

Title	<i>Aplus Vacuum Feedthrough Requirements</i>
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1 Scope

The following requirements pertain to the manufacture and procurement of conflat flanges (CF) and associated electrical vacuum feedthroughs as required for the LIGO A+ upgrade.

2 Mechanical Requirements

- 2.1 All flanges must be engraved with a unique serial number and manufacturer's part number. The list of serial numbers will be generated by LIGO and supplied to the contractor but will conform to the format Sxxxxxxx (S followed by 7 digits).
- 2.2 All flanges must be fabricated from Ultra-high Vacuum (UHV) compatible 304 stainless-steel in accordance with SAE AMS-QQ-S-763 or equivalent.
- 2.3 All hermetic seals associated with electrical pins are to be made of a ceramic (not glass) with Coefficient of Thermal Expansion (CTE) matched to beryllium/copper
- 2.4 It is assumed that since vendor supplied drawings are being utilized for this order that vendor protocols will be followed, and all necessary welding shall be consistent with best UHV practices. All material is to be virgin material (i.e. no weld repairs, plugs or recycled material). No repairs shall be made unless approved in advance, and in writing, by LIGO Laboratory.
- 2.5 A Total Leak Rate of less than 1×10^{-9} torr-liter/second of helium at one atmosphere differential pressure at room temperature is required for each flange.

3 Electrical Requirements

- 3.1 All D-sub connectors must conform to MIL-DTL-24308
- 3.2 All D-sub electrical pins must be rated for a DC current of 5 amperes or greater
- 3.3 All electrical pins must have an end-to-end resistance of less than 5 milliohms
- 3.4 All pins associated with the 3-pin power D-sub variant must be rated for continuous operation at a DC current of 10 amperes or greater
- 3.5 The dielectric used to isolate each electrical feedthrough from the body of the flange, or other electrical feedthroughs must be rated for continuous operation at a breakdown voltage of 500VDC or greater
- 3.6 The dielectric resistance as measured from pin-to-pin, or pin-to-flange body must be greater than $100M\Omega$
- 3.7 All electrical pins are to be made of gold-plated beryllium/copper alloy in accordance with ASTM B196/197M