

Creative Pultrusions, Inc. Standard Practice for Classifying Visual Defects
Form: CPQ008-1206.1C
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Name	Definition	Visual Acceptance Level
<i>Blister</i>	<p>A rounded elevation of the pultruded surface with boundaries that may be more or less sharply defined.</p> <p>NOTE – The rounded elevation somewhat resembles in shape a blister on the surface of human skin. Blisters may exist within the pultrusion as a hollow delaminated area (usually gas-filled) under a raised portion of the surface.</p>	<p>Permitted if formed between the surfacing layer and balance of laminate and the width is no greater than 50% of the surface width. The overall size of the blister cannot be greater than 3 inches in width or 5 inches in length. Maximum of two per 10 ft. length.</p> <p>Exception: Small intermittent corner blisters are acceptable continuously throughout the part length. Product must meet test requirements and not exceed dimensional tolerances. Repair if limits exceed.</p>
<i>Chips (Gouges)</i>	<p>Minor damage to the pultruded surface at the end cut caused by saw cuts.</p>	<p>Permitted if the chip is not larger than .25" wide or long and is not deeper than 10% of the wall thickness.</p>
<i>Fiber Blooming/Glassiness</i>	<p>A pultrusion surface condition exhibiting a fiber prominence or fiber show that usually has a white or bleached color and a sparkling appearance.</p> <p>NOTE – The surface generally feels rough when touched by the fingers and is of superficial thickness easily removed by buffing or light sanding.</p>	<p>Permitted for rod and bar with all roving reinforcement. Not permitted for a mat and roving construction unless there is no surfacing veil.</p> <p>Fibers must be encapsulated by resin.</p>
<i>Insufficient Cure (Can be referred as cold)</i>	<p>A dull and bleached surface color that is evident in pultruded material.</p> <p>NOTE – This condition is usually the result of insufficient surface cure.</p>	<p>None</p>

<i>Thermal damage (Part too Hot)</i>	A discoloration, distortion, or destruction of the pultruded surface as a result of thermal decomposition, not from a saw cut. Can be caused by excessive heat.	None
<i>Crack (Shrinkage)</i>	Cracks found in heavy roving areas caused by resin shrinkage. Perpendicular to the off axis reinforcement as viewed on the cross section of the profile. This type of crack must be less than .030" wide.	Permitted if the crack does not reach the surface of the product or penetrate through more than one layer of reinforcement. The crack cannot propagate through the layer of roving and into the next layer of reinforcement.
<i>Crack (Interior)</i>	A crack that occurs internally and is parallel to the off axis reinforcement as viewed on the cross section. This defect is close to a delamination, but not gapped open. Normally located near the flange tips and heavy radii areas.	Permitted if the crack is not over 3/8" in width and is not gapping. If the crack is gapping and can be penetrated by a splice needle it is considered a delamination and should be dealt with as a delamination.
<i>Crack (Surface)</i>	A visual separation that occurs from the surface of the part and penetrates more than one layer of reinforcement or .019" Note: can be caused by puller blocks.	None
<i>Crack (Resin Rich) Note: More prominent with stitched fabric constructions and resin injection profiles.</i>	Multiple fine separation cracks or longitudinal cracks at the pultruded surface not penetrating into the profile by more than .020" NOTE – This condition is usually due to resin shrinkage during cure in resin-rich areas.	Continuous resin rich cracking permitted if the crack is less than .030" wide and no deeper than .020".
<i>Delamination</i>	The separation of two or more layers or piles of reinforcing material within a pultrusion. The separation can be penetrated by a splicing needle. If the defect is over 3/8" wide it is a delamination and not a crack.	None

<i>Die-Parting Line</i>	A lengthwise flash or depression on the surface of a pultruded plastic part.	The line projection caused by the die-parting line shall not exceed product's material thickness more than 0.012 in (0.30 mm). It shall not create a sharp feeling or have loose fibers. Repair if limits exceeded.
<i>Discoloration</i>	A streak or other pattern on the surface that causes a noticeable change of color from the rest of the pultruded surface.	Spots of any color not over 3/4 in. (19 mm) diameter or eight per 10 ft. (3 m) of length are permitted. Streaks or longitudinal stains permitted if not over 3/4 in. (19 mm) wide, 10 in. (25 cm) long or more than six per 10 ft. (3 m) of length.
<i>Dry Fiber</i>	A condition in which fibers are not fully encapsulated by resin during pultrusion.	None
<i>Dullness</i>	A lack of normal pultruded surface gloss or shine. NOTE – This condition can be caused by insufficient cure locally or in large areas, resulting in the dull band created on a pultruded part within the die when the pultrusion process is interrupted briefly (see Stop Mark).	Permitted unless caused by insufficient cure.
<i>Exposed Under Layer, Veil Slippage</i>	The underlying layer of mat or roving not covered by surface mat in a pultrusion. NOTE – This condition can be caused by reinforcement shifting, too narrow surface mat, too wide underlying mat, uneven slitting of surface mat or excessive tension in pulling it off the spindle.	Permitted if surfacing material covers all but 1/2 in. (12 mm) from each free edge but not to exceed 50% of the width of the surface being inspected or 30% of the perimeter of a round product. The exposed underlayment may be present intermittently along an entire length. All reinforcing fibers shall be encapsulated with resin.

