



UNIONE EUROPEA
Fondo Europeo di Sviluppo Regionale



Capitolato Tecnico

PON "Ricerca e Innovazione 2014-2020" Avviso D.D. n. 424 del 28/02/2018 per la concessione di finanziamenti finalizzati al potenziamento di infrastrutture di ricerca, in attuazione dell'Azione II.1

PACK(PIR01_00021)

Potenziamento Appulo Campano di KM3NeT

**Fornitura di 16.000 schede di elettronica per
fotomoltiplicatori da 3" e loro integrazione e
coating**

PON "Ricerca e Innovazione 2014-2020" Avviso D.D. n. 424 del 28/02/2018 per la concessione di finanziamenti finalizzati al potenziamento di infrastrutture di ricerca, in attuazione dell'Azione II.1

Atto GE n. 12406 del 14/05/2020

CUP I11G18000190001

CIG Lotto1: 83215307CA

CIG Lotto2: 8321549778



Istituto Nazionale di Fisica
Nucleare
codice fiscale 84001850589

INFN - Napoli Via Cintia Complesso Universitario Monte Sant'Angelo – 80126 Napoli (Italia)
<https://www.na.infn.it/>
tel. +39 081 676283- fax +39 081676346 - email: prot@na.infn.it PEC: napoli@pec.infn.it

Pasquale Migliozi - email: pasqualemigliozi@na.infn.it

1. GENERAL RULES

General rules to be followed during the production and the PMT-Base assembly and coating

- Boundary scan tests (JTAG or similar). This should be mandatory.
- The PCB production has to be compliant with standard IPC Class 3 (with some design limitations). The production should be done according to the manufacturing files provided by KM3NeT. Any modification on them should be agreed with KM3NeT.
- The assembly process has to be compliant with IPC Class 3.
- Solder paste masks should be provided and generated by the company starting from the given gerber files, so they can choose the pad shrinking factor depending on solder paste used and mask thickness.
- Solder paste must be deposited on PCB using the abovementioned masks with an automatic machine in order to have very good uniformity. Solder paste deposition has to be inspected before starting the population of the PCB.
- The use of Flying Probe will be considered a plus.
- All the SMD components must be placed using automatic pick&place machines. Visual inspection should follow.
- A reflow oven must be used for soldering the components.
- The boards will have to be identified by means of labels attached to them. The information to print those labels (using QR code) will be provided by KM3NeT. In case the PCBs will bear also an individual identifying code defined by the producing company, an electronic file containing the correspondence between the KM3NeT label and the company's label will have to be provided by the company.
- The company must provide traceability of all the procured components in agreement to IPC level 2. IPC level 3 of traceability can be considered as an option.

2. LOTTO 1: BASE ASSEMBLY PROCEDURE

The base assembly procedure should follow the technical documentation available in the following file

BASE02_ODB.TGZ	Assembly/PCB Data	ODB++
BASE02_PCB.PDF	PCB Drawings	PDF
BASE02_SCH.PDF	Schematic Drawings	PDF
BASE02_BOM.XLS	Bill Of Materials	Excel
BASE02_PCA.PDF	Assembly Drawings	PDF

2.1. BILL OF MATERIALS

Among the components listed in the Bill of Materials (BASE02_BOM.XLS) the following ones (indicated in green in the file) will be supplied by the INFN to the company that will win the contract:

- PROMIS
- COCO
- EP7 Coil Assembly.



2.2. PRODUCTION AND PCB-A TESTING

Testing for production faults is at the discretion of the manufacturer using the locally available testing equipment and is part of the assembly and supply of the PCB and can consist, amongst others, of:

- Testing of the Bare board PCB: optically and/or electrically by means of ODB++ data.
- Testing during assembly (by means of ODB++ data at test points):
 - Optical check of paste
 - Components test before soldering
 - Optical assessment of solder joints

A functional test must be performed using a test setup provided by NIKHEF, ~3 minutes per PCB. The tester is described in "BASE03 HV Tester.pdf". In order to reduce the time needed to test all bases, NIKHEF will distribute 4 testers.

The output of the functional test will consist of different results:

- The base is OK and ready for the assembly; the base is not OK;
- An ascii file containing all the details of the test;
- The association between the serial number printed on the PCB and the 3D-QR code mounted onto the board.

2.3. APPENDICES:

- Application Note 01 – HAM PMT Base: BASE04 AN01_v1.pdf.
(description of I²C programming using a demo kit.)
- BASE05 Datasheet CoCoV2.pdf
- BASE06 Datasheet PromisV2.pdf
- BASE03 HV Tester.pdf

2.4. ACCEPTANCE TESTS

Each baseboard must be tested by the company according to the procedures described in <BASE03 Base Test Procedure> and in the documents mentioned in it. The results will be provided through the ASCII files automatically produced for each base by the test system.

3. LOTTO 2: PMT ASSEMBLY PROCEDURE

3.1. PMT INSPECTION

It is identified by visual inspection of photomultipliers (PMT) in order to identify any macroscopic defects such as glass tube lesions, absence of photocathode, missing rheophores.

3.2. INSPECTION OF SIDEBURNS



Inspection of all active sideburns in order to identify any evident and macroscopic defects such as connector breakage, missing parts of the sideburns.

Microscope inspection on a sample of 5% of the active sideburns in so as to identify any faults and/or defects that cannot be detected by visual analysis.

