Supplier Booklet

www.svmicrowave.com

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 The purpose of this manual is to communicate requirements for products purchased by SV Microwave from its suppliers. SV Microwave's goal is to minimize or eliminate rejected or reworked parts in order to meet deliveries while eliminating costly scrap and rework for suppliers.

1.2 Additional purchase order requirements are flowed down to SV Microwave suppliers via General Terms and Conditions and Quality Notes (Q-Notes). These will be itemized at the end of every PO. The specific requirements are located on our Website at www.svmicrowave.com

1.2.1 Failure to conform to Q-note requirements can result in product rejection and return. Contact your buyer for questions regarding these prior to manufacture.

1.3 If at any time SV receives a non-conforming product from a supplier, we reserve the option to:

1.3.1 Return the parts to the supplier for correction or require that the parts be remade at no cost to SV.

1.3.2 Return the parts to the supplier without payment and cancel the contract.

1.3.3 Rework the parts within the factory and deduct labor plus overhead costs from the supplier's billing. Parts to be reworked at SV will be discussed in detail with the supplier prior to starting the rework.

1.3.4 SV can reject and return parts to suppliers at any time during the SV assembly process (line rejects).

1.4 All drawings sent to SV suppliers are considered proprietary and may be controlled by ITAR, DFARS clause 252.227-7012 (48 CFR 252.227-7013), or SV Customers.

1.4.1 In order to ensure that suppliers are always working to the correct revision and that there is no inadvertent dissemination of our drawing to outside interests, SV requires that all hard copies be discarded.

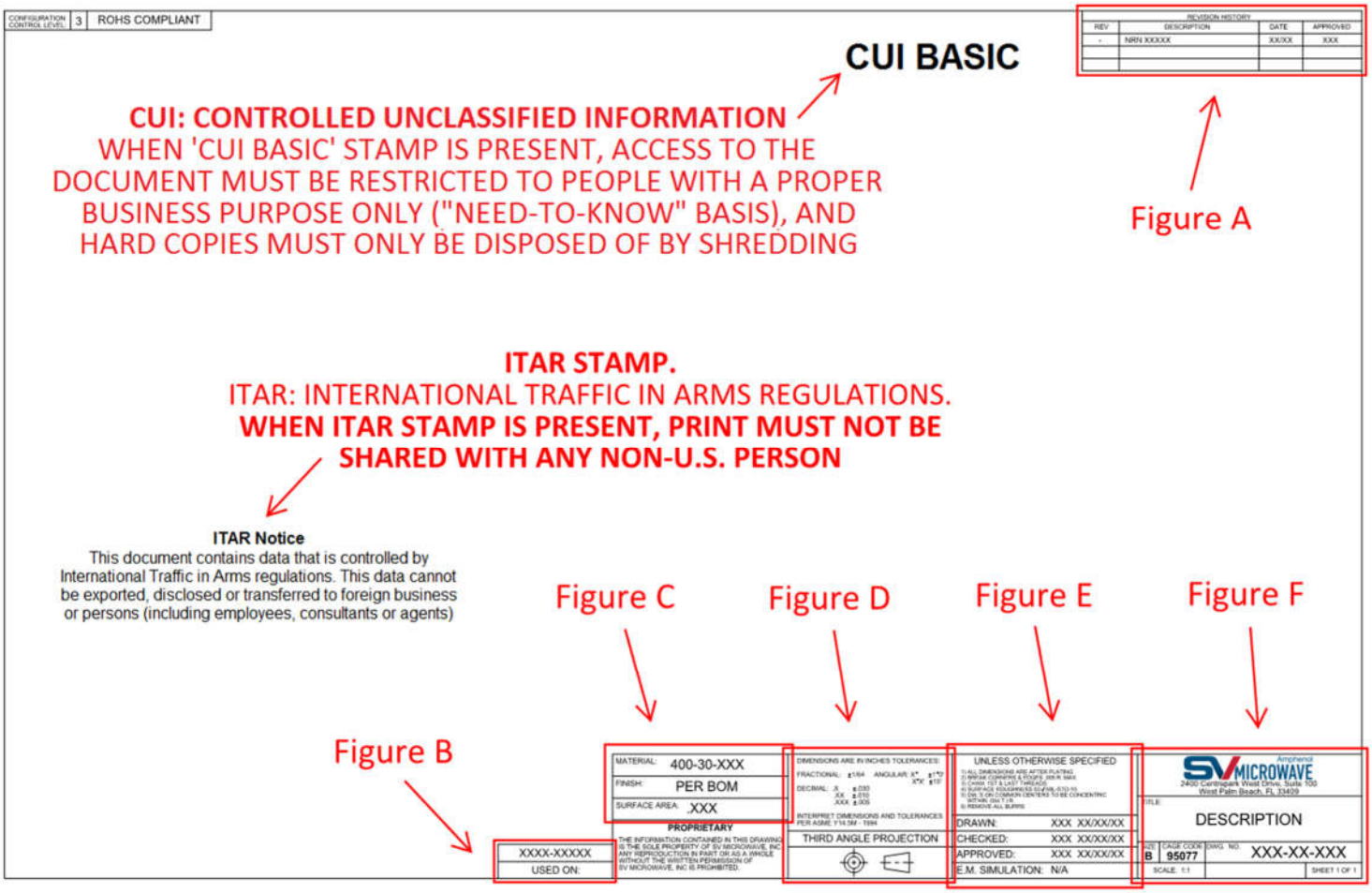
1.4.1.1 SV Purchasing Dept. is required to send new drawings for review with every quote/purchase order. If you do not get a new copy, you need to contact your buyer. DO NOT use old versions or revisions.

1.5 Technical collaboration with suppliers is common practice at SV Microwave. Suppliers are encouraged to contact SV with any questions and concerns about meeting requirements. SV will put a subject matter expert in contact with suppliers to engage in reciprocal technical exchanges.

1.6 Suppliers are required to provide material certifications matching SV requirements with every shipment. This is covered more in detail in Quality Terms and Conditions (section I, paragraph I).

1.7 Certificates of Conformance supplied with every shipment are required to include, at a minimum, the Seller's name and address, the manufacturer's name (if different from the Seller's), the PO number, SV part number, and revision, the manufacturer's part number and revision (if different than SV's), lot number or date code, and an authorized representative's signature. This is also covered in Quality Terms and Conditions (section I, paragraph E).

