Metorex

January 7, 2000

Dr. John Jankovich
United States Nuclear Regulatory Commission
Materials Safety Branch
Division of Industrial and Medical Nuclear Safety
Two White Flint North
11545 Rockville Pike
North Bethesda, MD 20852

Dear Dr. Jankovich:

This letter is in reply to your letter dated November 19, 1999, requesting additional information regarding our request to amend the Registration Certificate NR-0701-D-104-B for the SIPS probe.

Attached you will find three documents which provide the information requested. The first is a modified version of the document titled "Modifications to SIPS Probe" starting on page 1 of the attachments. This document includes the final mechanical drawings and illustrations requested and a modified version of the descriptive information. I believe that this is responsive to items 3, 4, 5, and 11 in your letter. The second document is titled "Free Fall tests of modified SIPS probe 1888", starting on page 14 of the attachments. This is responsive to item 10 of your letter. The third document is titled "Radiation Profiles" (beginning on page 17) which is responsive to items 7, 8, 9 and 13 of your letter.

In response to the other items of your letter:

1. These documents cover all of the modifications included in the modified SIPS probe Model 1888.
2. Instead of noting the modified probes as units with specific serial numbers, the model number of the probe has been changed. The current SIPS probe is a Model 2840 while the modified probe will be Model 1888. The Technical Passport, which follows the instrument from manufacture, includes this designation and so it is easy to verify which version is included in any shipment.
6. The new end cover will fit on either model probe while the old end cover will not fit on the new model. However, there is no intention of providing any combination other than the old cover with the old probe and the new cover with the new probe.
12. The activity specified on the isotope label is the nominal value supplied by the source manufacturer.
14. Enclosed it a copy of the ISO 9001 certificate for Metorex International OY (p27) as well as the most recent audit report dated August 18, 1999. Metorex Inc. does not have a separate certification.

Metorex

If you have any questions, please feel free to contact me at the telephone number below or via e-mail at John.Patterson@MetorexUSA.com

Sincerely,

John I.H. Patterson, Ph.D.
President

JIHP/jlr
Enclosures

Modifications to SIPS Probe
NR-0701-D-104-B

The configuration of the detector in the SIPS probe has been changed to achieve better analytical performance. In conjunction with this change a few changes have been made to the mechanical parts of the probe.