<i>Exposed Roving</i>	Rovings which are not covered on exterior mat (or off axis reinforcement) in a composite other than an all roving composite.	A maximum of 3/8" from the edge is acceptable if no longitudinal cracks are present. Note: Carrier rovings located on the interior of hollow profiles are acceptable.
<i>Fiber Prominence</i>	A visible and measurable pattern of the reinforcing material on the surface of a pultruded plastic part.	Permitted if reinforcing material is encapsulated by resin.
<i>Folded Reinforcement, Hair Pinning</i>	An unintentional or unspecified misalignment of mat or fabric reinforcing material in relation to the contour of a pultruded section. NOTE – Such folds may or may not affect the surface appearance of the pultrusion and are chiefly visible in a cut cross section of the product. Such reinforcement irregularities are usually due to shifting and crowding of the reinforcing material during pultrusion.	Permitted if reinforcement-rich area is not created and a resin rich pocket not exceeding 50% of the part thickness is created. Permitted if product meets applicable test requirements and specified fitness for use requirements.
<i>Fracture (Caused by damage)</i>	Cracks, crazing, or delamination, or combination thereof, is resulting from physical damage to the pultrusion.	None
<i>Grooving</i>	Long narrow grooves or depressions in a surface of a pultrusion parallel to its length. NOTE – This condition is usually caused by die fouling or by a spot of resin buildup on the die surface, effectively changing the shape of the cross section.	Permitted if material thickness reduction is not over 10% and groove width is 3/16 in. (5 mm) or less. Grooves on opposing surfaces are not permitted. Repair as permissible.
<i>Inclusion</i>	Any foreign matter or particles that are either encapsulated or imbedded in the pultrusion. Example: Tape from a mat.	Permitted if product meets test requirements. None in excess of 1/2 in. (12 mm) diameter or not more than six per 10 ft. (3 m) of length. No inclusion should create a surface blemish above the resin.
<i>Mat splice</i>	The conjoining of two mats during production. All splices should be stitched with thread.	Permitted

<i>Porosity, Internal</i>	The presence of numerous pits or pin holes beneath the pultruded surface; usually observable only in a cut cross section.	For material thicknesses below 3/8 in. (9 mm), no more than twenty pits or pin holes per 10 in ² . (64.5 cm ²) of cross section. The pinhole must be <.06” diameter. For materials 3/8 in. and over in thickness, no more than sixty pits or pinholes per 10 in ² . (64.5 cm ²). The pinhole must be <.06” diameter. Sum of pin hole porosity area and void area shall be no more than 8% of cross-sectional area.
<i>Porosity, Surface</i>	The presence of numerous visible pits or pin holes at or near the pultruded surface.	Permitted if pits are less than 1/32 in. (0.8 mm) diameter. Maximum of ten pits per 10 in ² (64.5 cm ²) of area and no more than one such area per lineal foot (0.3 m) of product.
<i>Puller Track Marks</i>	Depression at regular intervals by excessive pull block pressure.	Acceptable if the depression is less than .005” measured from the surface.
<i>Reinforcement-Rich Area</i>	An over-concentration of reinforcement in the pultruded cross section. NOTE – This usually occurs where mat or other reinforcement is folded, creased, or bunched in a portion of the cross section.	Permitted if product meets test requirements and other visual requirements.
<i>Resin Rich Area</i>	An area of the pultrusion that lacks sufficient reinforcement. NOTE – The fiber pattern may not be visible.	Permitted if product meets test requirements and other visual requirements.
<i>Roving Knot</i>	A knotted or enlarged section of roving found in a pultrusion. NOTE – Such a knot may cause high fiber concentration locally and may or may not be visible as a white or light spot on the surface of the section.	Permitted if encapsulated with resin and product meets test requirements.

<i>Saw Burn</i>	<p>Blackening or carbonization of a cut surface or a pultruded section.</p> <p>NOTE – This condition is usually caused by cutting with a dull saw blade, cutting too slowly, or cutting a highly reinforced material with a diamond blade without water.</p>	<p>Permitted if product meets test requirements and further inspection shows that part is properly wet out, (needle test).</p>
<i>Scale</i>	<p>A condition wherein resin plates or particles are formed on the surface of a pultrusion.</p> <p>NOTE – Scales can often be readily removed, sometimes leaving surface voids or depressions.</p>	<p>Permitted if removal does not expose dry fibers and dimensional tolerances are met. Repair of exposed fiber permitted if dimensional tolerances are met.</p>
<i>Scuffing</i>	<p>Long white scrape marks on the surface of the pultrusion.</p> <p>NOTE – This condition usually results from mechanical scraping or scratching of the pultrusion in the machine or in handling it afterwards.</p>	<p>Permitted if not over 3/4 in. (19 mm) wide or 12 in. (30.5 cm) long and not over five such marks per 10 ft. (3 m) of length. On inside radius, permitted if not over 1/8 in. (3 mm) wide or 6 in. (15 cm) long even if they appear intermittently along each length. Repair if limits exceeded.</p>
<i>Sluffing</i>	<p>A condition wherein scales peel off or become loose, either partially or entirely, from the pultrusion.</p> <p>NOTE – This term is applied to an occurrence during the pultrusion process and is not to be confused with scraping, prying, or physically removing the scale from the pultrusion. “Sluffing” is sometimes spelled “sloughing”.</p>	<p>Permitted if sharp feeling is not created and dimensional tolerances are met. Repair permitted if dimensional tolerances are met.</p>

Stop Mark

A band, either dull or glossy, on the surface, approximately 1/2 to 3 in. (12 to 76 mm) in length and extending around the periphery of a pultruded shape.

Permitted if no other defects are present.

NOTE – This condition is the result of an interruption in the normal continuous pulling operation.

Wrinkle Depression

An undulation or series of undulations or waves on the surface of the pultruded part.

NOTE – This condition can occur in either the lengthwise or crosswise direction of the pultrusion and is caused by reinforcement shifting and crowding (see “Folded Reinforcement”). Wrinkles affect the flatness of the surface.

Permitted if the indentation is less than 15% of the shape thickness and is less than 3/8” in width

Must meet grooving and scaling specification.