SV DRAWING FORMAT INTERPRETATION



SV Microwave Standard Drawing Format

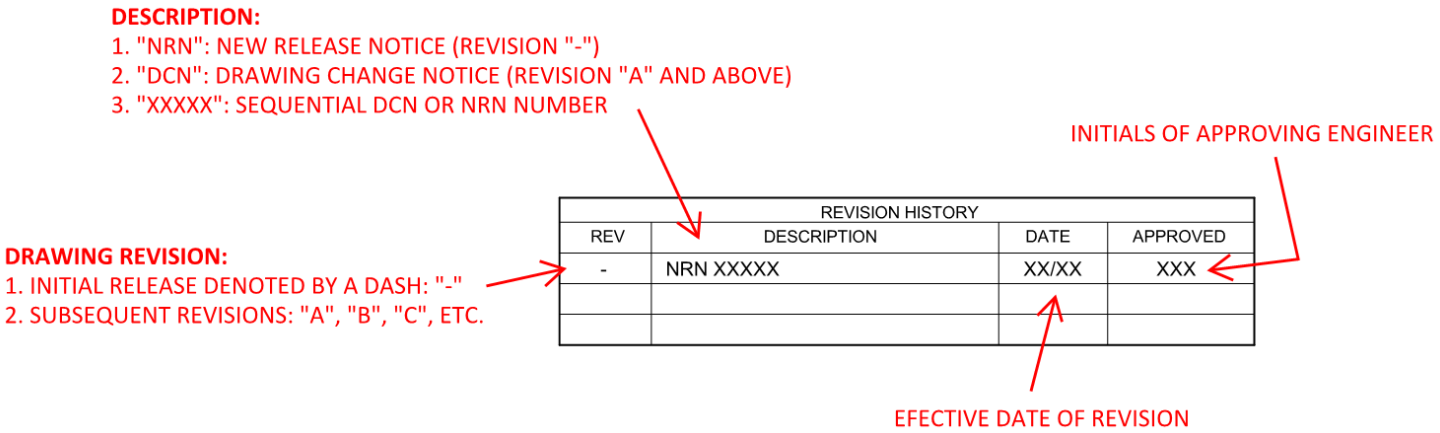


Figure A

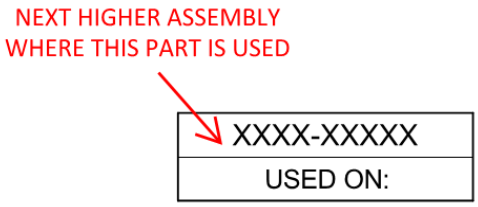


Figure B

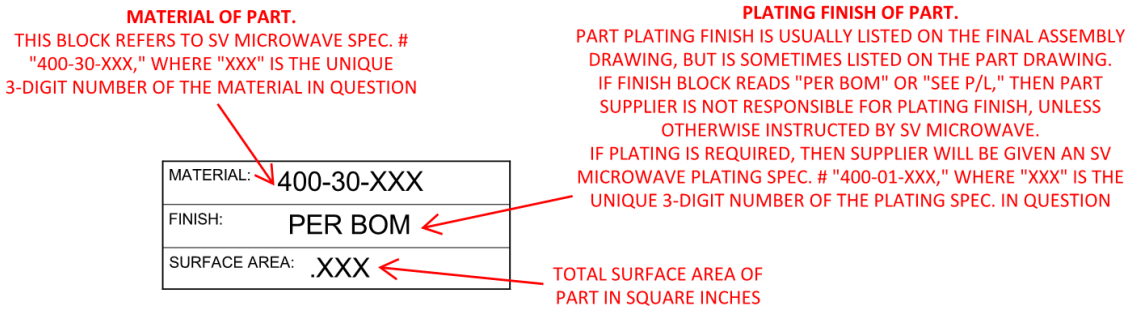


Figure C

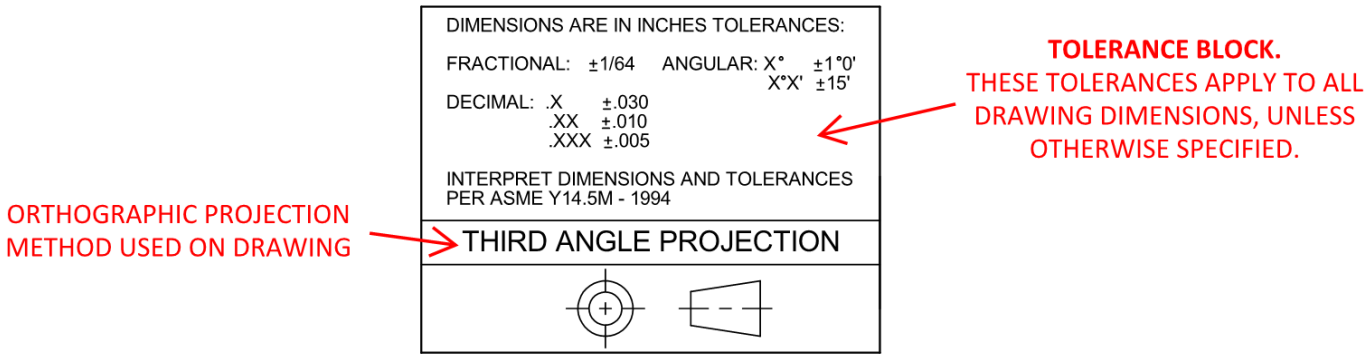


Figure D

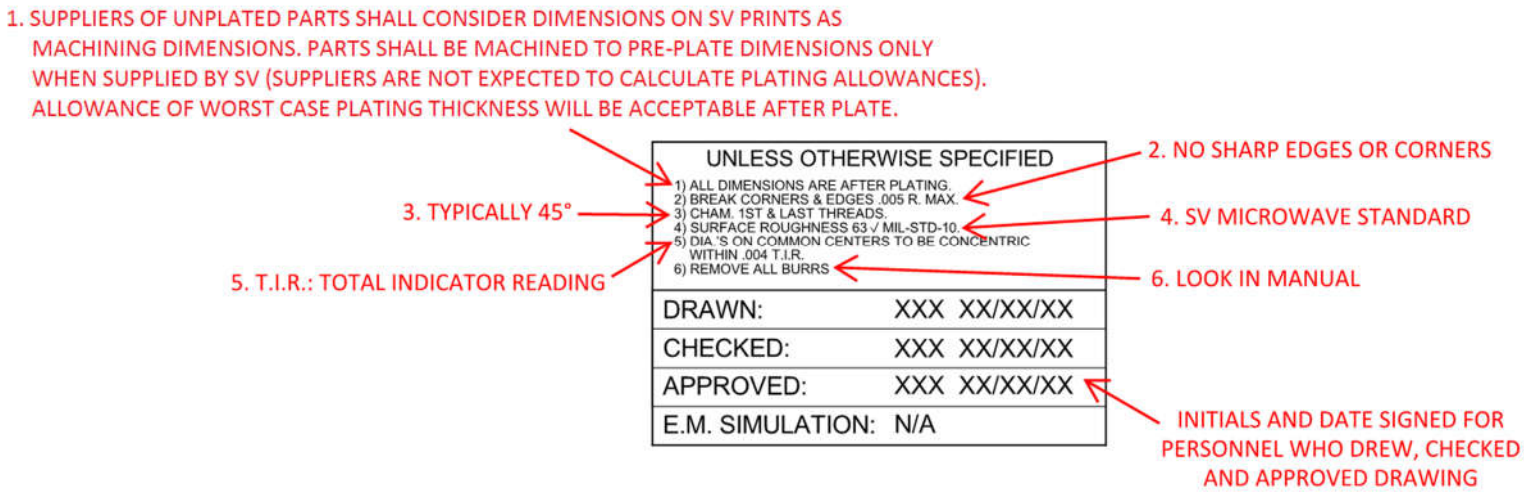


Figure E

Figure F

2.0 INSPECTION CRITERIA

2.1 SV Microwave uses the following criteria as a guideline for visual and mechanical inspection:

2.1.1 When visually inspecting the product, an illuminated microscope with at least 7X magnification is used. SV reserves the right to increase magnification to verify a suspect condition.

2.1.2 The sample size for inspection is in accordance with ANSI/ASQC Z1.4, General Inspection Level II, 1.0 AQL (a=0, r=1) unless otherwise specified by a customer or drawing requirement. All inspections are performed on parts randomly selected from the lot.

2.1.3 In the event a conflict arises between this document and the drawing, the drawing shall prevail. Parts are inspected for all dimensions and notes on the drawing.

2.1.4 Parts must be clean and free of all contaminants, including oils, dirt, and debris left from manufacturing operations (more details on section 6.0).

2.1.5 SV reserves the right to perform any testing to ensure the product received meets all requirements.

3.0 MEASUREMENT TECHNIQUES

3.1 The following recommended practices are guidelines for the use of standard measuring tools and techniques to inspect SV products.

3.1.1 External Measurements:

- Use the Vernier tool (calipers) for tolerances of .005" or greater.
- Use a one-inch micrometer for tolerances of .0005" to .005".
- Use a bench micrometer or dial snap gage for tolerances of .0003" to .0005".
- Use electronic calipers, comparators, and gage heads for tolerances of .0005" to .0001".

3.1.2 Internal Measurements:

- Use plus pin gages for tolerances of .0005" or greater.
- Use a dial bore gage for tolerances of .0003" to .0005".

3.1.3 Measurements of counterbore depths:

- Use a height gage with .001" graduations for tolerances of .005" or greater.
- Use a height gage with .0001" graduations for tolerances of .0003" to .005".
- Use an electronic gage with a height check for tolerances of .0003" or less.

