

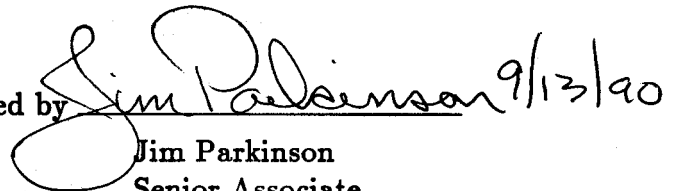
**Fabrication of Ultra High Vacuum Equipment**

**CEBAF Specification #22631-S-001**

**December 7, 1990**

**Revision B, September 13, 1990**

Submitted by

 9/13/90

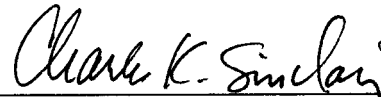
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# FABRICATION OF ULTRA HIGH VACUUM EQUIPMENT

CEBAF Specification #22631-S-001

Revision B, September 13, 1990

## 1.0 SCOPE

This specification outlines standard procedures to be followed in the fabrication of components for Ultra High Vacuum (UHV) systems. This is a general specification, not all sections will necessarily apply to all drawings which refer to this specification. You must check the individual part drawings to determine which requirements pertain to that particular component.

## 2.0 MATERIALS SPECIFICATIONS AND CERTIFICATIONS

All materials must be purchased to an ASTM or CEBAF approved equivalent specification. Original Mill source certifications must be obtained; ordinary "certs" are not acceptable. As a minimum, certifications must include the heat number and the results of chemical analysis and mechanical properties tests. Copies of certifications must accompany delivery of the finished parts to CEBAF.

## 3.0 FABRICATION

3.1 The knife edge sealing surface of UHV flanges must be kept covered at all times. The best protection is a copper gasket. Other methods which permit machining or welding without removal of the protection may also be used. Flanges with even the least defect on the knife edge will be rejected.

3.2 Metal working lubricants which contain sulphur or silicone shall not be used. Use any of the following:

Aqua Syn 55	Cimcool 5 Star 40	Cimperial #1011
Cutzol EDM 220-30	Dip Kool 868	Dip KUT 819H
Haloform CW-40	Kool Mist #88	No Sul #6871
Rapid Tap	RD2-195	Relton A-9
Rust-Lick G-25-J	Tap Magic	Tapmatic #2
Tapmatic #1	Trim Tap	Vytron Concentrate
Tool Saver by Do All Corp.		Wheelmate #203
Pearl Kerosene by Chevron Chem Co.		
Sunnen MAN-852 Honing Oil		

- 3.3 Break all sharp edges and inside corners approximately 0.015" radius unless otherwise noted.
- 3.4 Abrasive cloth or paper shall not be used. Grinding wheels shall not be used without prior written permission by CEBAF's procurement representative.
- 3.5 Parts fabricated under this section of the specification shall be cleaned only to the extent of removing excess lubricants and particulates by wiping.
- 3.6 After QC/Inspection, all parts shall be individually wrapped to prevent damage in transit. Exception: very small parts may be wrapped together at vendors option.

#### 4.0 LEAK TESTING

- 4.1 Parts and assemblies cleaned for UHV shall be leak tested as per CEBAF Specification #22634-S-001.
- 4.2 Leak test part with a Mass Spectrometer Helium Leak Detector calibrated to a minimum sensitivity for helium of  $2 \times 10^{-10}$  std. CC He/sec. per leak rate meter division on the most sensitive range. Reject any part which, when probed with helium for at least one minute, results in a 2% of full scale deflection on the most sensitive range.
- 4.3 A thin film of Apiezon L or Celvacene Light may be used on the seal itself only with prior written permission from CEBAF. Do not use Silicone grease.

#### 5.0 UHV HANDLING

- 5.1 Do not use masking tape on the surface of any UHV part. If adhesive backed tape is necessary, use only 3 M #471 vinyl electroplaters tape.
- 5.2 If chemical cleaning is required, the appropriate specification will be identified in the purchase order and made available by CEBAF.
- 5.3 Parts which have been chemically cleaned for UHV service, furnace brazed, hydrogen fired, etc, shall not be touched with bare hands. Handle only with new powder free latex gloves. For storage or transit, wrap parts with lint free paper and/or designated UHV grade aluminum foil (to be approved by CEBAF). All handling and assembly of "UHV Clean" parts shall take place in a clean area designated for UHV welding assembly. Use only materials and methods, apparel requirements, and other constraints appropriate to U.H.V. technology.
- 5.4 In the event that the leak detection process uses materials that are not entirely metallic, the affected surfaces shall be carefully cleaned using a CEBAF approved, vendor specified cleaning method. An example of such a method uses a succession of lint-free wipes soaked in acetone followed by isopropanol to wipe the surfaces.

## 6.0 WELDING

Unless otherwise specified, all welds shall be made by Gas Tungsten Arc process (GTAW). Refer to CEBAF Specification #22633-S-001.

## 7.0 HIGH TEMPERATURE FURNACES

All furnace firing for stress relieving, annealing, brazing, "clean firing" or other purpose shall be in Hydrogen or inert atmosphere. Vacuum furnaces are also acceptable with prior approval of the designated CEBAF representative.

## PARTS INSPECTION

Individual parts shall be inspected for conformance to the drawing, both in dimensions and other requirements. Copies of such inspection reports shall be made available to the CEBAF representative upon request.

A Manufacturing Certificate of Compliance, signed by Seller's quality assurance/control manager, stating that the supplied item(s) conforms in every respect to physical configuration and functional requirements as specified in the Contract shall be supplied by the vendor to CEBAF.