

MANUFACTURING SPECIFICATION

1.0 COOLANTS, LUBRICANTS, AND SOLVENTS (CLS)

The Coolants, Lubricants, and Solvents (CLS) used in fabricating parts for microwave, power-grid, and X-ray Vacuum Electron Devices (VEDs) must be controlled to prevent contamination in high-vacuum applications. Chemical constituents that are listed in Section 1.1 must be completely removed during the standard cleaning process at CPI.

All dilution of the commercial materials must be with water or with a sulfur-free, chloride-free, or silicone-free blending oil or solvent.

All parts must be cleaned prior to shipment to CPI to remove any coolants, lubricants, or solvents used during manufacture of the part being supplied. (The exception to this rule would be components made from materials that would rust if not protected by an approved rust inhibitor. Materials in this category should be degreased and coated with an approved rust inhibitor before being packaged for shipment or introduced into the supplier's stock.)

1.1 Parameters of Acceptability

The chemical elements listed below must be completely removed during the standard cleaning process. The CPI standard cleaning process consists of hot alkaline detergent and/or naphtha-based solvents. The CLS compound shall not harden, corrode, or deteriorate the parts under prolonged storage conditions. The chemical elements that are most harmful when present on component parts used in the manufacture of microwave, power-grid, and X-ray VEDs are listed below.

Fluoride	Antimony	Cadmium
Chloride	Lead	Lithium
Sulfur	Mercury	Phosphorus
Manganese	Selenium	Silicon
Potassium	Tellurium	Zinc
Sodium		

1.2 Applicability

Parts that are not used inside the vacuum envelope of microwave, power-grid, and X-ray VEDs or similar devices are exempt from the requirements of Section 1.1. These parts are either made from brass, aluminum, zinc, lead, or plastic or are designated by the drawing as not used in the vacuum envelope of the VED.

1.3 Approved Coolants, Lubricants, and Solvents

A tabulation of the approved coolants, lubricants, and solvents and their designated distributors can be found in Appendix A.

Appendix B lists UNALLOWABLE coolants, lubricants, and solvents that, after evaluation, have NOT demonstrated the ability to satisfy the requirements defined in Section 1.1.

Revision Information

Updated to add lubricants tested between 2018-2019.

NOTE

UNDER NO CIRCUMSTANCES MAY THE PRODUCTS FROM APPENDIX B BE USED IN THE FABRICATION OF VACUUM-ENVELOPE PARTS. VIOLATIONS SHALL RESULT IN REMOVAL FROM THE APPROVED SUPPLIER LIST AND POSSIBLE EXPOSURE TO CONSEQUENTIAL DAMAGES.

Use of coolants, lubricants, or solvents other than those listed in Appendix A requires suitable proof of conformance to Section 1.1. If a supplier or other CPI division wishes to utilize CLS that are not currently listed on the approved list, they must comply with the provisions of Section 1.4 of this specification. Once approved or disapproved, the CLS will be added to the appropriate current list to prevent redundant evaluation.

The current labeling requirements for ozone-depleting chemicals outlined in M7-13, "Fabrication Standards," must be observed for all applicable CLS. If new alternative materials are to be used, CPI must be notified and the materials must be qualified according to the provision of Section 1.4 of this specification before the substitution can be made.

Products that do not normally come into contact with fabricated parts (specifically, way oils and greases) are not governed by this specification. However, controls must be in place to prevent contamination of parts by incidental contact with these products.

1.4 Qualification of Coolants, Lubricants, and Solvents

Suppliers or other CPI divisions that wish to qualify additional coolants, lubricants, and solvents shall fabricate four sample test pieces in conformance with Figure 1. These samples shall be made from each of the following: OFE Copper, 304 Stainless Steel, and CE Core Iron. If the qualification of the additional CLS is for use on molybdenum, an additional four samples shall be machined from molybdenum. The samples shall be forwarded to the CPI MPP Process Engineer for testing per M18-266, "Coolants, Lubricants, and Solvents Qualification Testing." If the sample parts pass the tests, the CLS shall be added to Appendix A. If the sample parts fail the tests, the CLS shall be added to Appendix B.