3.2 The use of optical measurement equipment (automated or otherwise) to inspect SV products is also acceptable.

3.3 Whenever a datum is called out by an SV drawing, related dimensions must be inspected with respect to it. If a supplier is unclear about this, or the inspection method precludes measurement with respect to the datum, SV must be consulted for clarification/resolution.

4.0 BURRS, ROLL-OVERS, AND SHARP EDGES

4.1 Parts delivered to SV Microwave must be free of burrs, roll-overs, and sharp edges visible under an illuminated microscope at 7X magnification, which may cause interference, an out-of-tolerance condition, arcing, corrosion, or a malfunction during operation.

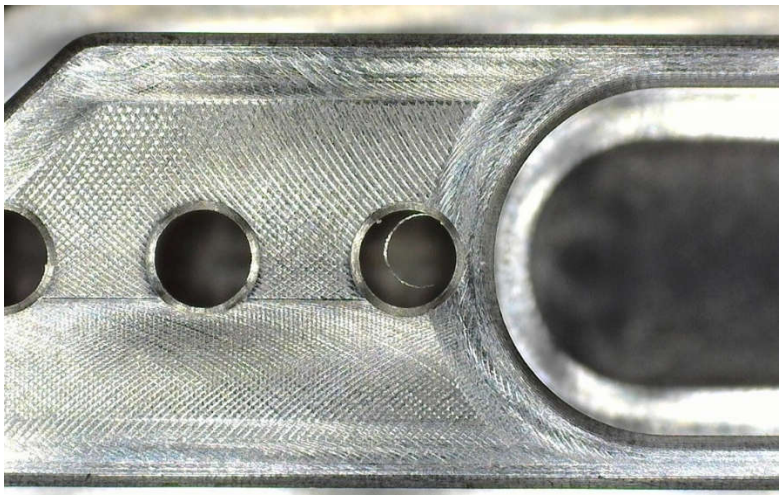
4.2 Burrs that are firmly attached to the parts should not exceed .002" in size and may not exceed dimensional tolerances. Firmly attached burrs are those that cannot be detached by picking, brushing, or scraping.

4.3 Some examples of burr-induced defects are:

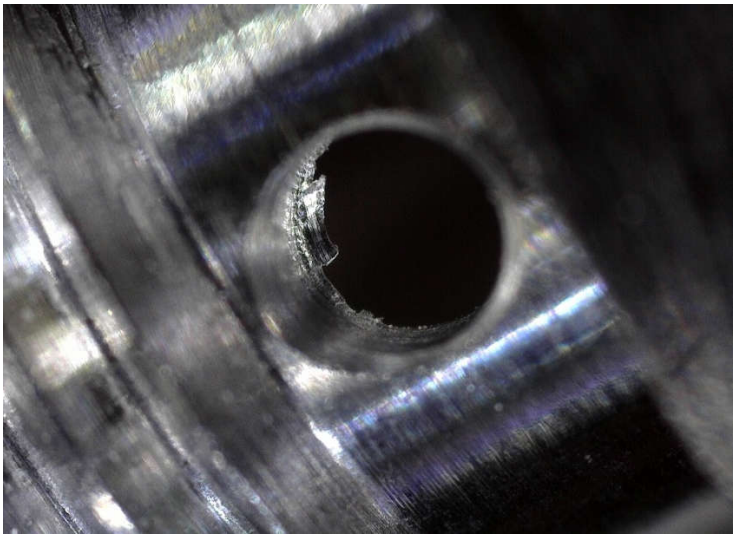
- Interference between mating parts.
- The potential of breaking off, exposing the base surface and leading to deterioration of the base material.
- Causing parts to seize, gall or function in an erratic manner.
- Electrical and/or mechanical failures.
- Corrosion caused by trapped plating solutions.
- Interference with the plating process that may cause "shadows" or voids in the plating.

4.4 Tumbling (barrel or vibratory), magnetic pin spinning, sandblasting, and manual deburring (as needed) are common deburring methods recommended by SV.

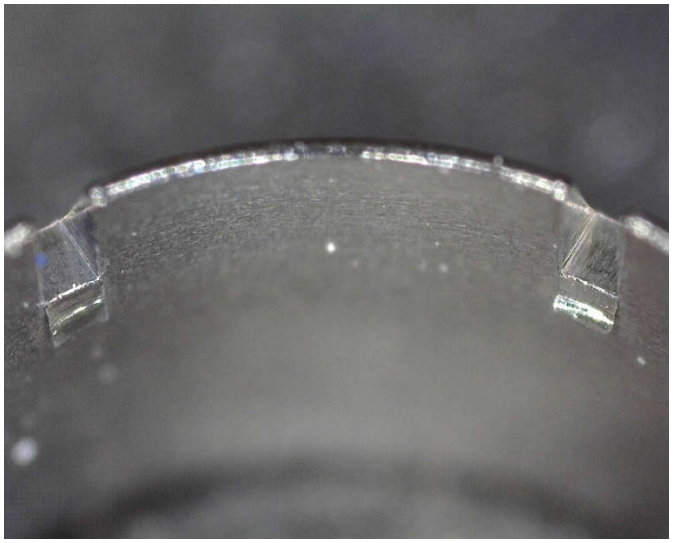
4.5 Examples of common types of burrs:



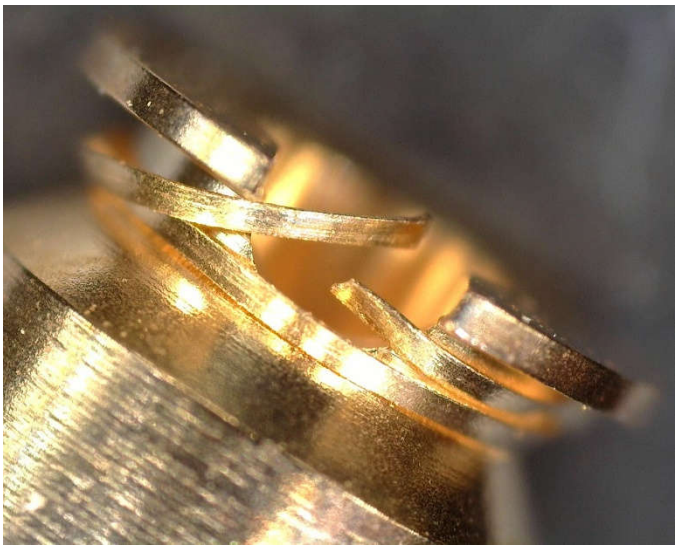
Burr in the ID



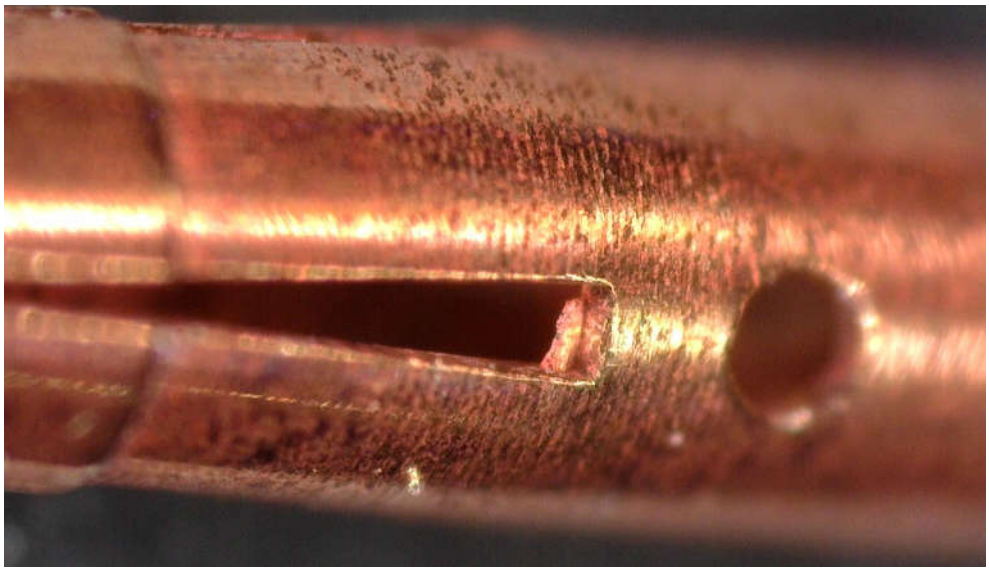
Burr at the edge of a thru-hole



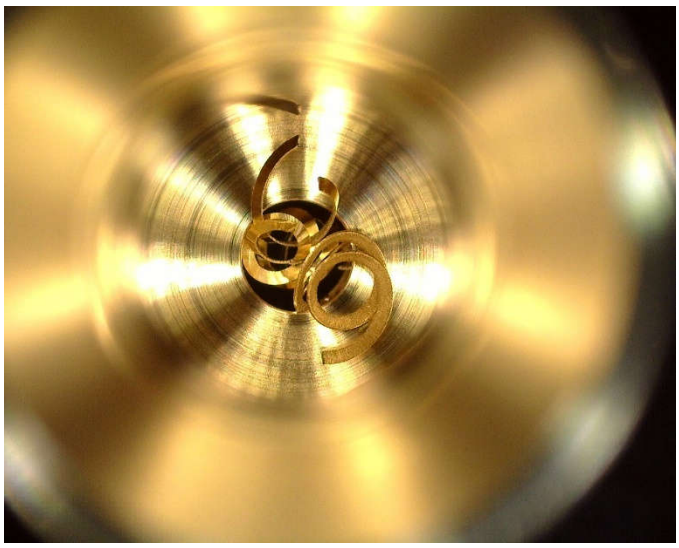
Folded-over burrs



Wrap-around burrs



Burr at the bottom of a slot



Loose metal burrs in the ID

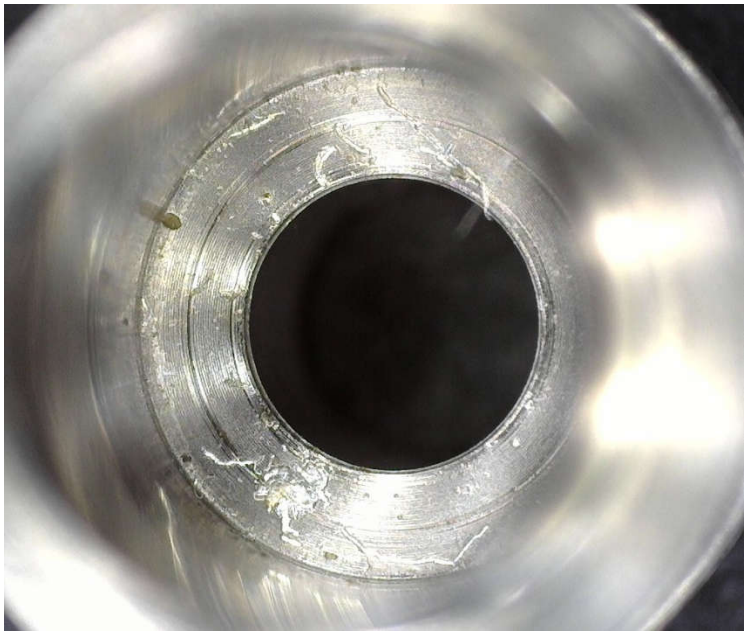
Loose Teflon burrs

5.0 CONTAMINATION/FOD

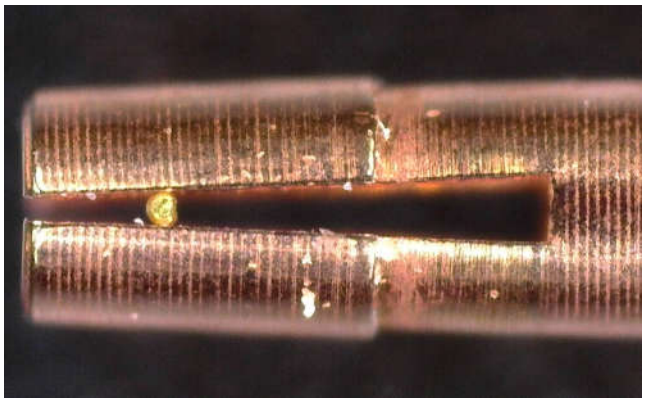
5.1 All parts delivered to SV Microwave must be clean and free of oil, material chips, coolant, water, cleaning solution, and deburring media.

Note: No ozone-depleting chemical shall be used to clean SV Microwave parts.

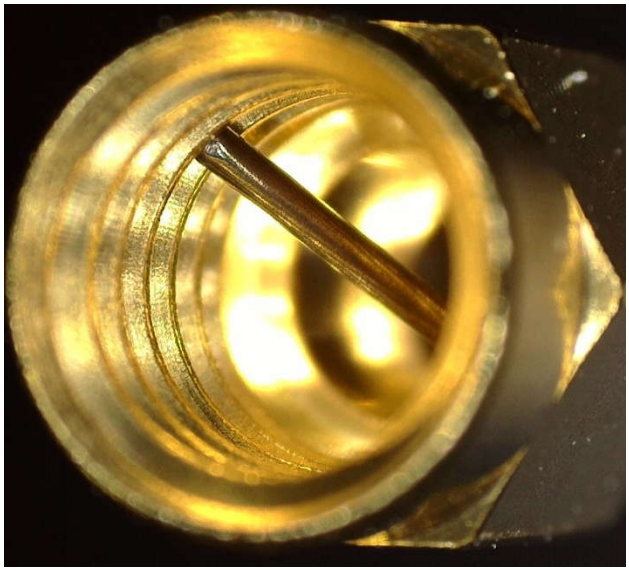
5.2 Examples of contamination/FOD on parts:



Oil and material chips



Lodged deburring media



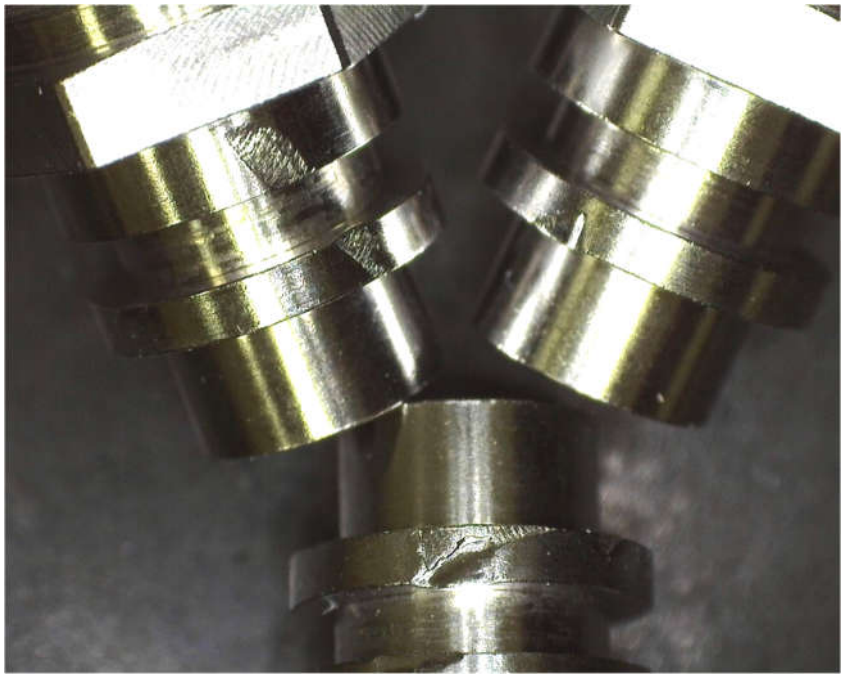
Lodged spinning pin

6.0 WORKMANSHIP

6.1 Parts delivered to SV Microwave shall meet industry workmanship standards.

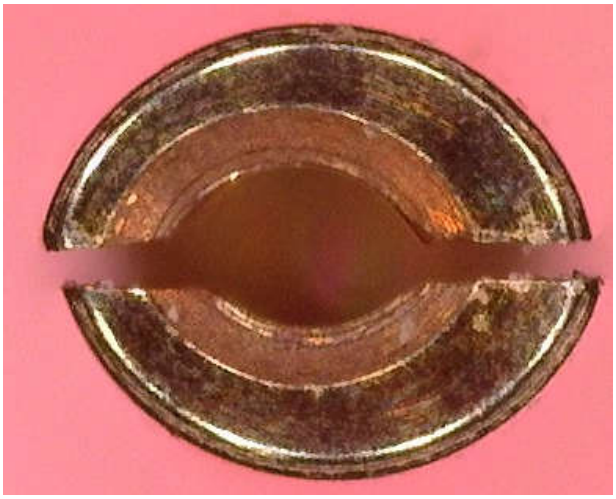
6.2 Excessive nicks, dents, gouges, tool marks, scratches, or damage, in general, are considered detrimental to the mechanical, electrical, or environmental performance of parts and will cause rejection.

