

1. PURPOSE

This document establishes minimum time-and-distance requirements for the inspection of surface finishes on products manufactured for Voga Coffee, Incorporated.

2. SCOPE

This procedure applies to all material used in Voga manufactured products.

This includes, but is not limited to:

- a. All material received from outside sources.
- b. Any material assembled, reworked, manufactured touched-up, etc., within Voga.

3. ISSUED BY/OWNER

Gerald Davis/Engineering

4. REFERENCES

ASTM Standard (D 3359-97) Standard Test Methods for Measuring Adhesion by Tape Test

5. INSPECTION ENVIRONMENT

5.1 Inspection Conditions

Use the following guidelines unless otherwise noted on the part's specifications:

Lighting:	Daylight or cool white fluorescent lighting of typical office space (8-15 foot-candles). Lighting should be diffused so shadows are not a factor.
Viewing Distance:	18 to 24 inches.
Viewing Plane:	Parts shall not be manipulated to reflect a single light source in order to accentuate surface flaws. View without reflecting a single light source.
Dwell Time:	8 to 10 seconds. Inspection Aids: No magnifying devices are permitted for visual inspection. Magnifying devices are permitted for determining the size of defects.
Repetitive Inspection:	A flaw that occurs repeatedly in the same surface location becomes more easily noticed. If this same cosmetic flaw was judged acceptable at the beginning of the lot inspection, it shall be acceptable at the end.
Inspection for voids:	Inspection for bare metal and paint voids should be performed with inspection flashlight to improve detectability. If other flaws are found with this increased lighting, they are to be ignored unless they are obvious without the increased light.

5.2 Classes of Finish

Unless otherwise specified by drawing, classes of finish are defined by how often and by how visible the surface is in the finished product as seen by customer:

- 5.2.1. **Class I** Surfaces are frequently viewed. Typically front and top of product.
- 5.2.2. **Class II** Surfaces are occasionally viewed (typically the sides of the product).
- 5.2.3. **Class III** Surfaces are rarely or never viewed. These are typically inside or covered surfaces.

NOTE: For high gloss paints, all surfaces are to be treated as **Class I**.

5.3 Cleanliness

Completed parts shall be free of dirt, grease, and other contaminants. Dust caused by shipping material is acceptable if it can be blown off with air or wiped off.

5.4 Surface Roughness

As needed, Voga drawings indicate the maximum roughness in Ra units per the following table.

Surface Finish Conversion Chart						
N	Rt	Ra	CLA	RMS	Cut-off length	
					Inches	mm
1.	0.3	0.025	1	1.1	0.003	0.08
2.	0.5	0.05	2	2.2	0.01	0.25
3.	0.8	0.1	4	4.4	0.01	0.25
4.	1.2	0.2	8	8.8	0.01	0.25
5.	2.0	0.4	16	17.6	0.01	0.25
6.	4.0	0.8	32	35.2	0.03	0.8
7.	8.0	1.6	63	64.3	0.03	0.8
8.	13	3.2	125	137.5	0.1	2.5
9.	25	6.3	250	275	0.1	2.5
10.	50	12.5	500	550	0.1	2.5
11.	100	25.0	1,000	1,100	0.3	8.0
12.	200	50.0	2,000	2,200	0.3	8.0