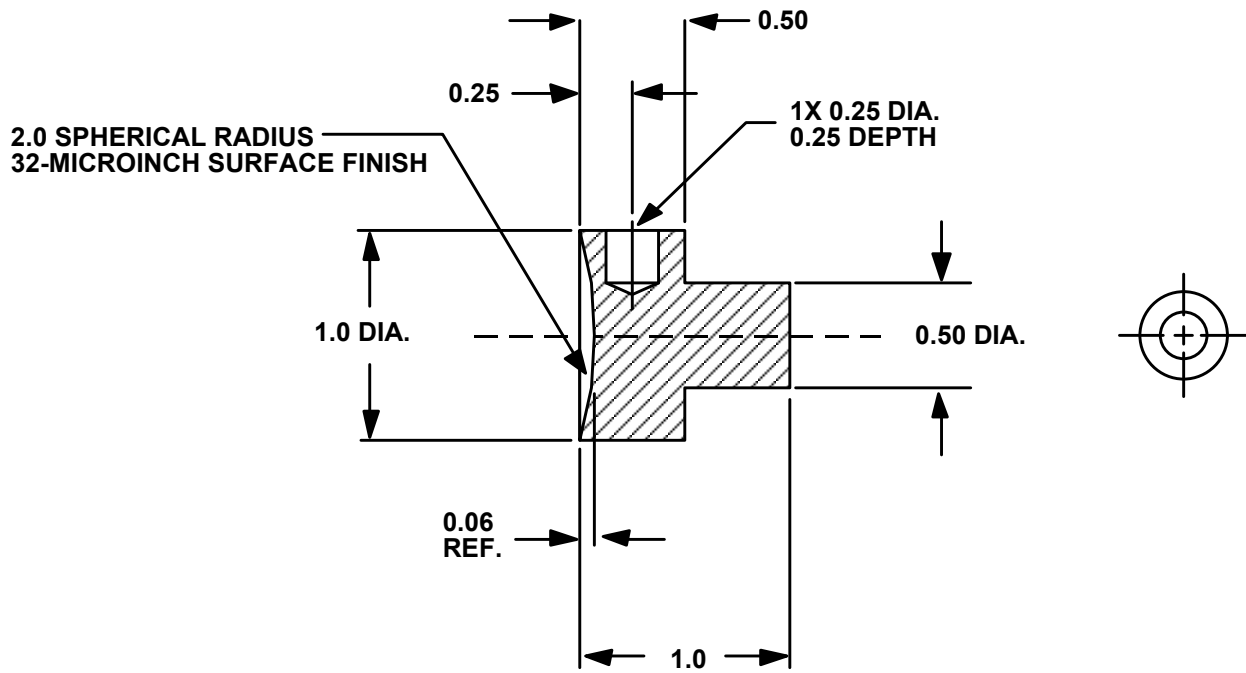


FIGURE 1. Test Piece

**APPENDIX A:
APPROVED COOLANTS, LUBRICANTS, AND SOLVENTS**

Coolants and Lubricants	
Brand Name	Distributor Name and Address
Astro-Cut 2001B	Monroe Fluid Technology
Aqua Kool 21EP-5	G-C Lubricants Co.
Aqua Kool 21EP-7	G-C Lubricants Co.
Aqua Syn 190	G-C Lubricants Co.
Blasocut BC35NF Lubricant	Blaser Swissslube, Inc.
Blasocut 2000 CF	Blaser Swissslube, Inc.
Blasocut 2000 CF SW	Blaser Swissslube, Inc.
Blasocut BC40NF	Blaser Swissslube, Inc.
Castrol	Hysol MB 50
Cimflo 20 Hydroforming Lubricant (Mt. View only)	G.E.M. Products
Cimstar 40F	Cimcool Fluid Technology
Cimstar Qual Star XLHZ	Cimcool Fluid Technology
Cimperial 1060CF	Cimcool Fluid Technology
ClearTex D 02234	Texaco
EDMS-25 Dielectric Oil (Mt. View only)	EDM Supplies
Elite-Cut NM	Chevron
Fancy Tallow	Stuart-Ironsides, Inc.
Far West No. 4300	Farwest Oil Co.
Far West No. 1140	Farwest Oil Co.
GC Lubricants	Lube Kut 808
Hangsterfer's Missile Lube 1XL	Hangsterfer Laboratories
Hangsterfer's S-500CF	Hangsterfer Laboratories
High Life Coolant Additive (Mt. View only)	Chem Lube
High Life Cutting Oil	Cal-Tek Industries
International Compound No.131-A	International Chemical Company
Kool Mist No. 77	Kool Mist Corp.
Lanolin, Anhydrous (Technical Grade)	Lanaetex Products, Inc.
Lard Cut 240	G-C Lubricants Co.
Lard Cut 281	G-C Lubricants Co.
MAN-852	Sunnen
Molecular Products, Inc.	Sta-Kleen
P-Special Lard Oil	W. A. Wood Co.