6.3 Examples of common workmanship issues:

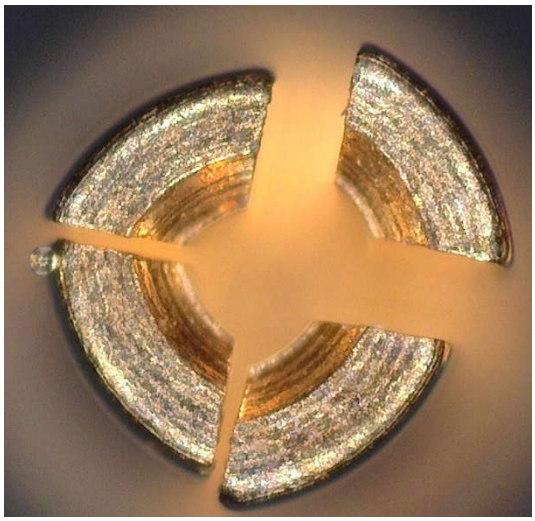


Excessive tool marks

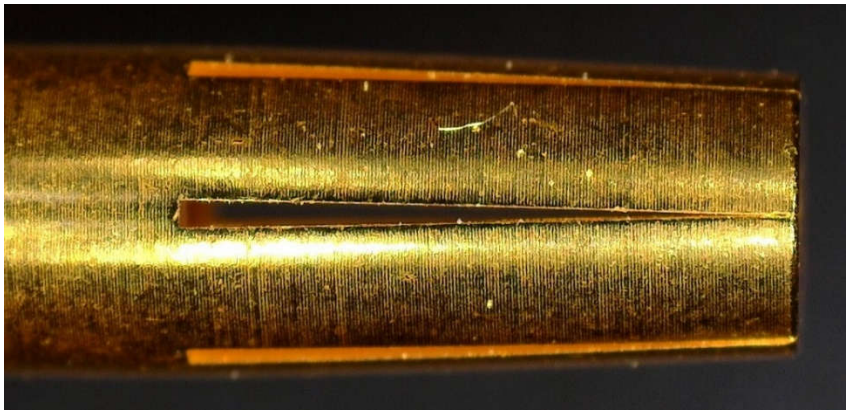
Stamping defect



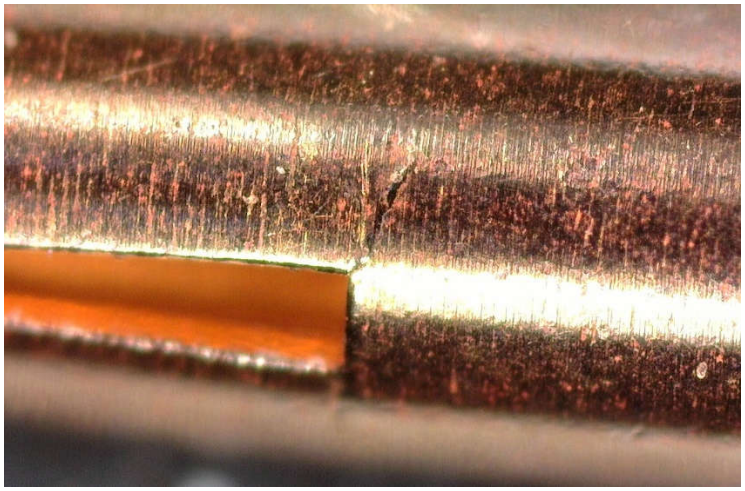
Eccentricity of part features



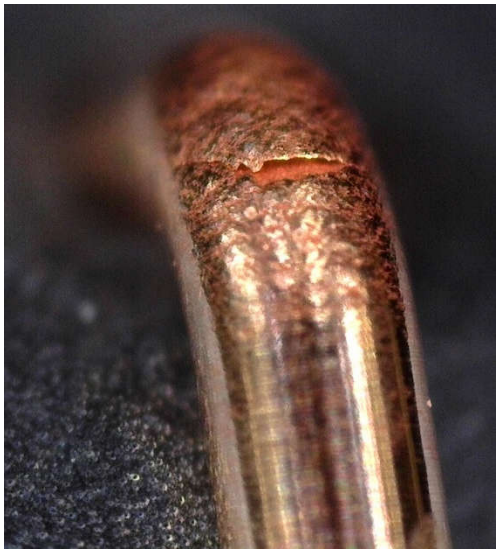
Uneven tine closure



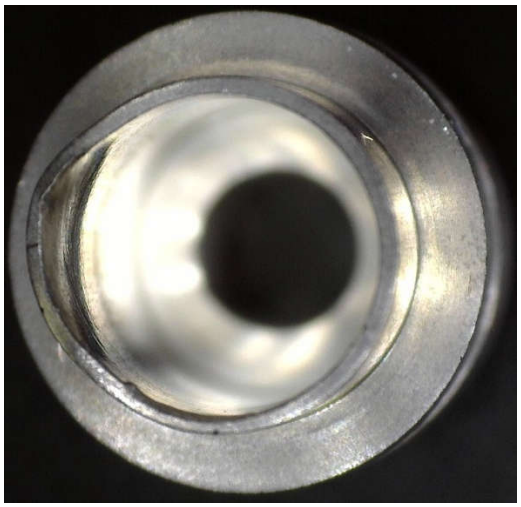
Touching tines



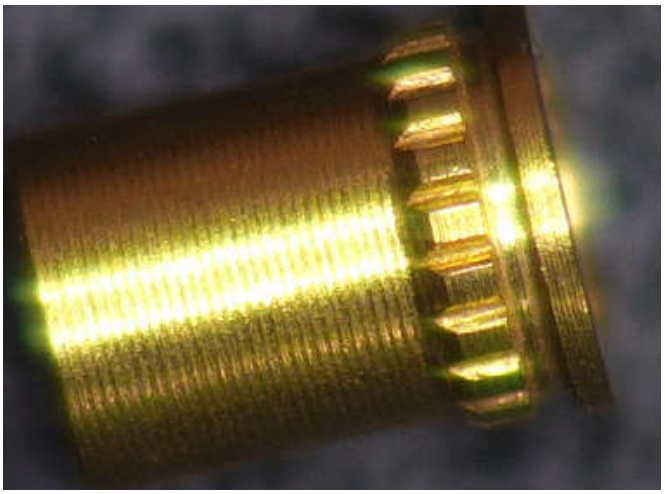
Crack at the bottom of a slot



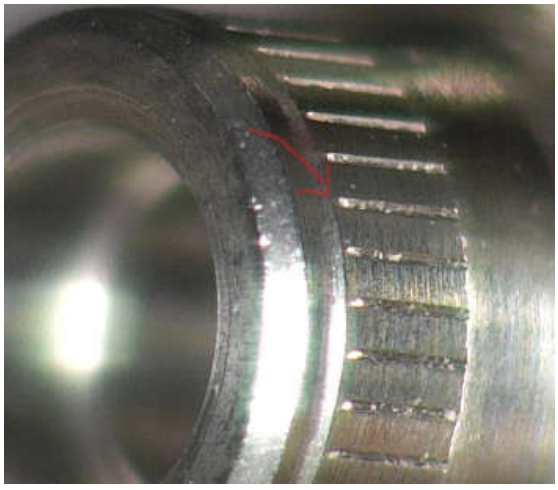
Crack at a right angle bend



Excessive damage



Improperly formed knurl (Root diameter not below work blank diameter)



Improperly formed knurl (Root diameter is not the full length of knurl)

7.0 SURFACE FINISH

7.1 SV Microwave inspects the surface finish of parts using visual standards. The following are descriptions of surface finishes used on SV parts:

7.1.1 A 125µin surface finish is a coarse production surface for interior clearance and clean-up operations. This finish is typically produced by turning, milling, drilling, boring, etc., and is permitted wherever definite tool marks are not objectionable. This finish is used on interior surfaces where a better finish is not needed, such as areas that are designed to accept insulators.