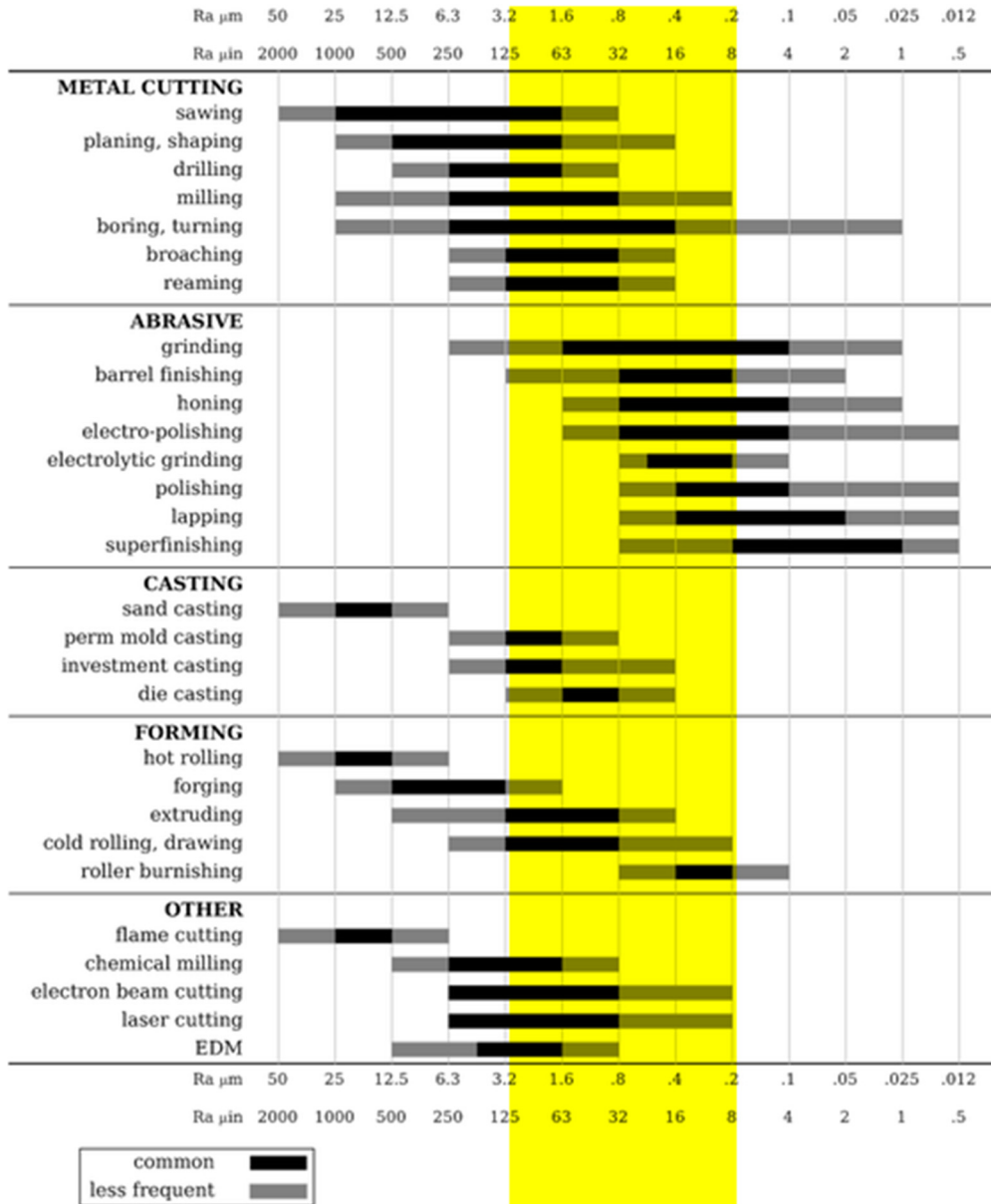
N = New ISO scale numbers
 Rt = Roughness, total in microns

CLA = Center line average in microinches
 RMS = Root mean square in microinches

Ra = Roughness, average in microns

5.5 Surface Roughness Reference Chart

Unless otherwise specified, surfaces are expected to be in the Ra range of 125 to 32.



