

Welding Specification for U.H.V. Components

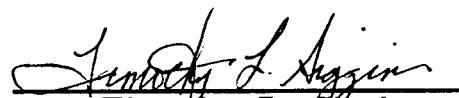
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WELDING SPECIFICATION FOR ULTRA HIGH VACUUM COMPONENTS

**CEBAF Specification #22633-S-001
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1.0 SCOPE

This document covers requirements for Gas-Tungsten-Arc Welding (GTAW) of austenitic stainless steels.

2.0 WELDING PROCESS

- 2.1 Parts to be welded and fixtures, jigs, chill blocks, etc. to be used are to be cleaned prior to welding by CEBAF specifications, and must be handled in an appropriate manner so they remain clean. Clean, white, polyester/nylon gloves shall be worn during handling of vacuum and weld surfaces and if these gloves come in contact with other than clean surfaces, they shall be replaced with new ones.
- 2.2 Gas purge the back of the weld area where appropriate. The purge shall be used before initiating the arc, during welding and cooling to provide adequate gas shielding.
- 2.3 Use shielding gas at all times, including tack welding, and start sufficiently before initiating the arc. Purge and shielding gas shall be "Ultra Pure" grade helium, or "High Purity" grade argon, or a mixture of each.
- 2.4 Flanges shall be tack welded into proper alignment prior to welding.
- 2.5 Use high frequency start to initiate the arc and perform the longest possible uninterrupted weld. With an interrupted weld, make the overlap as generous as practical to eliminate voids.
- 2.6 Weld, using the lowest heat input parameters (current and voltage) which permits complete fusion to be accomplished. Use rectifier power supplies which have machine characteristics that are steeply "drooping" for thin sheet materials, .062" or less.
- 2.7 Minimize electrode tip to work surface distances, and weld with as short an arc length as feasible to assure a satisfactory weld.
- 2.8 When filler wire is required, wire shall conform to the requirements of A.W.S. A-59. Table 1 shows the filler rod that should be used with various alloys. Store filler metal in a manner such that it is protected from oil and other contaminants. Prior to welding, clean the filler rod using lint-free tissue and reagent grade acetone.
- 2.9 Do not use copper, zinc, cadmium, lead, tin, or any alloy of these metals on the surfaces of fixtures, alignment devices, chill blocks, etc. Aluminum and chrome or nickel plated materials are O.K.

- 2.10 Only hand held brushes with stainless steel bristles from .002 inches to .008 inches in diameter may be used for cleaning oxides off welds. Power driven brushes, abrasive paper and abrasive wheels shall **not** be used. Brushes shall be cleaned of oil and other contaminants by ultrasonic cleaning in trichloroethane or a method approved by CEBAF.
- 2.11 Parts with weld defects detected during vacuum leak detection shall be set aside for review by the CEBAF inspector. No repairs will be made to such parts without prior and written approval of the CEBAF inspector and such repairs shall be done under the direct supervision of the CEBAF inspector. Entirely remove weld defects, visible defects (cracks, pinholes, incomplete fusion) before fusing or depositing any additional weld metals.

Table 1. Welding Filler Rod

<u>Alloy</u>		<u>Filler</u>	
Stainless Steel:	304	Stainless Steel:	308, 308 L
	304L		308L
	316		316, 316L
	316L		316L
	321		347
	347		347