7.1.2 A 63µin surface finish (industry standard) is a medium commercial finish produced by relatively high speeds and fine feeds. This is the finish typically required for non-critical exterior surfaces produced by lathes, mills, and controlled drilling and counterbore operations. When required, tool marks in excess of this surface finish are cause for rejection. This spec is generally used for all diameters, thread reliefs, cable crimps, flats, and shoulders.

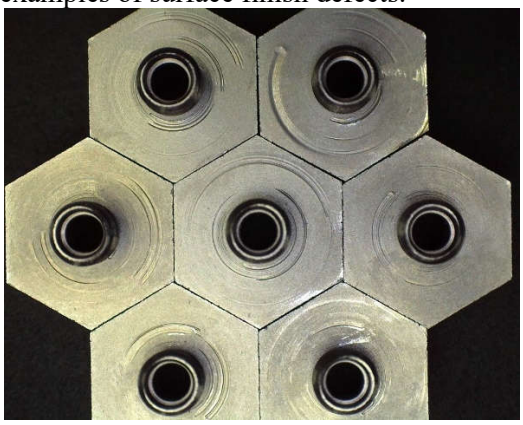
7.1.3 A 32µin surface finish is a good finish produced by the use of high-speed cutting operations combined with fine feeds and well-sharpened cutting tools. This finish is generally required on mating parts and surfaces meant for close fits. This type of finish should be used on "O" ring grooves, mating counterbores, contact areas of outer conductors, center contacts, mating areas, and screw threads.

7.1.4 A 16µin surface finish is a fine finish produced by the use of high-speed cutting operations combined with fine feeds, well-sharpened cutting tools, and buffing. This finish is typically used for mating parts and surfaces where other moving metal surfaces will interface. This type of finish is used on contact areas of outer conductors for switch connectors.

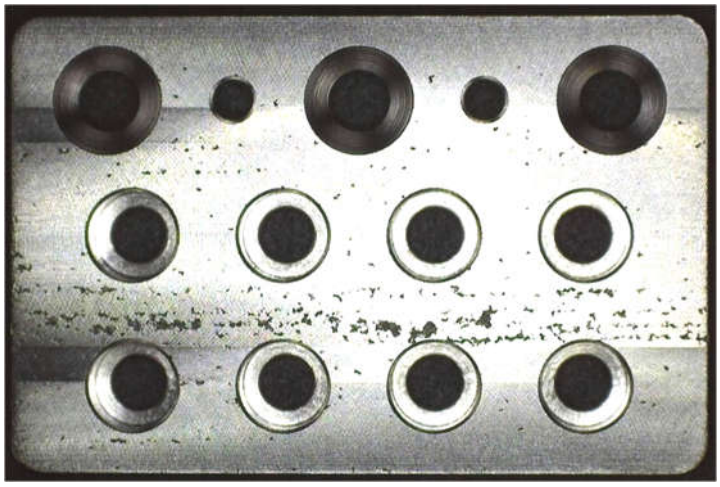
7.2 Tool marks are irregularities on the surface finish whose height (or depth) and width are in excess of the adjacent surface allowable limits. Tool marks are always objectionable and, in most cases, unacceptable. Tool marks may be accepted at the discretion of the SV Material Review Board (MRB).

7.3 In cases where the surface finish cannot be confirmed via visual standards, SV reserves the right to verify and reject it based on testing using a profilometer.

7.4 The following are examples of surface finish defects:



Excessive tool marks



Excessive surface pitting

8.0 BRAZING

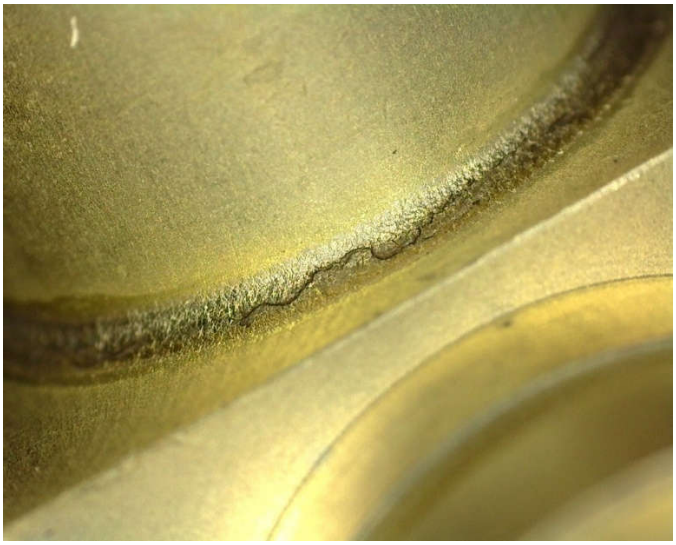
8.1 SV Microwave inspects brazing using the following criteria:

8.1.1 Silver alloy brazed joints are inspected to meet requirements on SV Microwave drawings and MIL-B-7883.

NOTE: MIL-B-7883 has been canceled with no replacement as of this rev date. However, it can still be referenced per DLA.

8.1.2 Nickel alloy brazed joints are inspected to meet requirements on SV Microwave drawings and AMS-2675.

8.1.3 Visually inspect the sample for evidence of a braze fillet at 7X minimum magnification. The fillet shall be free of cracks that could be detrimental to the performance of parts (see picture below). If any part does not exhibit a fillet, the entire lot can be rejected. A fillet is defined as a radius (curvature) that joins two surfaces essentially at right angles to each other.



Cracked brazed joint

8.1.4 Torque test samples and data must accompany all shipments. Reference the appropriate SV drawing(s) for minimum torque requirements.

8.2 Stainless steel piece parts will have been passivated per the specifications on SV drawing # 400-01-020 prior to brazing.

9.0 SCREW THREADS

9.1 Screw threads on SV Microwave parts shall be manufactured and inspected in accordance with FED-STD-H28, except as modified herein.

9.2 SV inspects screw threads using "before-plate GO" and "after-plate NO-GO" plug and ring gages.

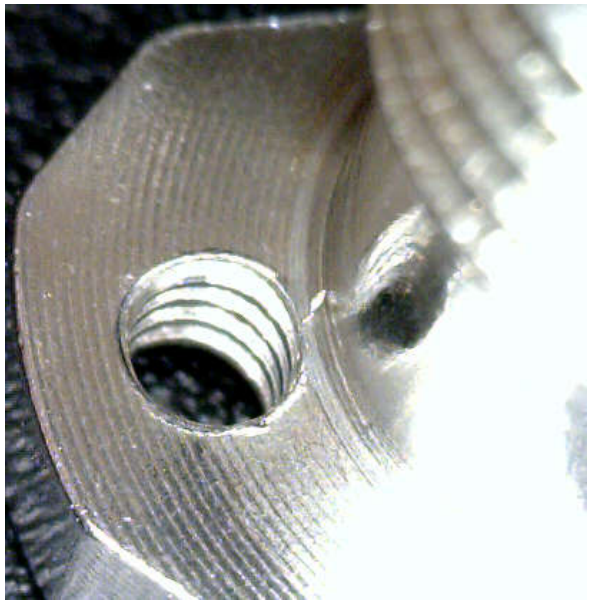
9.2.1 The "before-plate GO" and "after-plate NO-GO" thread plug gages check the limits of the major and pitch diameters of the part's internal threads. The "before-plate GO" plug gage must completely enter the part's internal thread to ensure that the major and pitch diameters do not exceed the maximum material limit. The "after-plate NO-GO" thread plug gage must not enter the part's internal thread by more than 2 ½ turns to provide adequate assurance that the major and pitch diameters do not exceed the minimum material limit.