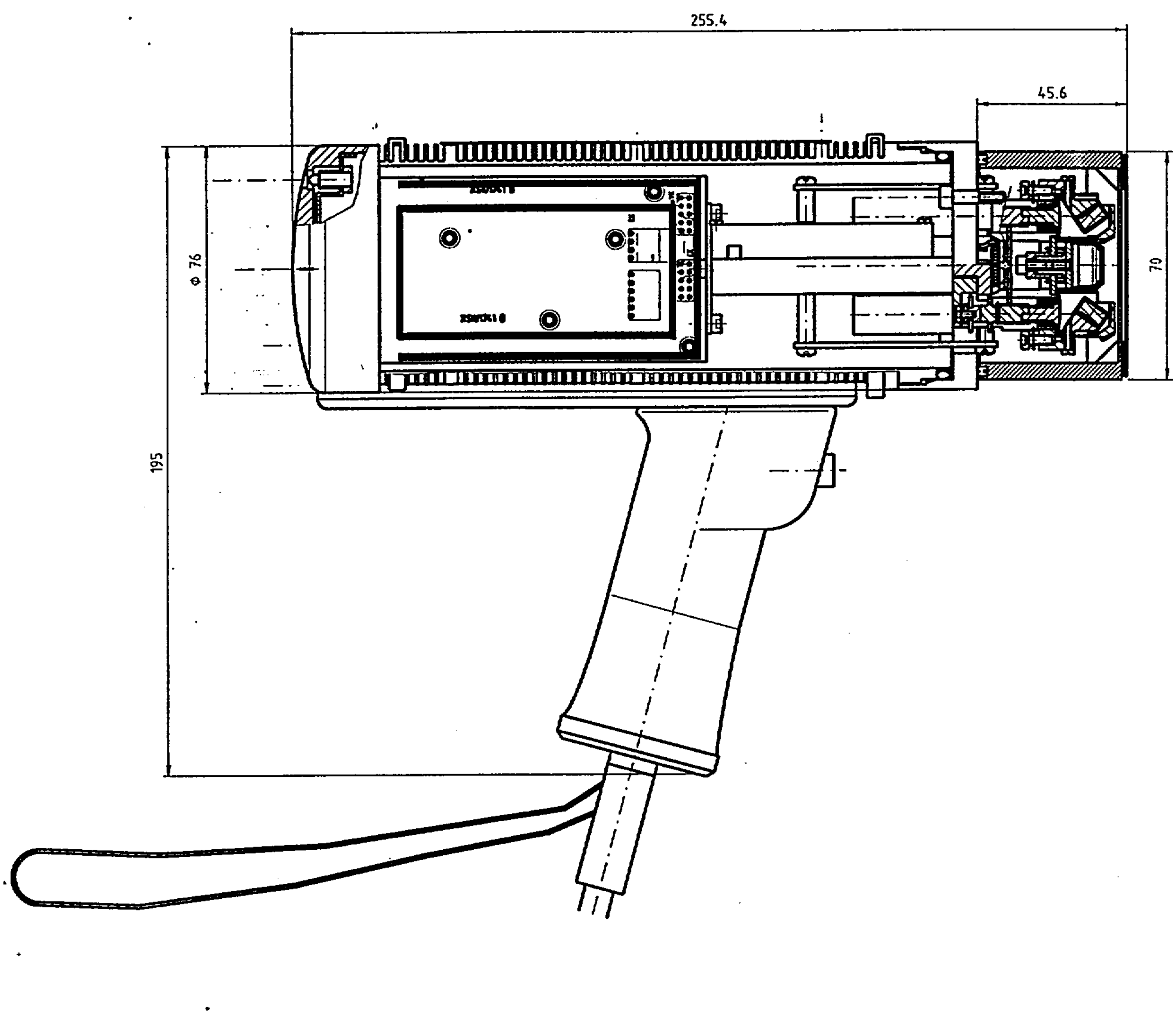
Attachment 1A (p3) is a drawing of the redesigned probe. Two external modifications have been made to the probe. First, three of the groves in the body of the probe have been eliminated. This provides a more secure mounting for the screws that hold the radiation warning label. The second change is that a new handle has been designed which better fits the grip and includes a safety strap to minimize the chance of dropping the probe. In addition, the probe cable now enters the probe through a connector rather than being hard wired to the probe.

Attachment 2A (p4) shows the modification of the detector geometry. In this view, the lower shutter is opened and the upper shutter is closed. When compared to Attachment 2 (p5) from the registry, the change in the position and shielding of the detector can be seen. The detector is much closer to the front of the probe. In order to shield the detector from the source, the source housing has been modified as shown in Attachment 3A (p6) and is manufactured to drawing 4102-054-4M (p7). No other changes have been made to the source holder and/or the shutter mechanism. Attachment 4A and 4B (p8,9) illustrates the assembly of the detector, sources and shutter. The detector is attached to the source holders with two (2) plastic bridges which attach by the three holes in the detector mount and the hole in each source holder.

The detector limiter/shield has been changed as the shielding requirements have been reduced by new detector geometry. In instruments containing Cd-109 and /or Fe-55, a small conical ring is attached to the top of the detector as a collimator (Attachment 5 on p10). This collimator is much smaller and lighter than the limiter in the previous design. Thus, the detector will better withstand shock and vibration.

