Jacek Sekutowicz

08/04/2015, Hamburg

Appendix to the FDR Interconnect Meeting on 07/29/2015

**Comments to the production and cleaning of Beam Line Absorbers**

**1. EXFEL- experience**

 The EXFEL linacs will be equipped with ca. 100 BLAs. Production of 108 BLAs is finished. Several pieces were sent back to the vendor for Cu re-coating and some minor mechanical corrections, last 16 of those will be delivered to DESY by the end of August.

 The vendor, Kubara-Lamina SA Company, located in Piaseczno/Warsaw, has many-year experience of designing and fabrication of microwave devices, for example microwave tubes. The Company continues this production and BLAs were only an additional product Company offers.

 The Kubara-Lamina Company has whole BLA production technology in house. All components, but ceramic cylinders, can be purchased in Europe or/and in the US. The cylinders are produced in the US and their purchasing required end-user licence. This should be easier for the LCLS II facility than it was for EXFEL.

 The Company offers products cleanness standards which can be accepted for room temperature linacs, but still they are not sufficient for a superconducting (sc) linac. I think, it will be difficult to find a vendor in Europe or US, delivering BLAs and having the sc linac cleanness and RGA standards. The BLA complexity, because of the variety of materials used, brazing and Cu-coating is closer to the fundamental power coupler complexity than to sc cavity complexity. I have impression that specification in the contract for the sc-linac cleanness and RGA standards can increase significantly the cost.

 Possible option is that either one of the partner labs or maybe DESY can perform the final cleaning and preparation of the BLAs for the installation in the tunnel. This is only my thought, I have not asked DESY if there is capacity to do the cleaning.

 Delivered finally BLAs to DESY fulfil following:

* Mechanical tolerances
* Leak rate spec
* Cu-coating adhesion spec
* Permeability spec.

2. Final EXFEL BLA inspection and cleaning procedure steps at DESY

|  |
| --- |
| **Whole BLA** |
| 1. Disassembly
2. Visual control of all components
3. Incoming mechanical inspection
 |
| **Body (Housing)** | **Ceramic cylinder with Cu-stub & flange** |
| 1. Inspection of the Cu layer
2. Permeability test
3. Heating in 300°C
4. Absorber cleaning
	1. Cleaning in ultrasonic washer
	2. Rinse with ultrapure water
	3. Rinse with isopropanol
	4. Drying in 55°C
 | 1. Cu-stub brazing inspection
	1. Counting of not brazed pins
2. Cylinder cleaning
	1. Cleaning with ultrasonic washer
	2. Rinse with ultrapure water
	3. Drying in 55°C
	4. Baking in vacuum in 600°C
3. Installing in housing for transportation\*
4. Test with mass spectrometer (not all)
 |
| **Whole BLA** |
| 1. Optical control before assembly
2. Assembly
	1. Cylinder installation in the housing
	2. Installation of a vacuum valve (EasyClose)
	3. Installation of steel flanges for spectrometer measurement
3. Mass spectrometer measurement
	1. If needed– heating of whole BLA and second mass spectrometer test
4. Replacement of steel flanges by plastic flanges (for storing)
5. Transport of BLA to the tunnel
6. Installation in the tunnel
 |

\*Previously, in step 10 cylinders were put in a plastic foil for the transportation to the assembly area, which caused that mass spectrum did not fulfil the spec!

The whole procedure was established by the MVP group at DESY (Lutz Lilje, Lutz.Lilje@desy.de) with support of Wojciech Grabowski (NCBJ, Wojciech.Grabowski@ncbj.gov.pl).