3.3. CODES OF SIDEBURNS

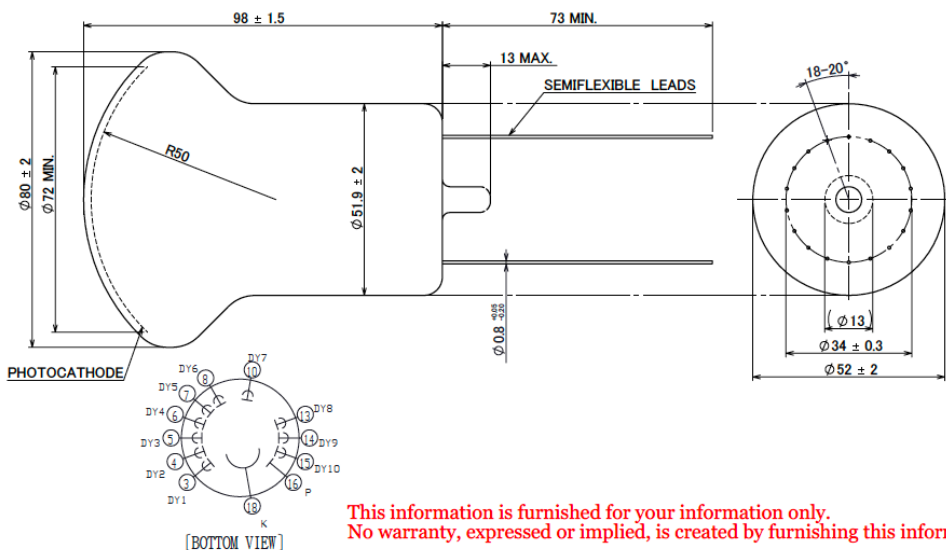
It consists in verifying that the code of each board, to be read with a special equipment provided by the customer, is included in the list of those calibrated. All those that do not appear on the list will be discarded.

3.4. INSERT

It is identified by the insertion of the active base in the rheophores of the photomultiplier following the order set. The operation must be performed on an antistatic bench and wearing the relevant bracelet.

3.5. POSITIONING

With the ESD (ElectroStatic discharge) modes, the base must be positioned so that it is parallel to the bottom of the PMT and the distance shown in the figure below.



MARK	REASON	SIGN.	DATE	MATRL.材質	SCALE 尺度	DATE	TITLE 品名
					1/1	2016.04.27	R12199-02
				QTY.数量	FINISH 仕上	APPO.承認	CHK.検閲
						DESIGN 設計	DEF.製図
				TRTM.処理	PAINT 塗装		
						HAMAMATSU PHOTONICS K. K.	DRAWING NO. 図面番号 72-0036-A

3.6. WELDING

The welding of the lead wires must be carried out in the same way (ESD) as before. When the operation is complete, check that all the welds have been carried out correctly.

3.7. FLYING LEADS CUTTING



It consists in cutting of the flying leads of the photomultiplier that protrude from the base in the most suitable way to carry out the welding process, therefore with the correct meniscus and avoiding burrs during the cutting.

3.8. LABELLING

It consists of the double reading of the barcodes of the base and the photomultiplier so that each PMT is uniquely defined by the two codes that compose it.

The data relating to the assembled PMT and the respective active base must be entered in a database and supplied to the I.N.F.N.

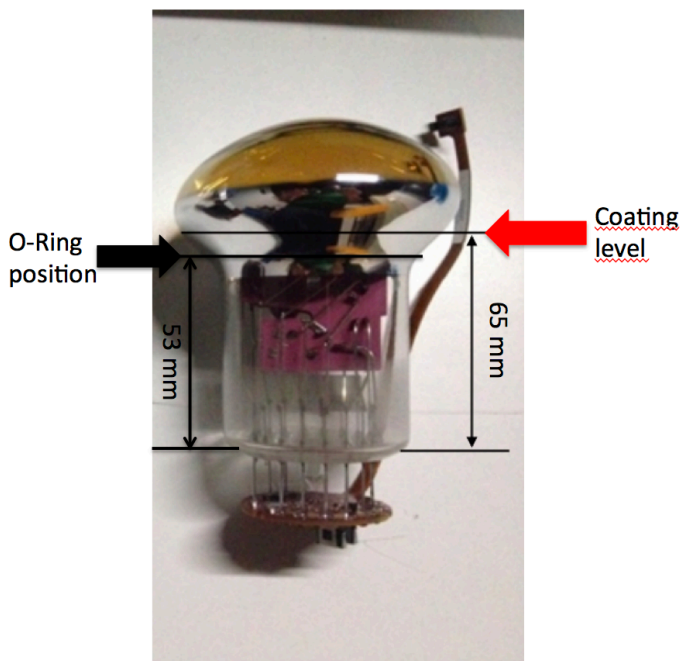
3.9. PMT CLEANING

Removal of any greasy or greasy residue from the glass part of PMT with isopropyl alcohol to improve the adhesion of the coating. Do not use cleaning brushes! This treatment degrades the performance of the base.

3.10. COATING

It is identified with the covering of the active base and the photomultiplier with tropicalised varnish **cod. 1991496** and subsequent drying.

This phase must be done by immersion of the assembly up to half of the metal shielding (tolerance + - 2mm) leaving the PMT head (detector area). The drying will be done in special shelves for 24 hours.



3.11. PACKAGING





UNIONE EUROPEA
Fondo Europeo di Sviluppo Regionale



The assembled PMTs should be carefully returned to the original packaging after checking that there is no "dripping" of the tropicalised varnish on the detection zone.

Il Responsabile Unico del Procedimento

(dott. Pasquale Migliozi)



Istituto Nazionale di Fisica
Nucleare
codice fiscale 84001850589

INFN - Napoli Via Cintia Complesso Universitario Monte Sant'Angelo – 80126 Napoli (Italia)
<https://www.na.infn.it/>
tel. +39 081 676283- fax +39 081676346 - email: prot@na.infn.it PEC: napoli@pec.infn.it

Pasquale Migliozi - email: pasqualemigliozi@na.infn.it