DAΦNE TECHNICAL NOTE

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Note: **V-2**

SUMMARY OF THE CLEANING PROCEDURES FOR ALUMINUM VACUUM CHAMBER

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The most common surface treatments for aluminum vacuum surface can be summarized in the following steps* :

degreasing in order to remove contamination with machining oil, grease and particulate matter of all types. Perchloroethylene vapour (at about 120 ˚C) is often used [1].

light alkaline etch immersion in alkaline (*p*H = 9.7) detergent (Almeco 18 from Henkel A.G.). Kaufherr N. et al. [2] investigated the effectiveness of the cleaning process developed at CERN for the extruded 6060 Al LEP vacuum chamber. The surface consists of a superficial MgO layer, also contaminated with hydrocarbons, on top of another layer of primarily Al_20_3 [3]. The problem is that the resulting oxide is very porous and it has to be removed in order to minimize the bad effects associated with beam induced desorption of trapped gases. The Almeco 18 detergent seems capable to remove all the Mg (present like MgO) but is quite ineffective for Al_20_3 . The Al removal is ~ 124 Å/min [1].

strong alkaline etch immersion in NaOH (KOH) solution. It seems to be quite effective removing Al and Al_20_3 .

acid etch immersion in an acid bath at ambient temperature (HNO_3 50%, HF 3% [1])

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* Note that this list is comprehensive of almost all the suitable surface treatments for aluminum but not all the steps have to be strictly performed together.

rinsing in demineralized water

bakeout at 150 ˚C

glowdischarge as a pretreatment

***in situ* glowdischarge**

the effectiveness of this treatment is a controversial matter [4,5], due to the fact that the decreasing of desorption efficiency for some gases (and of the conditioning time) is rather slow compared to the disadvantage of the high atomic number Ar atoms implanted in vacuum chamber wall that can reduce the beamlifetime due to the bremsstrahlung effect. Of course for different experimental conditions the effective pumping speed for Ar must be taken in account together also with the possibility to perform discharge treatments with lower atomic number gases such as He or N_2.

References

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