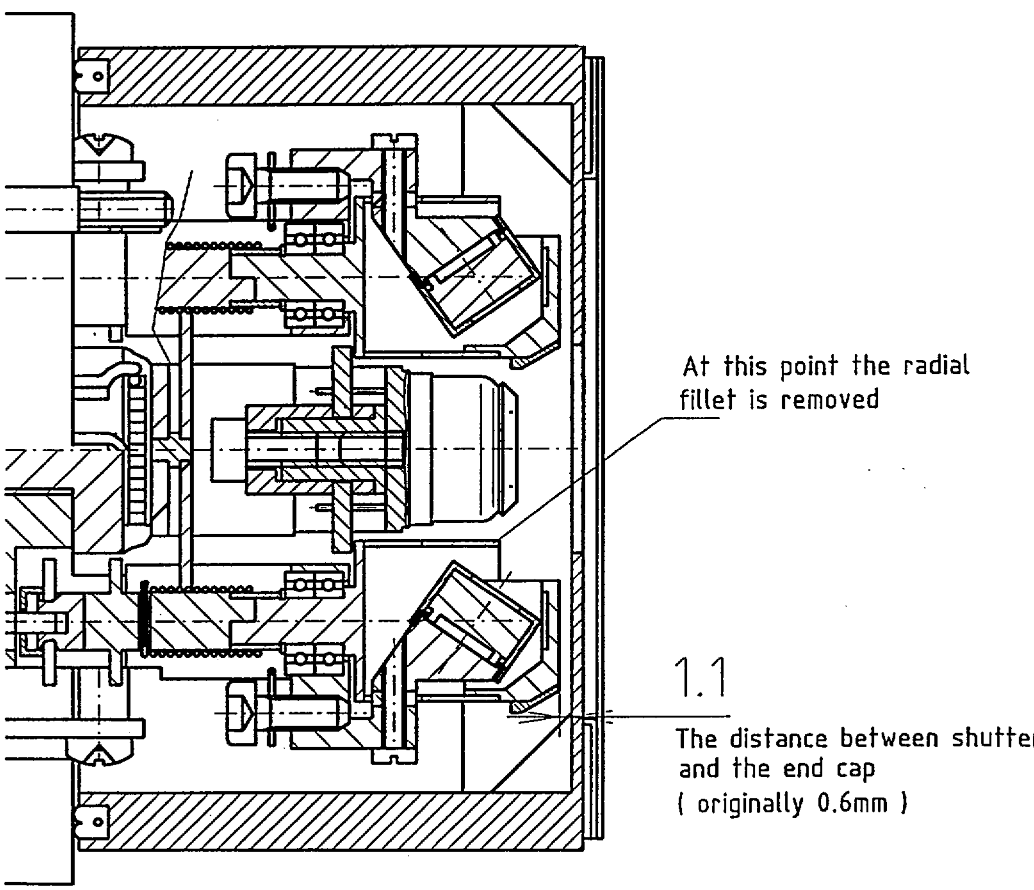
Attachment 6A&B (p11,12) illustrates the new heat shield and end cover and provide dimensions for the end cup. The heat shield (Attachment 7; p13) is an option for the unit to allow the probe to be used at elevated temperatures. The shield and associated mounting slightly separate the probe from the sample and provide some insulation. The installation of the heat shield slightly extends the length of the probe snout. Thus, with and without the shield, the probe snout will be of different lengths. This has lead to the development of a new end cover. In this version, the cover is fixed onto the probe snout with two spring loaded balls in the side of the cover. These balls fit into the small conical recesses in the probe snout. The cover is slightly longer than the old version and shielding mechanism is floating on four (4) springs. Two (2) bars on the side of the cover limit the outward movement. The same cover is used with or without the heat shield. The shielding mechanism is sandwich composed of a lead sheet between a steel and aluminum sheet. A copper reference sample is attached to the front of the sandwich. The steel plate adds to the shielding provided by the cover when compared with the previous cover.

