Test Ground

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Overview

Each OTE consists of an Airex ® foam core (8 mm thickness on the cylinder side and 5 mm on the Rear Flange (RF) area), covered on the inner diameter, with a thin layer of 25 microns aluminised Kapton® and with a copper backed kapton 43 microns thick on the outer one.

The major goal of this document is to evaluate the way to electrically connect the outer Cu-kapton layer to the inner Al-kapton one once the first OTE has already been assembled using a tab design (type 1) that we'll now compare with a new one trying to get an improved electrical contact.

The electrical contact is achieved by using a Cu-k tab overlapping 20 mm on each layer, so the total length is obtained as an addition of the Airex thickness + the overlapping distance (8 +20+20 = 48 mm) and about 10 mm extra when working on the sloped Rear Flange(RF) side.

Two different tabs have been compared:

1. Cu-kapton tab with conductive glue. (used at OTE1)

   Some drops of conductive glue TRA-DUCT BA 2902 are added to the Cu side of the tab and the remaining area is covered with non conductive glue Araldite 2011 in order to get a strong adherence.

2. Cu-kapton tab with a Chrome strip soldered.

   A chrome teethed strip is soldered to the tab, covering the remaining area with non conductive glue too in order to fix it to the OTE.

Fig. 1 Type 1 tab with conductive glue

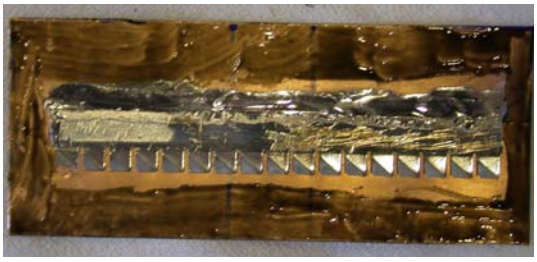

Fig. 2 Type 2 tab with chrome strip

Some tests of the two options have been done on prototyping OTEs.

Results

First of all we measured the electrical resistance of the Al-kapton sheet, so that we could estimate the resistance per unit length. Measurements have been done between 0 and 40 cm.

The cable resistance value has also been measured having a value of about 0.0013 Ohms. This value has been subtracted to measurements.

The following table shows the results obtained by measuring resistances at different distances to evaluate the material electrical resistance.

Distance	Barrel 1* (Ω)	RF 1 (Ω)	Barrel 2* (Ω)	RF 2 (Ω)
0	0.3487	0.3987	0.4987	0.4687
5	0.5987	0.6987	0.8987	0.7987
10	0.8187	0.8987	1.2987	1.1987
15	0.9587	1.0987	1.4987	1.4987
20	1.2487	1.2387	1.6987	1.5987
25	1.4487	1.4987	1.9987	1.6987
30	1.6987	1.6987	2.0987	1.8987
35	1.9987	1.8987	2.1987	1.9987
40	2.2487	2.2487	2.3987	2.2987

Table 1 Al-k electrical resistance value at different distances.

(*): Numbers 1 and 2 indicates the OTE prototype number.

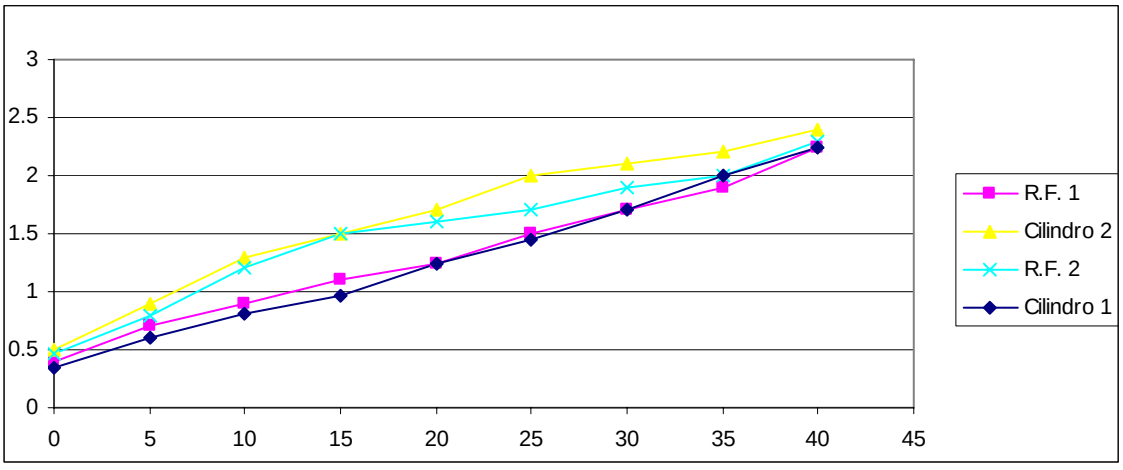

Fig. 3 Graph results.

The Al-k is quite uniform on its electrical resistance value, having a linear relationship with distance.

Now we measured the electrical resistance of connected sheets at different locations and by using both types of tab design is shown. As the material is quite uniform any deviation between measurements should be caused by the type of tab used.

Tab design & Location	Resistance (Ω)
Type 2 Rear Flange to Barrel	1.73
Type 1 Rear Flange to Barrel	2.4
Type 2 Barrel to Barrel	1.1
Type 1 Barrel to Barrel	4.7

Table 2 Electrical resistance with different tab design

Conclusions

Results are significantly better if the chrome teethed tab (type 2) is used. So this tab will be used on the second OTE to assemble.