

## **Transition Edge Sensor (TES) – Specifications**

**Description of the sensor:** The TES is a thin-film thermal sensor that intends to measure a fast energy deposition. The sensor is biased within the superconducting-to-normal transition. Within the transition temperature range, a very large resistance change occurs from zero to the normal value, which makes the TES very sensitive, but only within the transition temperature range. The sensors are intended to transduce temperature variations associated with second-sound in He II into proportional changes of the voltage drop or current across the film strip.

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### **Elements of the sensor:**

1. Substrate
2. Sensor Strip
3. Leads

### **Properties of the elements:**

- Substrate:
  - Material: quartz glass
  - Dimensions: optional
- Sensor strip
  - Superconductor/normal conductor bilayer: 1000 Å of Sn on 200 Å of Au
  - Dimensions: width: 0.03 mm; length: 1.3 mm or larger
- Leads:
  - Material: optional
  - Dimensions: depends on the arrangement

### **Comments:**

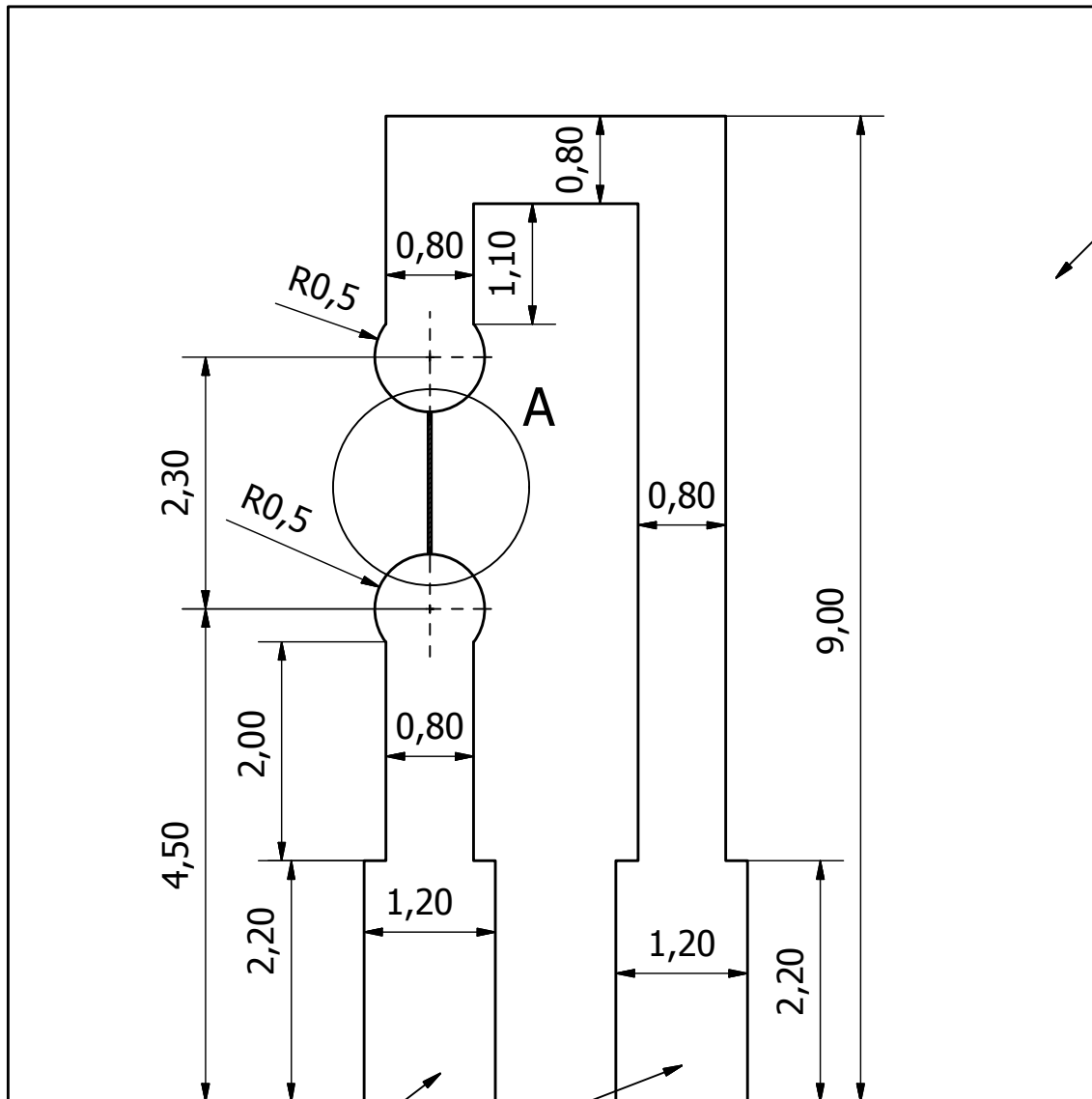
In a first step, we would like to reproduce the results presented in [1], by applying evaporation for the production of the first prototypes. Further, we would like to refine the study by comparing these first prototypes produced by evaporation with others samples produced by sputter-deposition and/or with other geometries. A mechanical mask is required in all the cases.