9.2.2 The "before-plate GO" and "after-plate NO-GO" thread ring gages are used to check all thread parameters except the major diameter of the part's external threads. The "before-plate GO" gage must completely receive or pass over the part's external thread to ensure that the minor and pitch diameters do not exceed the maximum material limit. The "after-plate NO-GO" gage must not pass over the major diameter of the part's external thread by more than 2 ½ turns to ensure that the minor and pitch diameters are not less than the minimum material limit.

9.3 Screw threads should be smooth and free of surface defects. Common surface defects are nicks, burrs, chatter marks, and finish not meeting the surface finish requirement on the drawing.

9.4 Examples of thread defects:

Burr on thread



Lack of chamfer at the end of a thread

10.0 PLATING ALLOWANCE ON THREADS

10.1 When Brass or BeCu parts are purchased by SV, screw threads on them must be machined in a way that allows them to accept "before-plate GO" thread gages with pitch diameters per the table below to accommodate for plating thickness. Suppliers must contact their SV buyers for any thread types that are not on this list.

"GO" BEFORE-PLATE PLUG GAGES	
THREAD SIZE	PITCH DIA.
0-80 UNF-2B	.0529”
1-72 UNF-2B	.0652”
2-56 UNC-2B	.0756”
3-56 UNF-2B	.0884”
4-40 UNC-2B	.0970”
6-32 UNF-2B	.1187”
6-40 UNF-2B	.1228”
8-32 UNC-2B	.1447”
8-36 UNF-2B	.1472”
10-32 UNF-2B	.1709”
10-36 UNF-2B	.1732”
10-48 UNS-2B	.1777”
12-40 UNS-2B	.2010”
¼-28 UNF-2B	.2282”
¼-32 UNEF-2B	.2309”
¼-36 UNS-2B	.2330”
9/32-40 UNS-2B	.2662”
5/16-32 UNEF-2B	.2934”
3/8-24 UNF-2B	.3490”
3/8-32 UNEF-2B	.3559”
3/8-40 UNS-2B	.3598”
7/16-28 UNEF-2B	.4155”
7/16-32 UN-2B	.4182”
½-20 UNF-2B	.4687”
½-28 UNEF-2B	.4780”
½-32 UN-2B	.4810”
½-40 UNS-2B	.4850”
9/16-24 UNEF-2B	.5366”
9/16-28 UN-2B	.5405”
9/16-32 UN-2B	.5432“
5/8-24 UNEF-2B	.5991”
11/16-24 UNEF-2B	.6616”
¾-20 UNEF-2B	.7189”

"GO" BEFORE-PLATE RING GAGES	
THREAD SIZE	PITCH DIA.
0-80 UNF-2A	.0504”
1-72 UNF-2A	.0622”
2-56 UNC-2A	.0728”
4-40 UNF-2B	.0940”
6-32 UNC-2A	.1159”
6-40 UNF-2A	.1200”
8-36 UNF-2A	.1440”
10-32 UNF-2A	.1676”
10-36 UNS-2A	.1700”
10-48 UNS-2A	.1746”
12-32 UNEF-2A	.1936”
12-40 UNS-2A	.1978”
¼-28 UNF-2A	.2246”
¼-32 UNEF-2A	.2275”
¼-36 UNS-2A	.2301”
9/32-40 UNS-2A	.2629”
5/16-32 UNEF-2A	.2900”
3/8-32 UNEF-2A	.3525”
3/8-40 UNS-2A	.3567”
7/16-28 UNEF-2A	.4120”
15/32-32 UNS-2A	.4474”
½-28 UNEF-2A	.4745”
½-32 UNEF-2A	.4777”
½-40 UNS-2A	.4816”
9/16-24 UNEF-2A	.5330”
9/16-32 UNS-2A	.5400”
5/8-24 UNEF-2A	.5955”
11/16-24 UNEF-2A	.6580”
¾-20 UNEF-2A	.7150”

10.2 Standard "NO-GO" thread gages in accordance with FED-STD-H28 will be used to inspect all parts, including Brass and BeCu, both before and after the plate.

10.3 Reference Section 2.0, Figure E, Note 1 for pre-plate 'dimension' requirements.

11.0 PLATING

11.1 Random samples are pulled from lots of plated parts and examined for the following:

11.1.1 Correct plating type.

11.1.2 Plating omitted.

11.1.3 Plating coverage that meets all requirements of SV applicable plating specification (400-01-XXX).

11.1.4 Critical dimensions after plating (typically contact ODs, body IDs, and dimensions with ±.0005" or tighter tolerances).

11.1.5 Threaded areas are checked with the standard after plate "GO" and "NO-GO" thread gages.

11.2 Visual examination at 10X magnification will be performed for:

11.2.1 Evidence of chipping, peeling, nodules, pits, or blistered plating.

11.2.2 Evidence of scratches, nicks, or gouges on any part where the base metal has been exposed.

11.2.3 Verification of complete removal of plating salts.

11.2.4 Evidence of discoloration, contamination, or corrosion.

11.2.5 To ensure the color shade of the plating is as specified on the contract, as well as the type of finish (matte or polished).

11.2.6 Evidence of bleeding. This is where trapped plating solutions bleed through the outside plating layer.

11.2.7 Evidence of tarnish that detracts from the appearance of the finished part.

11.3 Platers are responsible for all quality assurance provisions and inspections required by the applicable plating standards. SV Microwave has the option to perform all or some of those tests.

11.4 Adhesion Testing

11.4.1 A minimum of one sample is subjected to a crush test for adhesion verification. The bend test is used on some contacts, but the crush test is used on all other products to break the base metal. The sample is crushed in a hand vise or other suitable type of equipment only until the base metal fractures.

11.4.2 The adhesion of all plating layers is examined at a magnification no greater than 10X. Neither the outer plating nor any underplating may show blistering, peeling, lifting, or flaking. Cracks in the base metal or any plating are not considered failures unless accompanied by flaking, peeling, or blistering. When crushing contacts, the solder pot is crushed just enough to fail the base metal. A sharp pointed tool is then used to determine if any area of plating can be separated from the base metal.

11.5 Bake Test (when required on SV drawing)

11.5.1 A 1.0 AQL sample per ANSI/ASQC Z1.4, General Inspection Level II (UOS), will be pulled and subjected to a bake test per requirement on SV drawing.

11.5.2 After removal and cooling, the surface of the sample will be examined at 10X for evidence of flaking, peeling, blistering, or discoloration.

11.6 Plating Thickness

11.6.1 A five-piece sample must be measured by the plater for plating thickness via a non-destructive method unless otherwise specified by the SV drawing or PO. The measured data must be supplied with the plater's C of C. SV Microwave's plating inspection will verify these readings.

11.6.2 SV Microwave's Hi-Rel customers require cross-sections to be performed for plating thickness verification. SV's Purchase Order may require the plater to cross-section a 2-piece sample for this purpose.

11.7 Hardness Testing

11.7.1 Platers are responsible for checking the hardness of plating per applicable plating standards. Certificates of Compliance are required.

