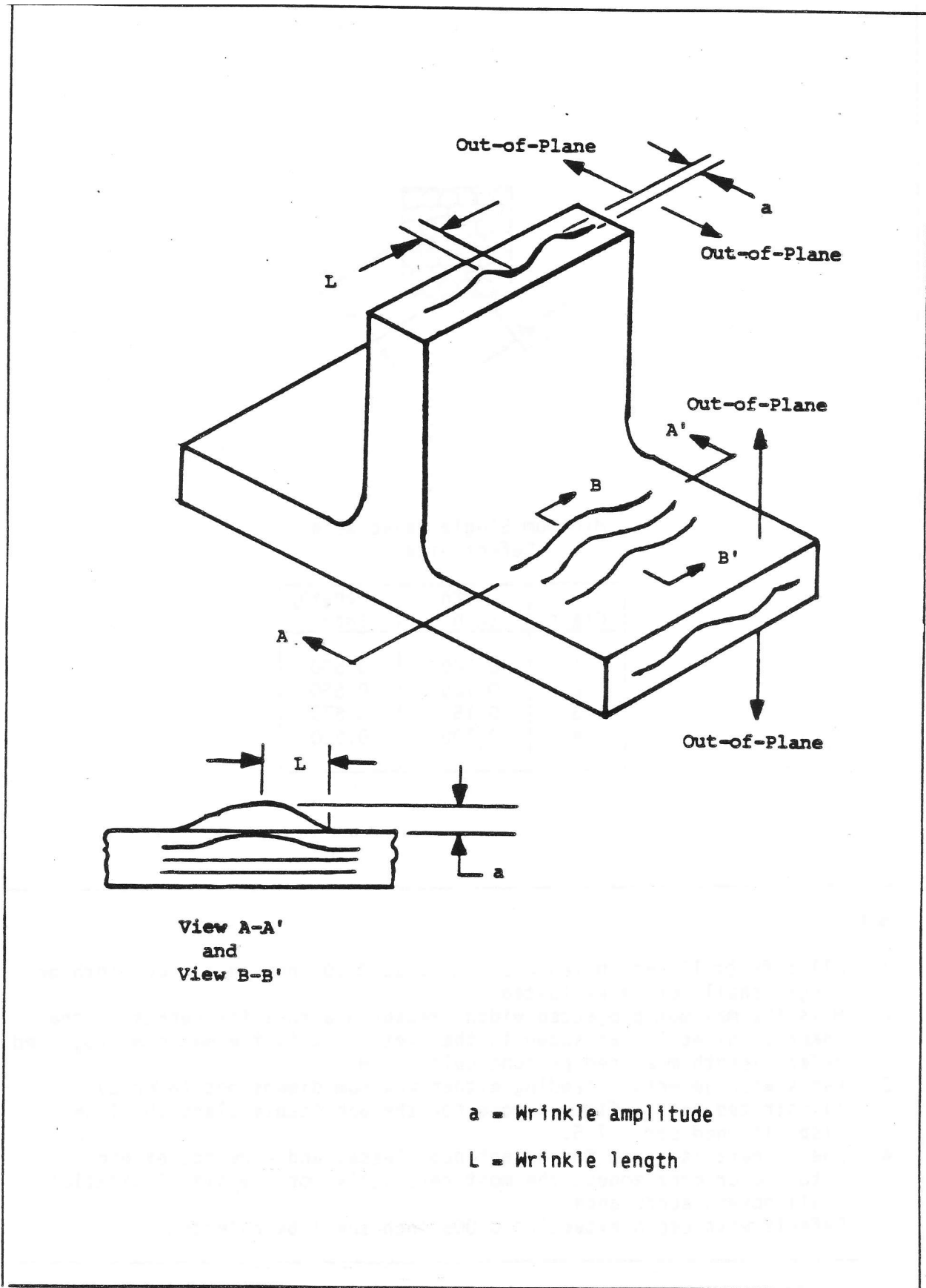
Class	Width, Inch	Length, Inch
1	0.100	0.500
2	0.125	0.550
3	0.150	0.675
4	0.200	0.800