Perkut 314	DuBois Chemicals, Inc.
Premium 4300	Farwest Oil Co.
EcoCutbase 44 LVC (Replacement for Renobase 44 LVC)	Fuchs Lubricants Co.
Sparcut NC	J. Scott Company
Super Kut Allesandro	W. S. Dodge
Synthetic 5528	Golden West Lubricants, Inc.
Trim Sol	Master Chemical Corp.
ValCool VP690	Walter USA, LLC
#377 Cutting Oil (Mt. View only)	Fiske Bros
1140 Metal Working Oil	Farwest Oil Co.

**APPENDIX A (Continued):
APPROVED COOLANTS, LUBRICANTS, AND SOLVENTS**

Drawing Compounds	
Brand Name	Distributor Name and Address
Castorflex No. 113 Soluble Oil	W. A. Wood Co.
Castrol	Iloform E7132
Circle-Prosco DL-461	Multiple
Circle-Prosco DL-500	Multiple
EcoCut LCO 3-55GL DR	Multiple
Hangsterfer's	Clear Cut 22
LPS Precision Clean	Multiple
Mineral Seal	Eppert Oil Co.
Near-A-Lard No. 52 Oil	G. Whitfield Richards Co.
Phillips 76 Soluble Oil	Multiple
PLC-Aerosol	Break-Free Corp.
Richards Apex	V-34BR Vanishing
Spinning Soap	Multiple
TechCool 35052	Chemetall
Tower Oil	E-603 Vanishing
Tuf Draw 1919	Multiple
Tuf Draw 2812	Fuchs
Valona 1081-S	Multiple
Xtreme Cut 250C	Qualichem, Inc.
Xtreme Cut 251	Qualichem, Inc.

Part Cleaning Solutions	
Brand Name	Distributor Name and Address
Parts Prep No. 0390	Sentry Ecilink Chemical Co.
Simple Green	Sunshine Makers, Inc.

Rust Inhibitors	
Brand Name	Distributor Name and Address
CR-3-36 Rust Preventative (Mt. View only)	McMaster Carr
LPS 3	LPS Laboratories, Inc.
Rustlick 606, 631	ITW Devcon Corp.
WD-40 Multi-Use Product	WD-40 Company