To improve the adhesion between the bottom layers and the quartz glass base, the application of a Cr layer could be beneficial.

The attached drawings represent the geometry of three different sensor shapes to test (sensing strip is hatched) and a schematic drawing of the layers of the sensing strip and their composition.

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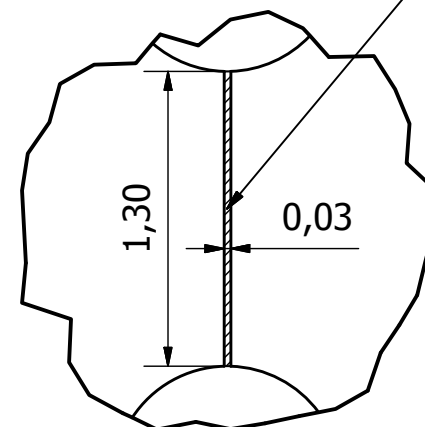
[1] H. Borner, T. Schmeling and D. W. Schmidt, *Experimental Investigations on Fast Gold-Tin Metal Film Second-Sound Detectors and Their Application*, (Journal of Low Temperature Physics, vol. 50, nos. 5/6, 1983) p. 405-426.



Substrate

A ( 30 : 1 )

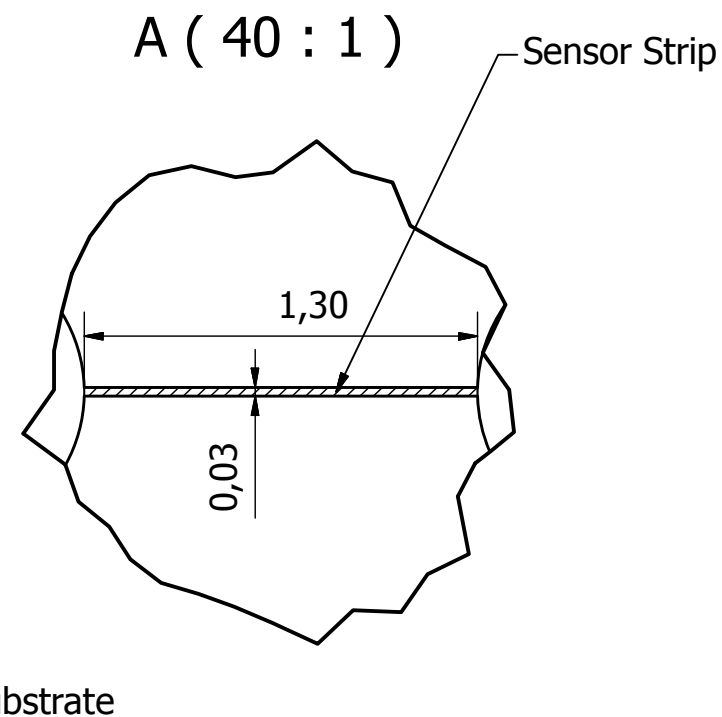
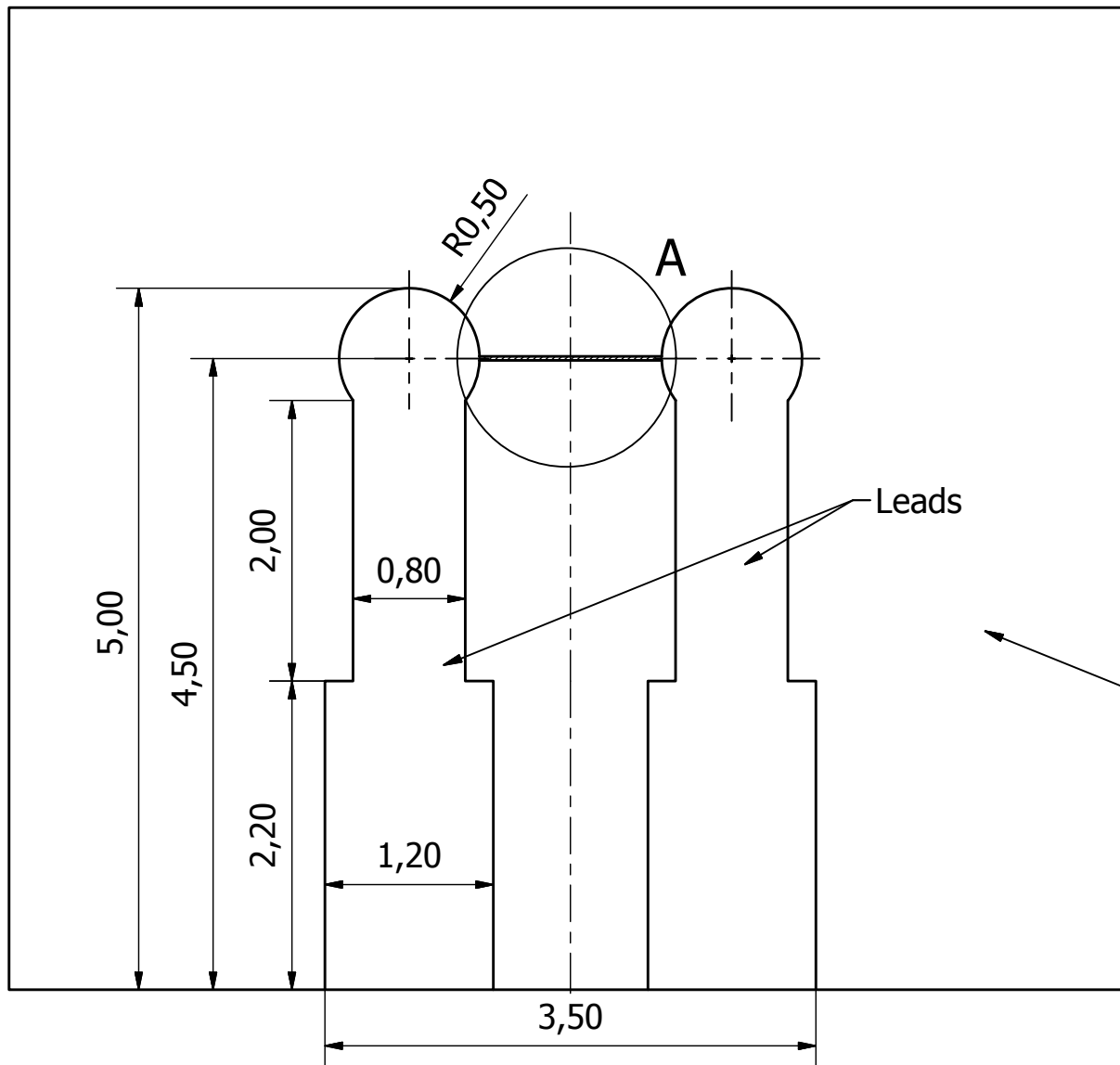
Sensor Strip