11.8 Salt Spray

11.8.1 Salt Spray testing is the responsibility of the plating suppliers.

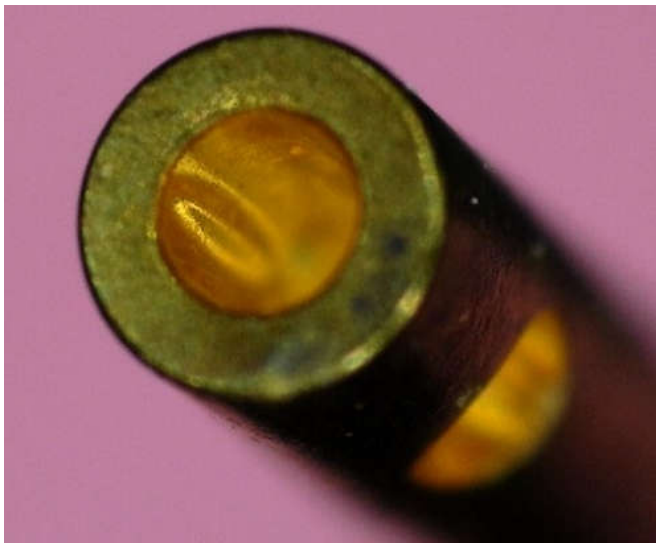
11.9 Form-over Parts

11.9.1 Prior to incoming inspection acceptance, parts requiring a form-over in the assembly process may have a sample sent to production in order to test the plating integrity at the form-over location.

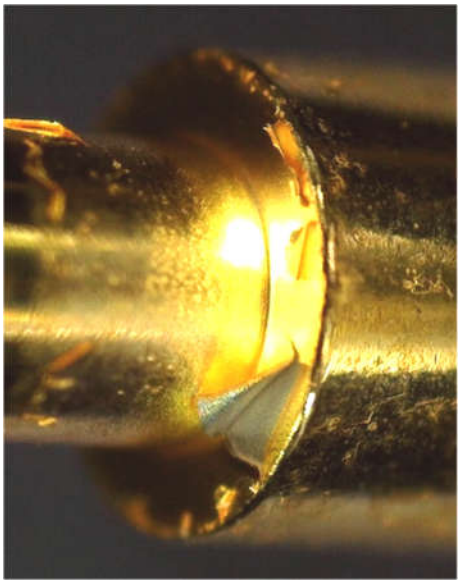
11.10 Glass Seals

11.10.1 Glass seal assemblies must have plating thickness documentation verified and supplied. This includes plating on the pins, if applicable. SV will crush test the internal pin and body, where applicable. Glass seal assemblies will be tested for thermal shock capability, leakage, insulation resistance, and dielectric withstanding voltage.

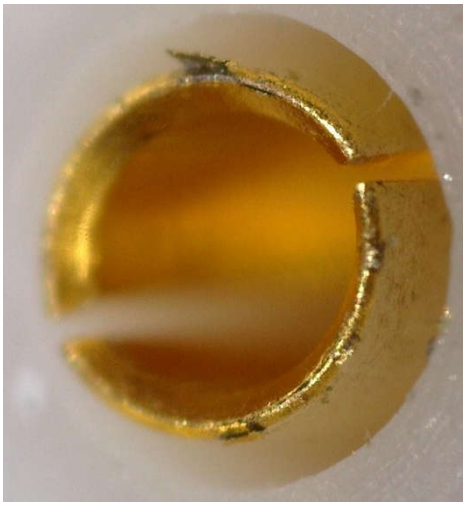
11.11 Examples of common plating defects:



Blistering

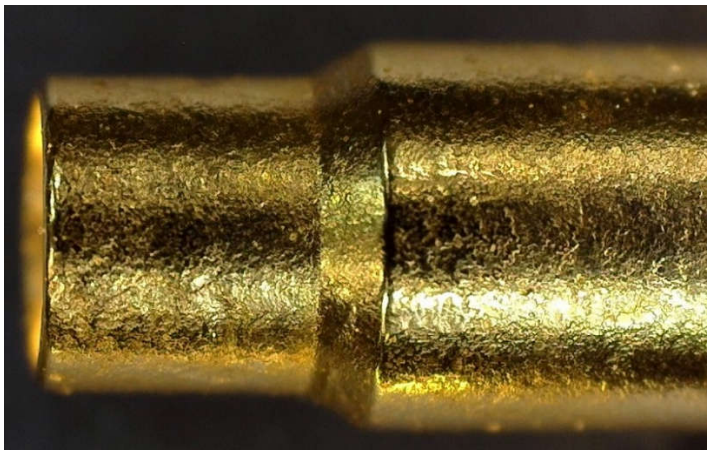


Peeling off

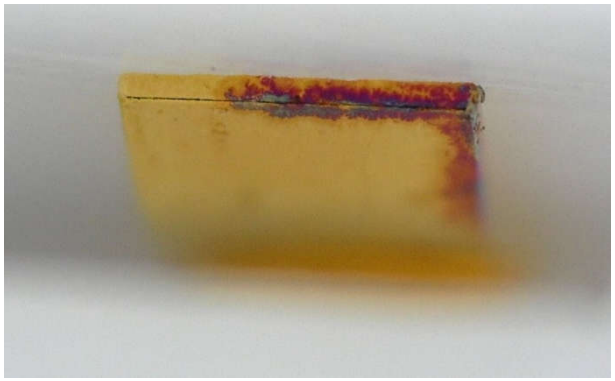


Flaking off

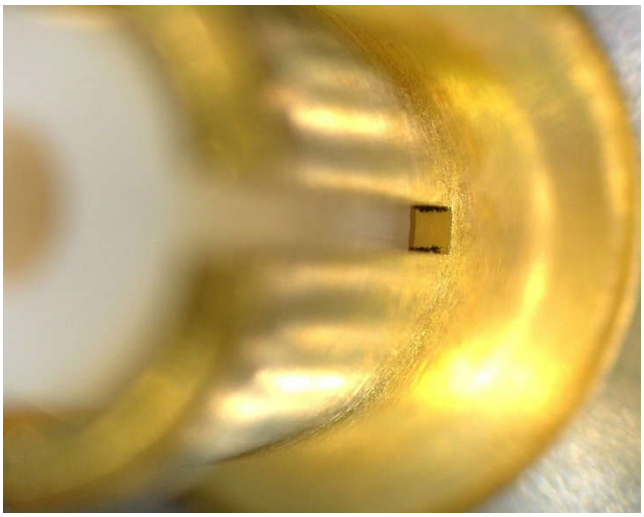
Poor adhesion



Over-etching of parts



Bleed-thru



Bleed-thru at the bottom of slots

12.0 PACKAGING AND HANDLING

12.1 All lots of SV Microwave parts must be packaged to ensure no damage occurs to the product during shipment.

12.2 All parts will be properly handled and packaged to prevent dings, dents, damage, gouges, scratches, etc.

12.3 Platers must put desiccants in all bags of gold-plated parts.

12.4 No carton or paper packaging that comes in direct contact with SV's plated parts is allowed.

13.0 SUPPLIER CORRECTIVE ACTION

13.1 Suppliers who consistently perform at an unsatisfactory level will be reviewed quarterly during Key Supplier meetings, and actions will be taken accordingly.

13.2 Whenever a defective product is found at SV incoming inspection, the magnitude of the problem is appraised against established product or process capability history. From this appraisal, if a corrective action is required, a Corrective Action Request (CAR) will be generated and sent to the supplier.

13.3 Suppliers are required to identify the root cause of the discrepancy, method(s) to contain any product that may have the discrepancy, method(s) to correct the condition (corrective action), and actions taken to prevent discrepancy from occurring on any future shipments.

13.4 Suppliers are required to reply by the documented due date so as not to affect their vendor status with SV Microwave. SV's Quality Manager may allow a reasonable extension if warranted.

14.0 CHANGE HISTORY

Rev -, QCBD Change Order No 240, Initial Release as Controlled Document	9/19
Rev A, QCBD Change Order No 440, Updated 7.0 Workmanship to include knurls	2/21
Rev B, CO 872, minor typo corrections	04/2024