6. DEFINITIONS

6.1 Definition of Cosmetic Flaws in Paint

6.1.1 Burrs

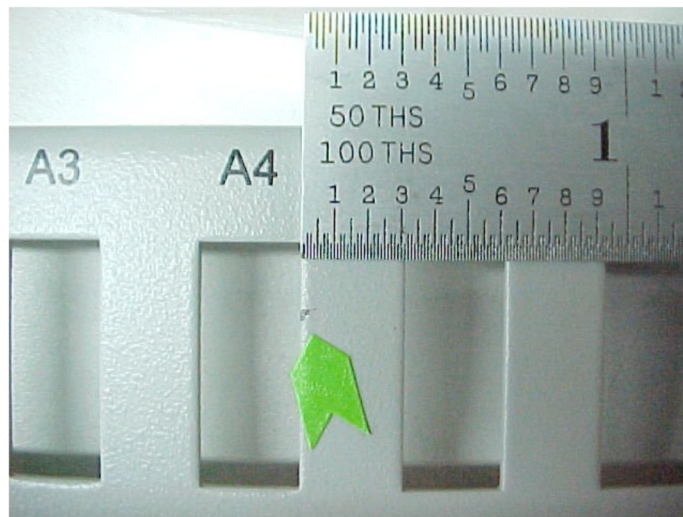
Sharp or raised edge perpendicular to surface/edge.

6.1.2 Blister/Peeling/Flaking

Enclosed raised spot resembling a blister. Any point where the coating material has separated from the base material.

6.1.3 Bare Metal, Chips or Voids

Any area on the base material that remains visible after coating. Areas of surface that have been racked, masked, broken, chipped, or missing paint.

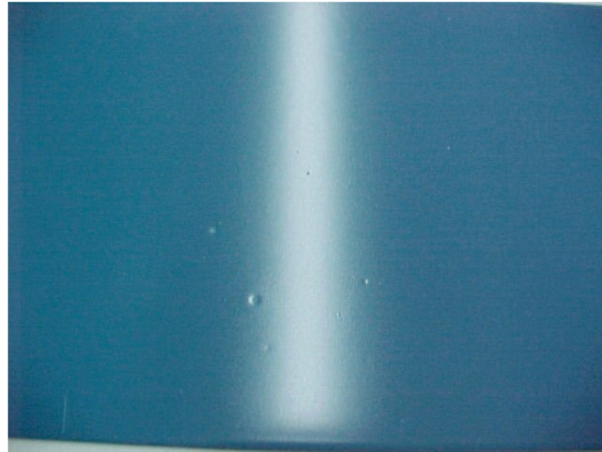


6.1.4 Color flaw

A deviation from the intended hue, gloss, and shade. An inconsistent color that does not match the applicable standard as specified on the drawing. This may include stains / chemical residue.

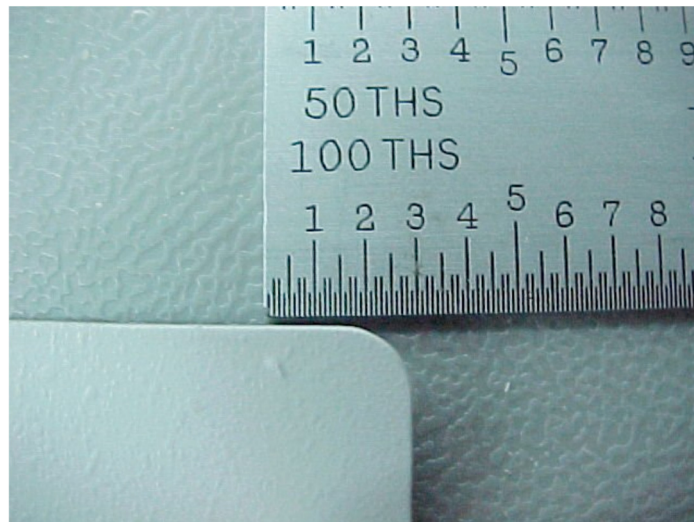
6.1.5 Fish eye

Cratering caused by organic contamination.



6.1.6 Foreign Material

Dirt, lint, or other particles being trapped in the paint.