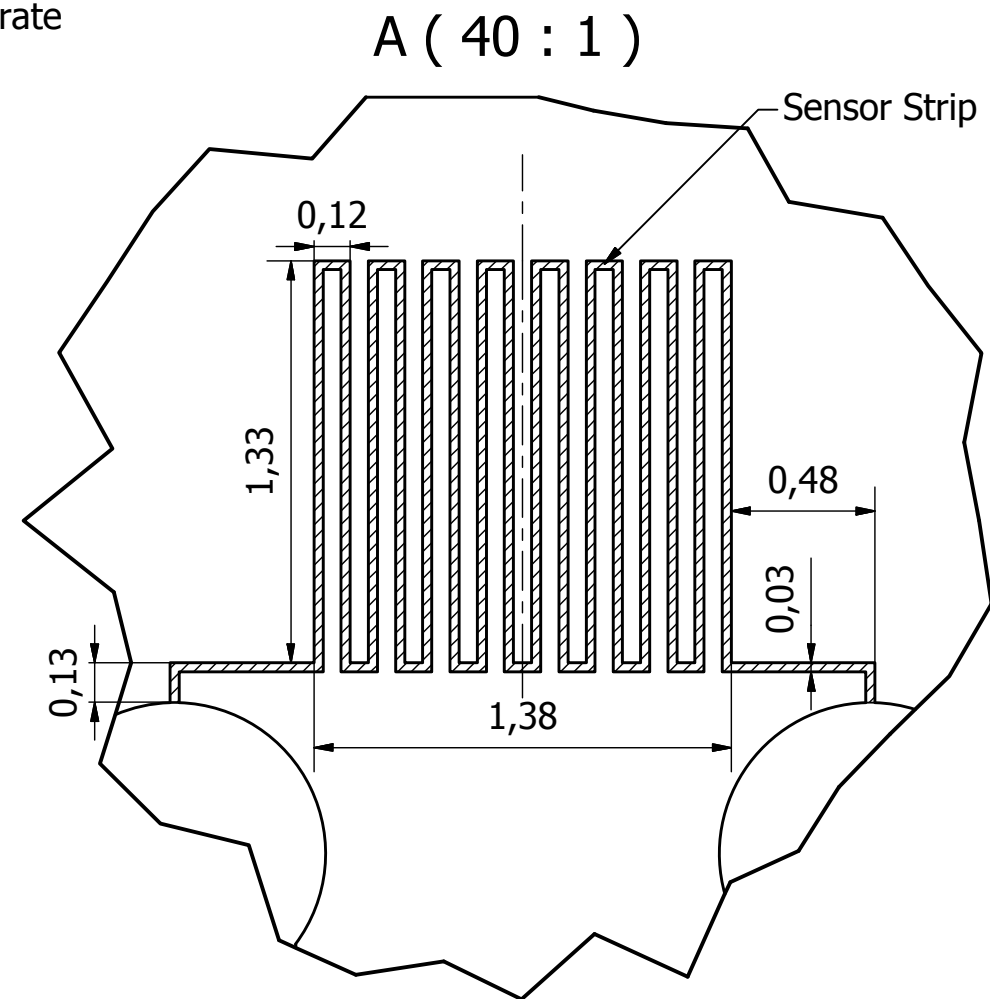