**Notes:**

1. All defects listed in Table I less than 0.10 inch in either width or length shall not be evaluated.
2. W is the maximum projected width, measured across the defect in the "narrow" direction as shown in the sketch. L is the maximum projected defect length measured perpendicular to W.
3. Parts with defects exceeding either maximum dimensions (W or L) illustrated in the figure above for the applicable class shall be dispositioned per 3.7.5.
4. When a part is zoned for acceptance classes and a defect extends into two or more zones, the most restrictive of the size limitations shall govern acceptance.
5. Defects with depth exceeding 0.005 inch shall be rejected.

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Figure 1. Definition of Acceptance Classes (Sheet 2 of 2)



$a$  = Wrinkle amplitude

$L$  = Wrinkle length

Figure 2. Wrinkles, Typical

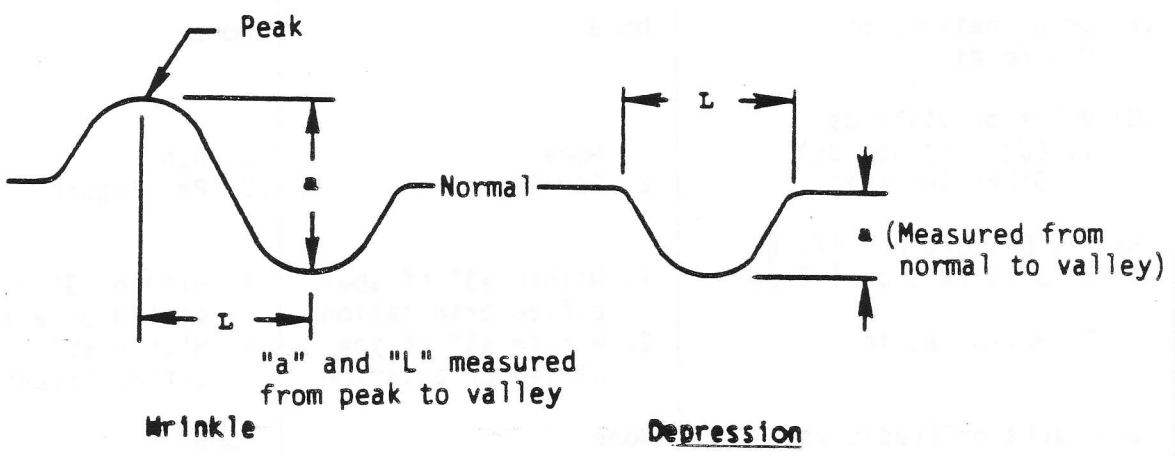
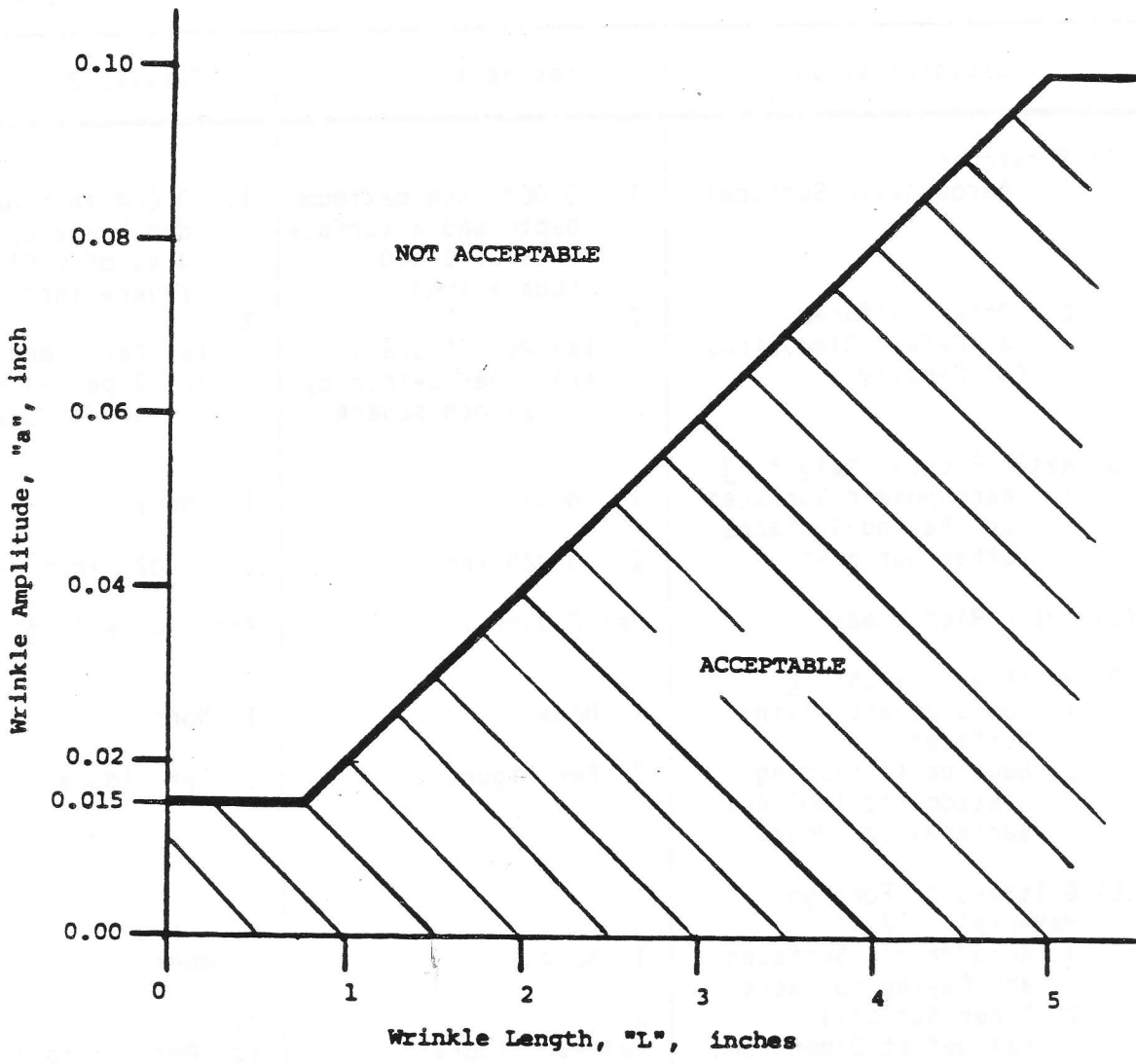