Attachment 1A



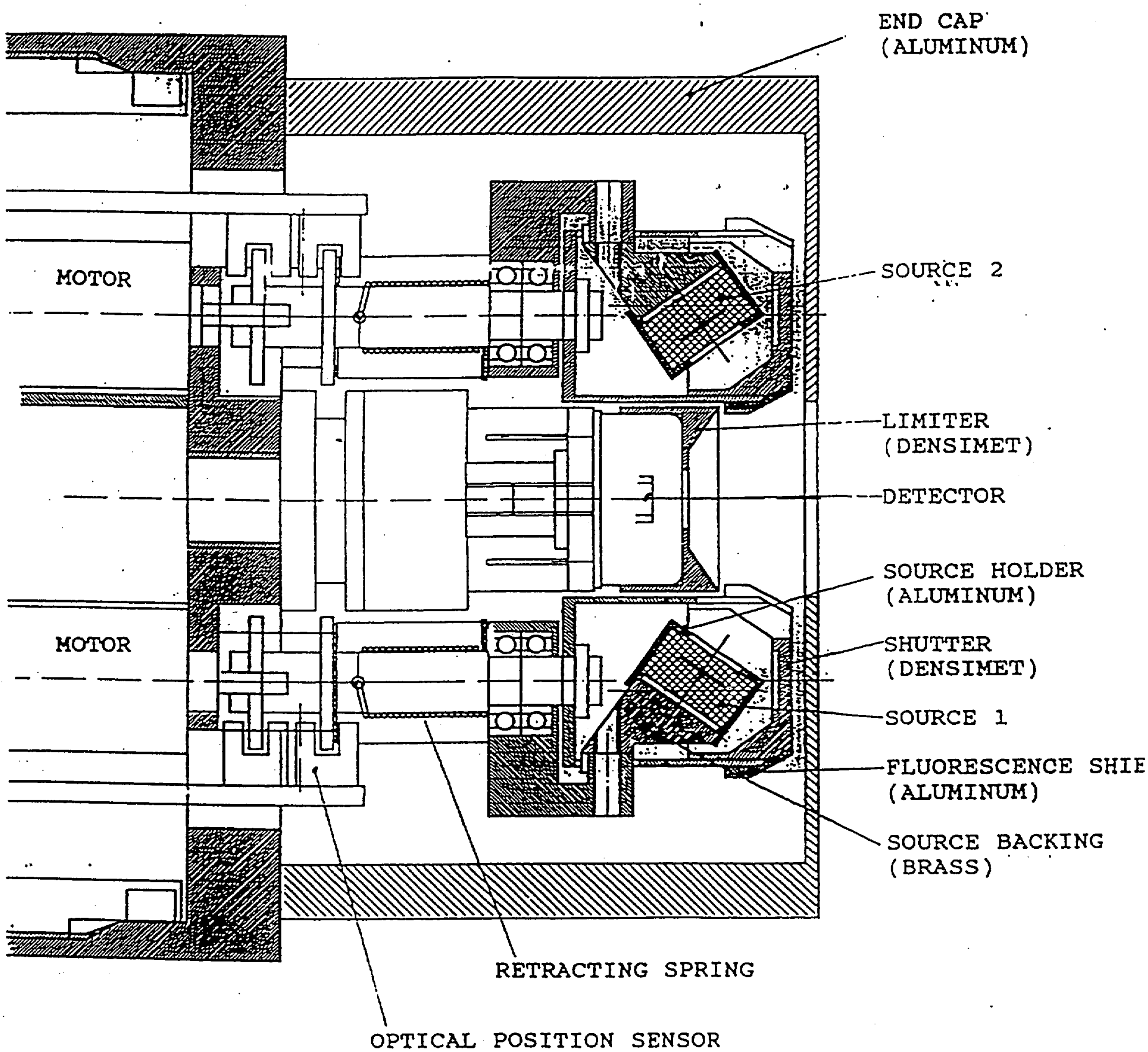
Dimensions in MM.