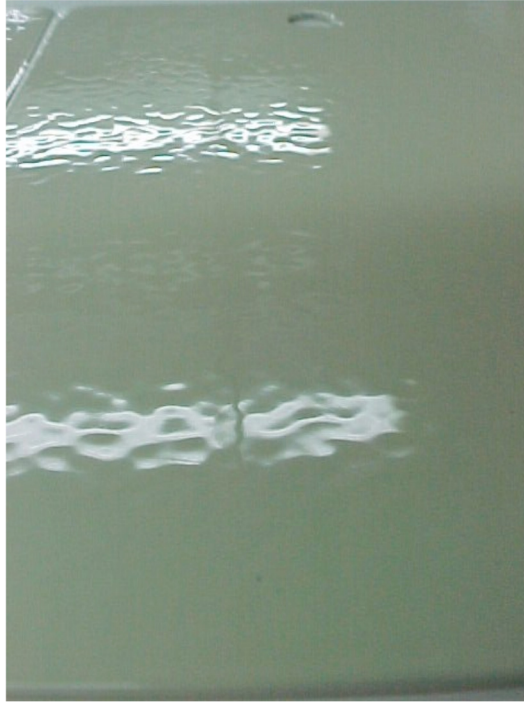


6.1.7 Gloss, Uneven

Any area of excessive or deficient gloss.

6.1.8 Orange Peel

An irregular or rough surface resembling the peel of an orange.

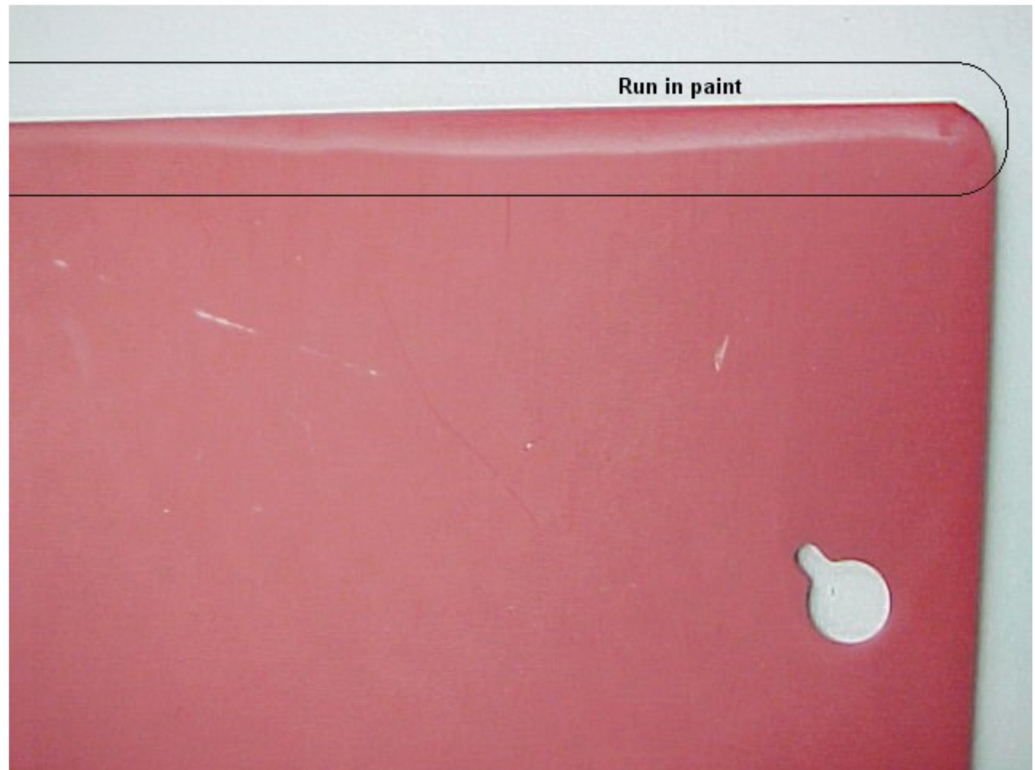


6.1.9 Painting Touch-up

Defects hidden by use of touch-up paint, either spray or brush.

6.1.10 Paint Runs, Sags, or Excessive Paint Build-up

Areas where paint is applied so heavily that gravity causes it to flow downward.



6.1.11 Scratches/Abrasions

Wearing, grinding, or rubbing of painted surfaces.



6.1.12 Texture, Non-Uniform

Texture is not consistent from surface to surface or within the same surface or does not match the standard as specified on the drawing.



6.2 Definition of Flaws in Plated, Bare Metal, or Plastic Parts

6.2.1 Bare Metal, Chip or Void

Any area on the base material that remains visible after plating. Such areas may have been racked, masked, oiled, chipped, or missing plating.