Figure 3. Wrinkle Acceptance Criteria

Table I. Acceptance Criteria for Visual Defects in Composites 1/, 2/

Classification	Classes 1,2	Classes 3,4
(A) Scratches 1. Aerodynamic Surfaces  2. Other surfaces (a) Defect Dimensions (b) Density	1. 0.004 inch maximum depth and a surface area of 0.010 square inch.  2. (a) Per Figure 1 (b) 1 per 2-inch by 2-inch square	1. 0.004 inch maximum depth and a surface area of 0.010 square inch.  2. (a) Per Figure 1 (b) 2 per 3-inch by 3-inch square
(B) Resin Ridges, height <u>3/</u> 1. Aerodynamic Surfaces and Faying Surfaces 2. Other Surfaces	1. None  2. 0.020 inch	1. None  2. 0.020 inch <u>4/</u>
(C) Resin Rich Areas	Per Figure 1	Per Figure 1 <u>5/</u>
(D) Wrinkles, height <u>6/</u> 1. Toolside and Faying Surfaces 2. Bagside (including elastomeric tooling) Surfaces or Edges	1. None  2. Per Figure 3	1. None  2. Per Figure 3 <u>4/</u>
(E) Blisters or Foreign Material <u>7/</u> 1. Aerodynamic Surfaces and Faying Surfaces 2. Other Surfaces (a) Defect Dimensions (b) Density	1. None  2. (a) Per Figure 1 (b) 1 per 2-inch by 2-inch square	1. None  2. (a) Per Figure 1 (b) 2 per 3-inch by 3-inch square
(F) Delaminations or Ply Folds	None	None
(G) Voids or Disbonds 1. Edges (disbonds) 2. Other Surfaces	1. None 2. Per Figure 1	1. None 2. Per Figure 1
(H) Ply Distortion <u>6/</u> , <u>8/</u> 1. Unidirectional Tape  2. Woven Fabric	1. Within $\pm 3^\circ$ of specified orientation 2. Within $\pm 5^\circ$ of specified orientation	1. Within $\pm 3^\circ$ of specified orientation 2. Within $\pm 5^\circ$ of specified orientation
(I) Cracks or Fractures	None	None