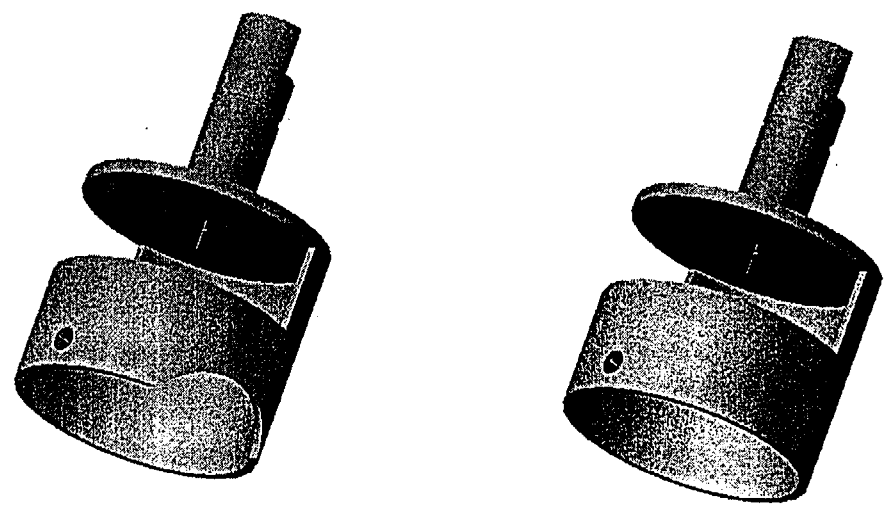
Attachment 2A



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE
(AMENDED IN ITS ENTIRETY)

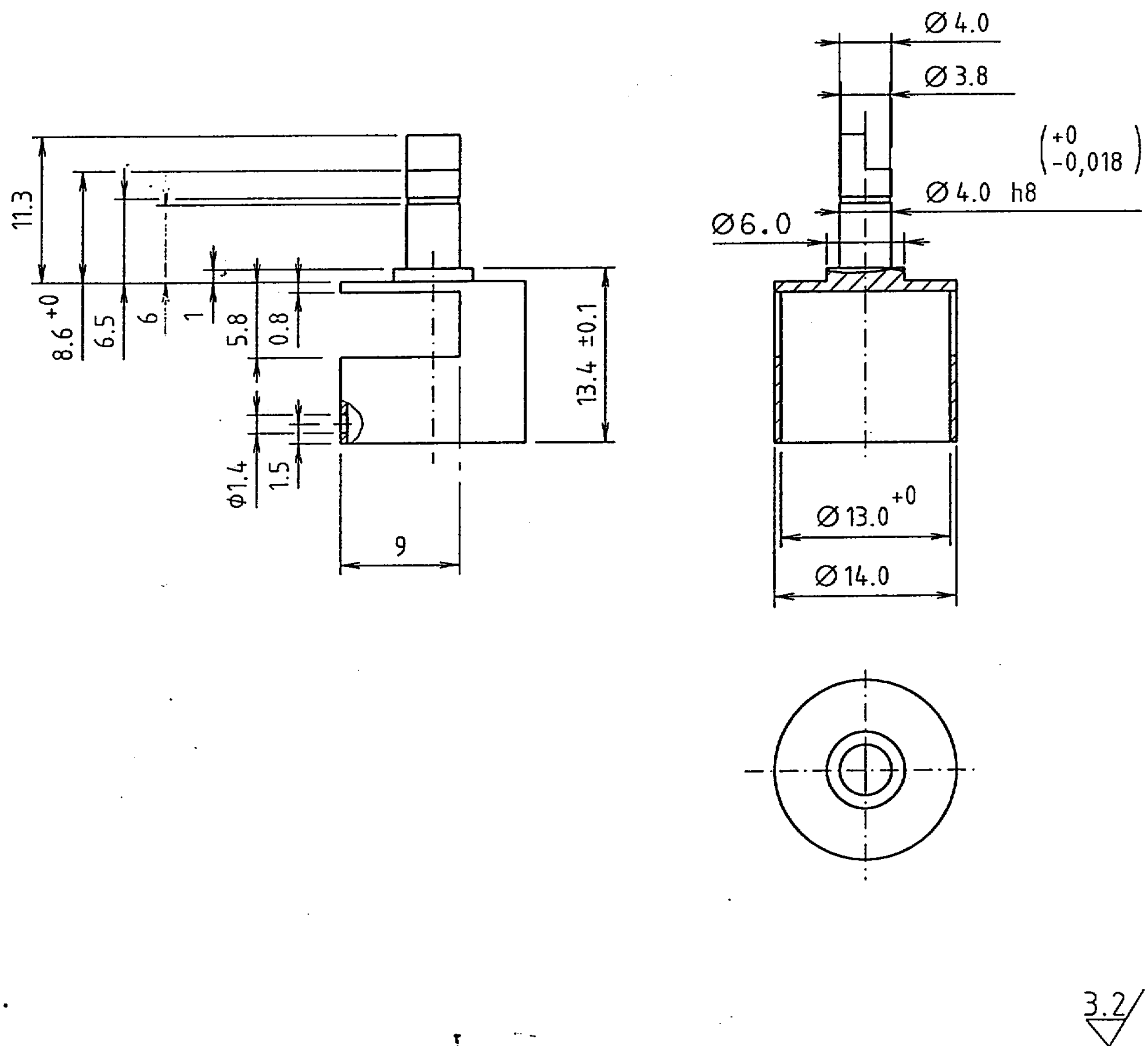
NO.: NR-0701-D-104-B DATE: NOV 12 1998 ATTACHMENT 2