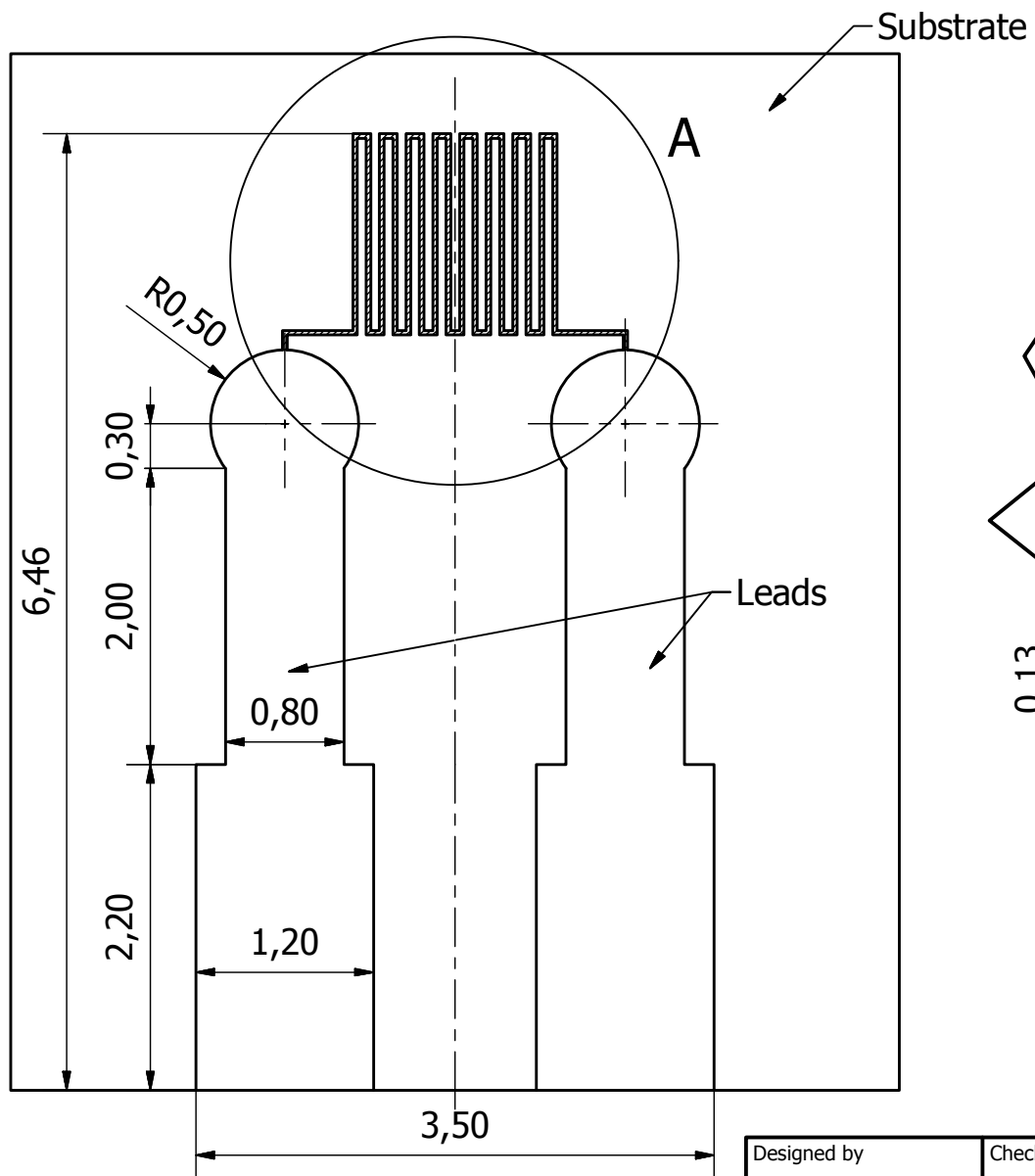
Leads