Ø Table I. Acceptance Criteria for Visual Defects in Composites 1/, 2/, (Continued)

Classification	Classes 1,2	Classes 3,4
(J) Out of Contour or Warped Areas <u>9/</u>	0.005 inch	0.020 inch
(K) Roughness, R <sub>a</sub> <u>10/</u> , <u>11/</u>		
1. Toolside and Bagside Surfaces	1. 600	1. 600 <u>12/</u>
2. Faying Surfaces	2. 250	2. 250
3. Edges	3. 250 <u>13/</u> , <u>14/</u>	3. 250 <u>13/</u> , <u>14/</u>
(L) Core		
1. Depressed, Crushed or Condensed Areas	Per Figure 1	Per Figure 1
(M) Depressions Depth		
1. Aerodynamic Surface	1. 0.004-inch maximum depth	1. 0.004-inch maximum depth
2. Nonaerodynamic Toolside Surfaces	2.	2.
(a) Defect Dimension	(a) Per Figure 1	(a) Per Figure 1
(b) Density	(b) 1 Per 2-inch by 2-inch square	(b) 1 Per 3-inch by 3-inch square
3. Bagside (Including Elastomeric Tooling) Surfaces or Edges	3. Per Figure 3	3. Per Figure 3



∅ Table I. Acceptance Criteria for Visual Defects in Composites 1/, 2/, (Continued)

Classification	Classes 1; 2	Classes 3, 4
<p>Notes: 1/ Unless noted, all dimensions in inches are maximum acceptable.</p> <p>2/ Record on the Withholding Tag, if applicable and measurable:            (a) Defect dimensions (depth or height, length, width).            (b) Defect locations per engineering drawing station lines, water lines or butt lines (<math>X_0</math>, <math>Y_0</math>, <math>Z_0</math>).</p> <p>3/ As an option, measurements may be made after sanding resin ridges (avoid fiber damage).</p> <p>4/ For Class 4 only, resin ridge or wrinkle height shall not exceed part reference thickness.</p> <p>5/ For Class 4 only, resin rich area requirements are not applicable.</p> <p>6/ Bagside surface deviations due to material overlap splices shall not exceed 2.5 times the nominal material per ply thickness.</p> <p>7/ For honeycomb sandwich parts with fiberglass facesheets, foreign materials shall not be allowed within or on the toolside facesheet.</p> <p>8/ Distortion is allowed around corners and sharp radii to a maximum of 4 inches from the corner or radius.</p> <p>9/ Check tooling fit after applying a 15 pound load at 18 inch centers.</p> <p>10/ Roughness Average (<math>R_a</math>), or fingernail roughness test using Surf-Chek Roughness Standards. Perform roughness test on:            (a) nontypical appearance areas, and            (b) whichever is the greatest of (1), (2), or (3) as follows :                (1) Each 40 square feet, or fraction thereof, of the planform areas of the part.                (2) Each 10 linear feet, or fraction thereof, of edge length of the part.                (3) Four areas typical in appearance.</p> <p>11/ Includes acceptance criteria for surface porosity.</p> <p>12/ For Class 4 only, bagside roughness requirements are not applicable.</p> <p>13/ 125 <math>R_a</math> maximum for fiberglass parts.</p> <p>14/ 400 <math>R_a</math> maximum for waterknife cut graphite epoxy.</p>		