**APPENDIX A (Continued):
APPROVED COOLANTS, LUBRICANTS, AND SOLVENTS**

Solvents	
Brand Name	Distributor Name and Address
Abzol (R)-EG Production Degreaser Solvent (Mt. View only)	Chem Point
Ace-O-Sol	G-C Lubricants Co.
Acetone	Various
*Chloroethene	Williams Manufacturing
*Chloroethene XL Solvent	Dow Chemical
*Chloroethene SM Solvent	Dow Chemical
Citrikleen	West Penetone
Isopropyl Alcohol bench degreasing (Mt. View only)	V.W.R.
Kerosene UN1223 Solvent (Mt. View only)	Western States Oil
Methanol	Burdick & Jackson
Methyl Ethyl Ketone	Various
Mineral Spirits	Eppert Oil Co.
*Perchloroethylene	Dow Chemical
*Trichloroethylene	Baron Blakeslee, Inc.
*1,1,1 Trichloroethane	Blaco-Thane

*These items are scheduled to be phased out.

Other	
Brand Name	Distributor Name and Address
E.D.M. Fluid 7025	Farbest Corp.
Light AW R & O	G-C Lubricants Co.
FM-286 Barrel Deburring Soap (Mt. View only)	Oakite
IC Cleanroom Lotion	R & R Lotion

Conditionally Approved Lubricants		
Material	Supplier	Conditions For Use
Blaser Synergy 735	Blaser Swisslube, Inc.	Tested for Beverly Microwave Division (BMD), but could be used by CPI. Qualified for use on copper, copper/chromium/zirconium alloy, and cupronickel.
Blasocut 2000 Universal MD	Blaser Swisslube, Inc.	Used exclusively by CPI's Beverly Microwave Division (BMD) to manufacture copper cavity plates for CCT.
Blasocut BC 25 SW UHV	Blaser Swisslube, Inc.	Used exclusively by West Valley Precision. CPI qualification was performed on copper and stainless steel only.
CIMPERIAL 18P	Connecticut Coining, Inc	Used exclusively by Connecticut Coining, Inc. for machining formed parts. CPI qualification testing was performed on copper and stainless

		steel.
Combo Base 35	W.S. Dodge Co.	Standard supplier degreasing process
EQO-MAX 712 MM	QualiChem	Tested and approved for use on copper and stainless steel only.
Q-CUT 246C	QualiChem	Tested and approved for use on iron and stainless steel. Copper test sample did not pass and is not qualified for use with Q-CUT 246C.
Semi Synthetic 5460 Blue	Golden West Lubricants, Inc.	Tested and approved for use on copper, cupronickel, and stainless steel only.
SHO500055 Honing Oil	Metric Design and Manufacturing	For honing Helix bodies only.
XTREME CUT 230	QualiChem	Tested and approved for use on copper only.

**APPENDIX B:
UNALLOWABLE COOLANTS, LUBRICANTS, AND SOLVENTS**

Coolants and Lubricants
Blasocut 2000 Universal
Blue Chip Synthetic Coolant
Cimcool Qual Star
Cimflow 10
Cimperial 1011-CA
Cimstar 50
Cimtech 100, 3750
Cindol 3202
Clario Oil 160
Cool Tool
Cut-Max 110, 570
Hangsterfer's Hard Cut No. 531
Hocut 795-H
Hycut CF 21 with Additive BF
Hycut CF 21 with Additive LM
Krytox Fluorinated Grease
LPS Greaseless Lubricant
Lube Kut 815, 828
Mineral Cutting 3B
Mobilmet Omicron
Molykote 44 Grease
Shell Pella (R) Oil A
Swiss Cutting Oil No. 71
Tapmatic Cutting Fluid No. 1, No. 2
Trim EP
Universal Tapping Compound

Drawing Compounds
Cook's Base 4676
Cook's Draw S513, 4901
Draw Temp 275
Petrochem 500

Part Cleaning Solutions
Defoamer 99011
Zep Aerosolve

Rust Inhibitors
LPS 1
Rust Defier 12000
Rust Inhibitor R-2
Zep Reserve No. 1434

Solvents
GP Purpose Cleaner/Degreaser
Safety-Klean 105 Solvent-MS