

APPENDIX D – Inspection Guidelines

Dimensional measurements shall be taken utilizing inspection equipment that is capable of accurately and precisely dividing the tolerance zone into 10 or more equal divisions.

Visual inspection shall be performed with normal to corrected 20/20 vision. Magnification will not be employed. Unless otherwise specified, the part will be positioned 10 inches below an 18W cool white fluorescent light, at an angle of 60°, and 18 inches from the Inspector. Visual comparison will be no longer than 4 seconds. The parts can be orientated in various ways to change the reflection or viewing angle. If applicable, visual standards can be used with prior OTTO Quality Department approval.

OTTO categorizes the various component, sub-assembly and assembly surfaces/areas as Critical, Class A, Class B and Class C. Each category is typically defined as follows:

- Critical - Those surfaces which are in direct physical or visual contact with the user. If the noted defect were present on the surface, an unsafe condition may result.
- Class A - The top or front, most often viewed surface.
- Class B - Generally the front edge and sides of a part. Not viewed as often as an “A” surface but easily seen by the user.
- Class C - Most often the back and bottom surfaces.

In addition to the specific defects noted on the following pages, all FAI samples and production parts are to be provided to OTTO in a clean and contamination/debris/FOD free condition.

PROCESS: PAINT FINISH				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Dirt / Dust	Not Acceptable	1 defect of .004 sq.in., separation from other defects must be greater than 0.8 in	2 defects of .004 sq.in., separation from other defects must be greater than 0.8 in	3 defects of .004 sq.in., separation from other defects must be greater than 0.8 in
Blisters / Raised Bumps	Not Acceptable	Not Acceptable	2 defects of .004 sq.in., separation from other defects must be greater than 0.8 in	3 defects of .004 sq.in., separation from other defects must be greater than 0.8 in
Scratches / Scuffs	Not Acceptable	Not Acceptable	2 defects of .004 sq.in., separation from other defects must be greater than 0.8 in	3 defects of .004 sq.in., separation from other defects must be greater than 0.8 in
Lint / Hair	Not Acceptable	1 defect of .004 sq.in., separation from other defects must be greater than 0.8 in	2 defects of .004 sq.in., separation from other defects must be greater than 0.8 in	3 defects of .004 sq.in., separation from other defects must be greater than 0.8 in
Pinholes / Crater	Not Acceptable	Not Acceptable	2 defects of .020 sq.in., separation from other defects must be greater than 2 in	3 defects of .020 sq.in., separation from other defects must be greater than 2 in
Overspray / Runs / Sags	Not Acceptable	Not Acceptable	2 defects of .020 sq.in., separation from other defects must be greater than 2 in	3 defects of .020 sq.in., separation from other defects must be greater than 2 in

PROCESS: ELECTROPLATED COATING				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Discolored spot / Color Mismatch	Not Acceptable	Not Acceptable	2 defects of .012 sq.in., separation from other defects must be greater than 2 in	2 defects of .012 sq.in., separation from other defects must be greater than 2 in
Intangible Scuff Mark/Scratch Mark	Not Acceptable	2 defects of .012 sq.in., separation from other defects must be greater than 2 in	3 defects of .020 sq.in., separation from other defects must be greater than 2 in	3 defects of .020 sq.in., separation from other defects must be greater than 2 in
Tangible scuff mark / Scratch Mark	Not Acceptable	Not Acceptable	1 defect of .012 sq.in., separation from other defects must be greater than 2 in	1 defect of .012 sq.in., separation from other defects must be greater than 2 in
Peeling / Blistering	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable
Water break / Solvent Popping	Not Acceptable	Not Acceptable	2 defects of .012 sq.in., separation from other defects must be greater than 2 in	2 defects of .012 sq.in., separation from other defects must be greater than 2 in
Tarnish	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable

PROCESS: CASTING				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Foreign Material	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Cracks / Cold Shuts	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Hot tears / Short shots	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Flush / Parting line	Not acceptable	Not acceptable	Acceptable if not visible in assembled position	Acceptable if not visible in assembled position
Gas holes / Gas porosity	Not acceptable	Not acceptable	1 defect of .080 sq.in. & below & depth < .004sq.in., separation from other defects must be greater than 2 in	1 defect of .100 sq.in. & below & depth < .004sq.in., separation from other defects must be greater than 2 in
Uneven surface caused by uneven buffing, polishing, or shrinkage	Not acceptable	Not acceptable	1 defect of .500 sq.in. & below & depth < .004sq.in., separation from other defects must be greater than 2 in	1 defect of .500 sq.in. & below & depth < .004sq.in., separation from other defects must be greater than 2 in
Tangible scuff mark / Knit line / Scratch mark	Not acceptable	Not acceptable	2 defects of .012 sq.in., separation from other defects must be greater than 2 in	2 defects of .012 sq.in., separation from other defects must be greater than 2 in
Pit / Dent / Nick / Bump	Not acceptable	Not acceptable	2 defects of .012 sq.in., separation from other defects must be greater than 2 in	3 defects of .012 sq.in., separation from other defects must be greater than 2 in

PROCESS: MOLDING				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Blisters / Chip / Air bubble	Not acceptable	Not acceptable	2 defects of .012 sq.in., separation from other defects must be greater than 2 in	3 defects of .012 sq.in., separation from other defects must be greater than 2 in
Cracks / Crater / Fracture	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Delimitation	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Die Parting Line	Acceptable if print permitted	Acceptable if print permitted	Acceptable if print permitted	Acceptable if print permitted
Discoloration	Not acceptable	Not acceptable	Acceptable if not visible in assembled position	Acceptable if not visible in assembled position
Short Shots / Wash	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Sink Marks	Not acceptable	Not acceptable	1 defect of .080 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in	2 defects of .100 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in
Foreign inclusion	Not acceptable	Not acceptable	2 defects of .012 sq.in., separation from other defects must be greater than 2 in	3 defects of .020 sq.in., separation from other defects must be greater than 2 in
Scratch / Scuff mark	Not acceptable	Not acceptable	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in
Porosity / Orange peel	Not acceptable	Not acceptable	2 defects of .080 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in	3 defects of .100 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in

PROCESS: STAMPING				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Sharp edges	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Tool marks	Not acceptable	Not acceptable	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in
Burrs	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Scratches	Not acceptable	Not acceptable	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in
Stress cracks	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Delaminating	Not acceptable	Not acceptable	Not acceptable	Not acceptable

PROCESS: MACHINING				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Sharp edges	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Tool marks	Not acceptable	Not acceptable	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in
Dent	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Burrs	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Scratches	Not acceptable	Not acceptable	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in	1 defect of .500 sq.in. & below & depth< .004sq.in., separation from other defects must be greater than 2 in

PROCESS: PRINTING				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Printing flow	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Color mismatch	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Discolored spots	Not acceptable	Not acceptable	Acceptable if not visible in assembled position	Acceptable if not visible in assembled position
Missing printing	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Smudges	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Blurry	Not acceptable	Not acceptable	Not acceptable	Not acceptable

PROCESS: WELDING				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Cracks	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Incomplete fusion	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Incomplete penetration*	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Porosity	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Slag/Splatter	Not acceptable	Not acceptable	Not acceptable	Not acceptable

*For groove weld only

PROCESS: MAGNETS				
DEFECTS	CRITICAL AREA	CLASS A AREA	CLASS B AREA	CLASS C AREA
Foreign Material	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Loose Chips	Not acceptable	Not acceptable	Not acceptable	Not acceptable
Chipped edge	Acceptable if print permitted	Acceptable if print permitted	Acceptable if print permitted	Acceptable if print permitted