On the left old source housing
On the right the new one.

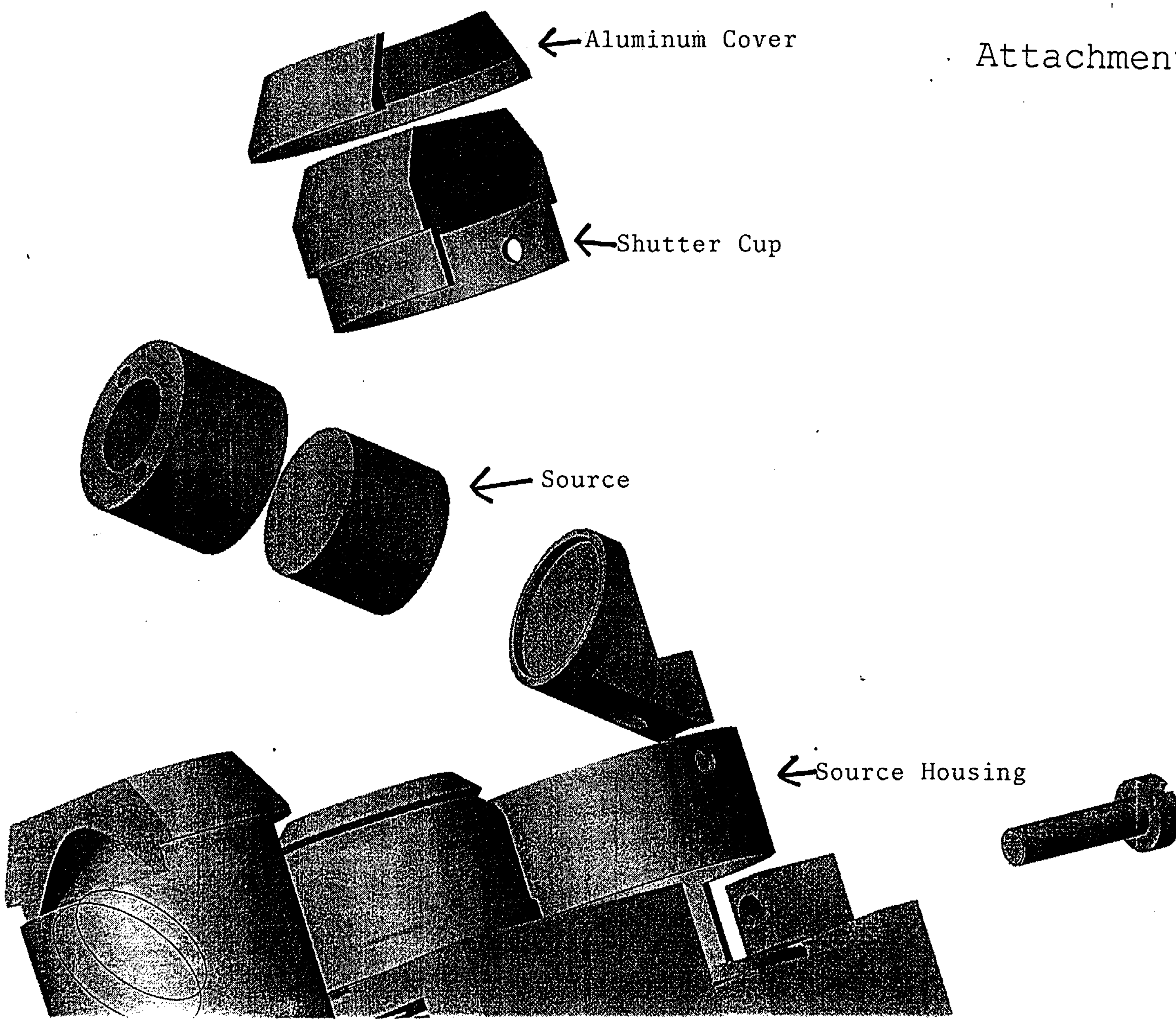
REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
	Densimet bar 16 x 250 mm	3060 177	