6.2.2 Blister, Peel, Flake

Enclosed raised spot resembling a blister. Any point where the plating has separated from the base material.

6.2.3 Burr

Raised edge that presents safety or assembly hazard. Burrs reflect improper plating, worn tooling, poor workmanship, and/or incorrect material processing.

6.2.4 Color flaw

A deviation from the intended hue, gloss, and shade. An inconsistent color that does not match the applicable standard as specified on the drawing. This includes stain and rust in/over/under the plating.

6.2.5 Foreign Material

Dirt, lint, or other particles being trapped in the plating.

6.2.6 Grain, Uneven

Wavy, inconsistent, missing grain pattern. Includes excessive roll-off of edges caused by excessive sandpaper pressure. Includes cross-graining of aluminum parts.

6.2.7 Scratch

Visible lines or mars that are not found on pristine (as manufactured) raw material.

6.2.8 Sharp Edge

See 6.2.1 Burr

6.2.9 Plating Touch-up

In general, plating touch-up with paint or clear coat is not an acceptable method of repairing newly plated parts.

6.3 Examples of citation of this standard on drawings

- FINISH: POWDER COAT WITH CARDINAL WH9-TO12. REFER TO VOGA VISUAL INSPECTION STANDARD CLASS I.
- FINISH: PASSIVATE PER QQ-P-35. REFER TO VOGA VISUAL INSPECTION STANDARD CLASS II.
- MATERIAL: 18GA (.048) AISI304 #4/PVC. FINISH: BARE. REFER TO VOGA VISUAL INSPECTION STANDARD CLASS I.

7. INSPECTION OF COSMETIC SURFACES

7.1 Racking Points

Unless otherwise specified by drawing, racking shall be accomplished as needed to achieve excellent paint application. Use locations for racking that will be inconspicuous in the final assembly. For visual inspection, the surfaces immediately adjacent to racking points are treated as Class III.

The hole or slot(s) used for racking may have flaws on their interior surfaces that might otherwise fail Class III evaluation; so long as the coverage is suitable for corrosion control, inspection of the interior of racking holes is not required.

7.2 Color

Inspect coating colors using a color chip that is approved by Voga. If a Voga approved paint chip is not available, use a color standard (e.g. Pantone #) or chip from the paint manufacturer and prepare an inspection chip set for future Voga QA.

The color is acceptable if the part and color standard are visually compatible, or if the difference in color is not readily apparent. The part is unacceptable if the color difference is easily detectable. Questionable conditions will be referred to Voga Quality Assurance for resolution.

Color plated parts (anodized) will be inspected with a Voga approved color chip.

7.3 Texture

Texture for powder coated surfaces (as for wet painted surfaces) is specified by the formulation indicated by the paint manufacturer's documentation. Texture will be specified on the part's fabrication drawing.

As for color, inspect texture using a paint reference chip that is approved by Voga.

The part is acceptable if the texture is visually compatible with the sample or standard texture and the texture is uniform throughout, or if the difference in texture is not readily apparent. The part is not acceptable if the texture difference is easy to detect or not uniform throughout one surface.

Grain direction, scratch length, scratch depth may be inspected using a reference chip approved by Voga. In general, Voga prefers standard pre-grained material over belt-sanded.

7.4 Coating Thickness

Coating thickness shall be uniform and in accordance with the paint manufacturer's recommendation.

In general, cured film thickness of 3mil-18mil (.003"-.018") is acceptable.

Coatings are an integral feature of the finished material. Unless otherwise stated, feature dimensions on Voga drawings apply to the bare part, not to the painted part.

Plated thickness will be in accordance with the specification on the drawing.

7.5 Coating Coverage

Coverage will be complete except as specifically noted on the part's the drawing.

If the part's drawing notes zones that do not require coverage, over-spray is generally acceptable, 100% coverage is preferred.

Zones designated as "masked free of paint" shall not have overspray.

In areas where coverage is difficult due to the shape of the part, contact Voga engineering for approval of light coverage or full masking prior starting work. The part's drawing should be corrected to address this issue prior to next build.