3,50

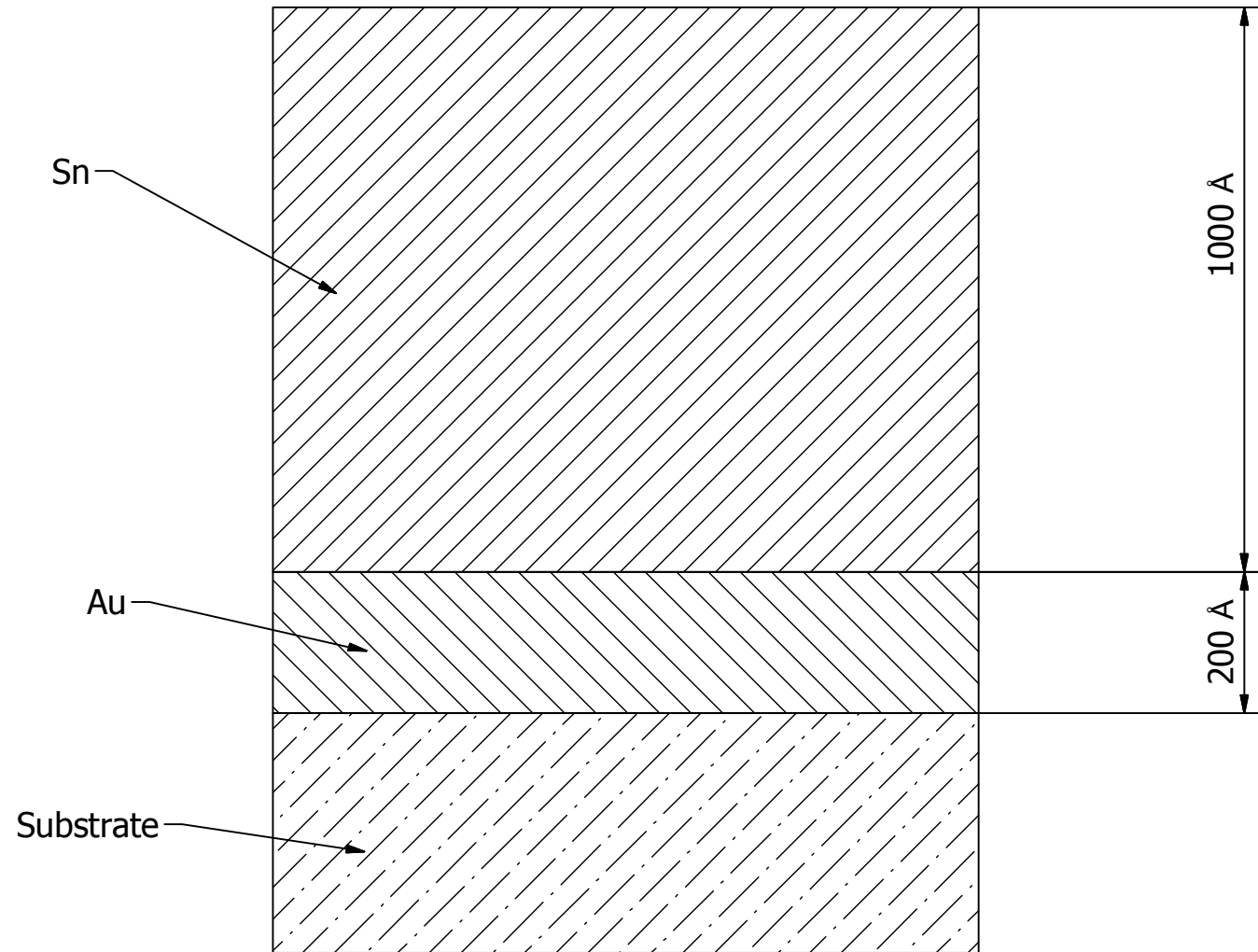
Designed by Zsolt Kovacs	Checked by Giovanna V.	Approved by	Date	Date 21/03/2016	
CERN			First Arrangement		
			Scale 15 : 1	Edition	Sheet 1 / 1



Designed by Zsolt Kovacs	Checked by Giovanna V.	Approved by	Date	Date 21/03/2016	
CERN		Second Arrangement			
		Scale 20 : 1		Edition	Sheet 1 / 1



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CERN		Third Arrangement			
		Scale 20 : 1		Edition	Sheet 1 / 1



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CERN		Layer Properties			
				Edition	Sheet 1 / 1