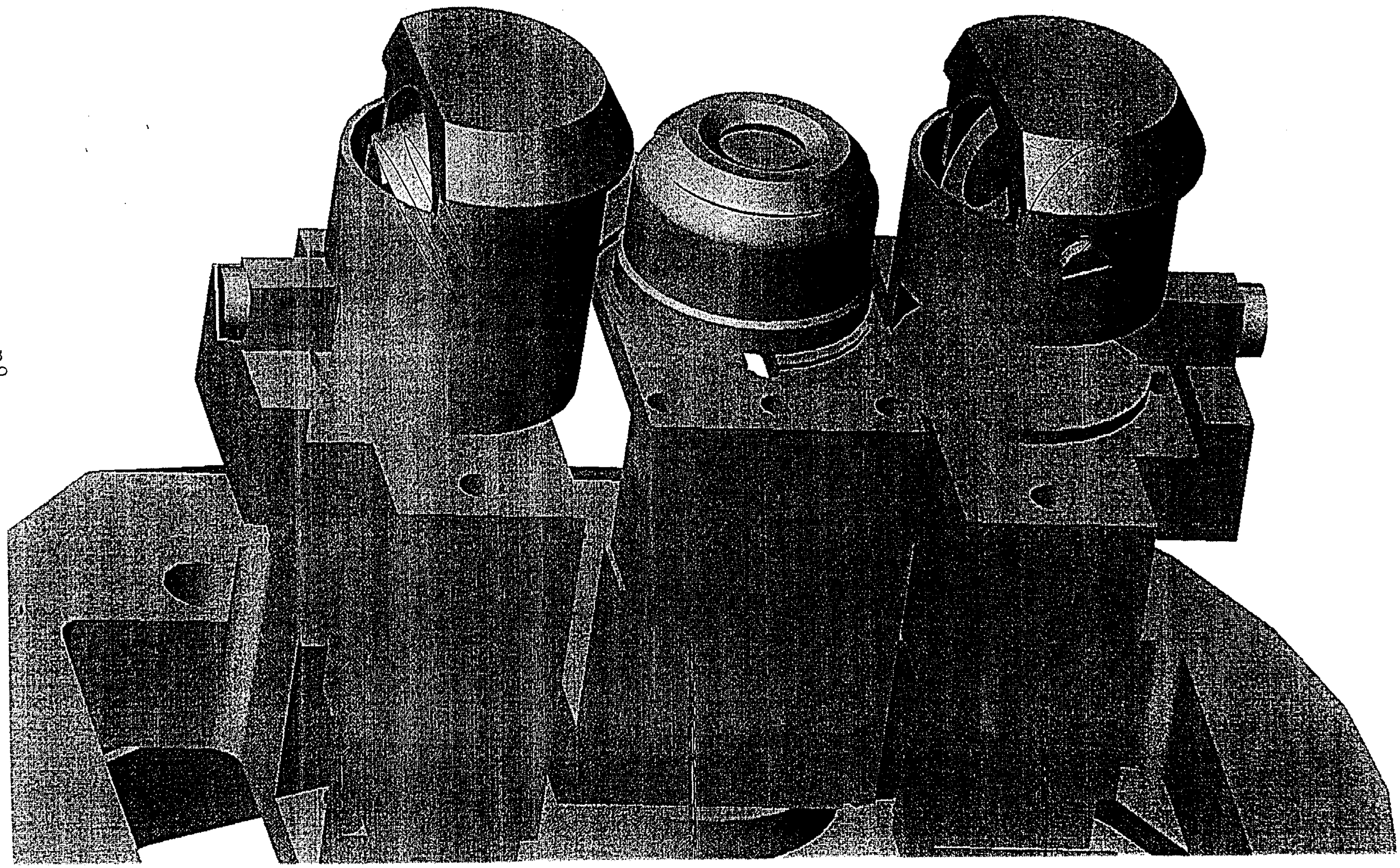
YLEISTOLERANSSI TOLERANCES: ISO 2768-mk		SUUNN. DESIGNED: 9912 SV	PIIRT. DRAWN: 9912 RM
SUHDE SCALE: 2:1	LIITTYY NEXT ASSY: SIPS 1888	TARK. CHECKED:	HYV. APPROVED:
		TUOTE PRODUCT: X-MET	
Metorex	Source housing Suljinkansi p7	OSAL.N:O PART LIST:	REV. 01
		PIIR.N:O CODE: 4102 054-4M	