7.6 Adhesion/Coating

Paint and/or plating shall not come off when rubbed with a dry cloth or with fingers. The applied finish shall not come off when subjected to an adhesion test.

To perform an adhesion test of the paint or plating, use the tester manufacturer's instructions. A typical method is as follows:

- a. Assemble scotch tape (or similar) and a new/clean plastic bag.
- b. Identify the area on the part to be tested. Do not clean the part prior to test.
- c. Secure the part for stability and safety.
- d. Place a 2" strip of scotch tape on the part; rub the tape to adhere – stroke in same direction three times. Make sure to remove all of the air bubbles.
- e. Remove the tape by pulling rapidly from a 90-degree angle from the surface finish in question.
- f. Place the tape sample in the plastic bag and seal.
- g. Evaluate the tape sample. Any residue during this inspection and/or exposed bare metal on the part and/or parts in question is cause for rejection of the part being inspected. There must be no evidence of finish coat removal on the tape.

8. ACCEPTANCE CRITERIA BY CLASS

Scratches / abrasions / voids that expose bare metal under painted or plated surfaces will not be acceptable.

Note: The following table is not to be considered all-inclusive. Flaws or defects not noted below will be considered on a case-by-case basis depending on the class of surface finish and type of defect. Questionable areas should be referred to Voga Quality Assurance.

Defect	Class 1 Acceptance Criteria	Class 2 Acceptance Criteria	Class 3 Acceptance Criteria
Orange Peel	None Allowed	None Allowed	Allowed
Painting Touch-up	Allowed	Allowed	Allowed
Texture, Non-Uniform	None Allowed	None Allowed	Allowed
Color	Per approved chip	Per standard	Per standard
Blister/Peeling/Flaking	None Allowed	None Allowed	None Allowed
Bare Metal, Chips or Voids	None Allowed	None Allowed	None Allowed
Paint Runs, Sags, or Excessive Build-up	None Allowed	None Allowed	None Allowed
Burrs / sharp edges	None Allowed	None Allowed	None Allowed
Fish eye	Not Allowed	Not Allowed	Not Allowed
Weld Porosity	None Allowed	None Allowed	None Allowed
Weld Spatter	None Allowed	None Allowed	All slag and spatter to be removed but the nuggets or rough surface left by the removal of the spatter may be present.
Gloss, Uneven (on any single surface in 1sq foot area)	Not to exceed .02" x 1" No more than 4 instances	Not to exceed .06" x 1.5" No more than 8 instances	Not to exceed .13" x 2" No more than 3 instances
Scratches/Abrasions (on any single surface in 1sq foot area)	Not to exceed .01" x .03" No more than 2 instances	Not to exceed .03" x .06" No more than 4 instances	Not to exceed .05" x .09" No more than 6 instances
Grind Marks	Not visible at viewing distance	Not visible at viewing distance	Allowed
Tool Marks	Visible but not to exceed .002" deep after paint. (not easy to feel with fingernail)	Visible but not to exceed .015" deep after paint. (felt easily with fingernail)	Allowed
PEM Stud Head / swaged fastener (always follow PEM guidelines)	GRIND/FILL TO HIDE UNDER PAINT	VISIBLE UNDER PAINT	NOT INSPECTED
Spot Welds	No ruptures to the surface. Size and diameter of witness marks shall not exceed 6 times the metal thickness.	Even, continuous, and smooth. Height of weld shall not exceed 30% of the width.	Pits may be present but not to exceed two (2) per ¼" of weld.

9. REVISION HISTORY

REV	DATE	REVISED BY:	DESCRIPTION
01	30JUN2017	G. DAVIS	REWORKED TELECT WORKMANSHIP STANDARD TWS-902 TO CREATE THIS ONE.
02	07JUL2017	G. DAVIS	CORRECT NUMBER IN 5.2; ADDED 5.4 AND 5.5.

10. Approvals

REV	DATE	APPROVED BY:
01	01JUL2017	G.DAVIS
02	07JUL2017	G.DAVIS

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