Attachment 4A



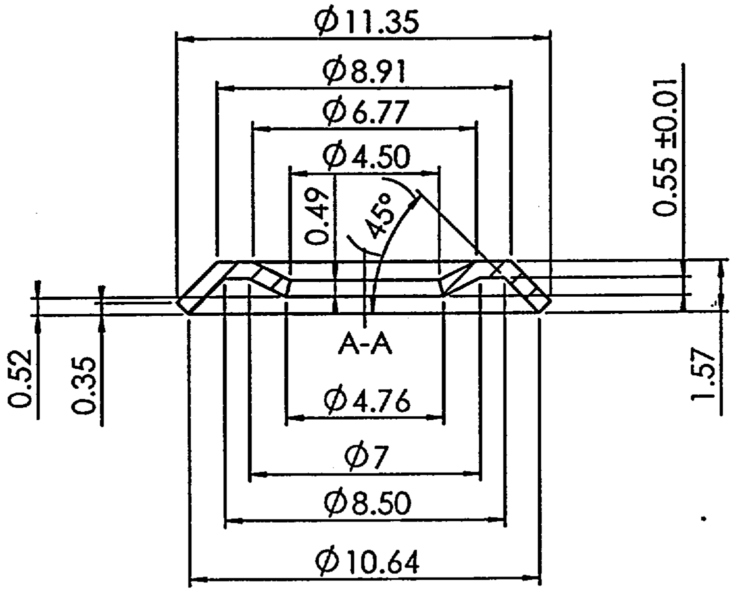
8d

Attachment 4B



p9

Attachment 5.

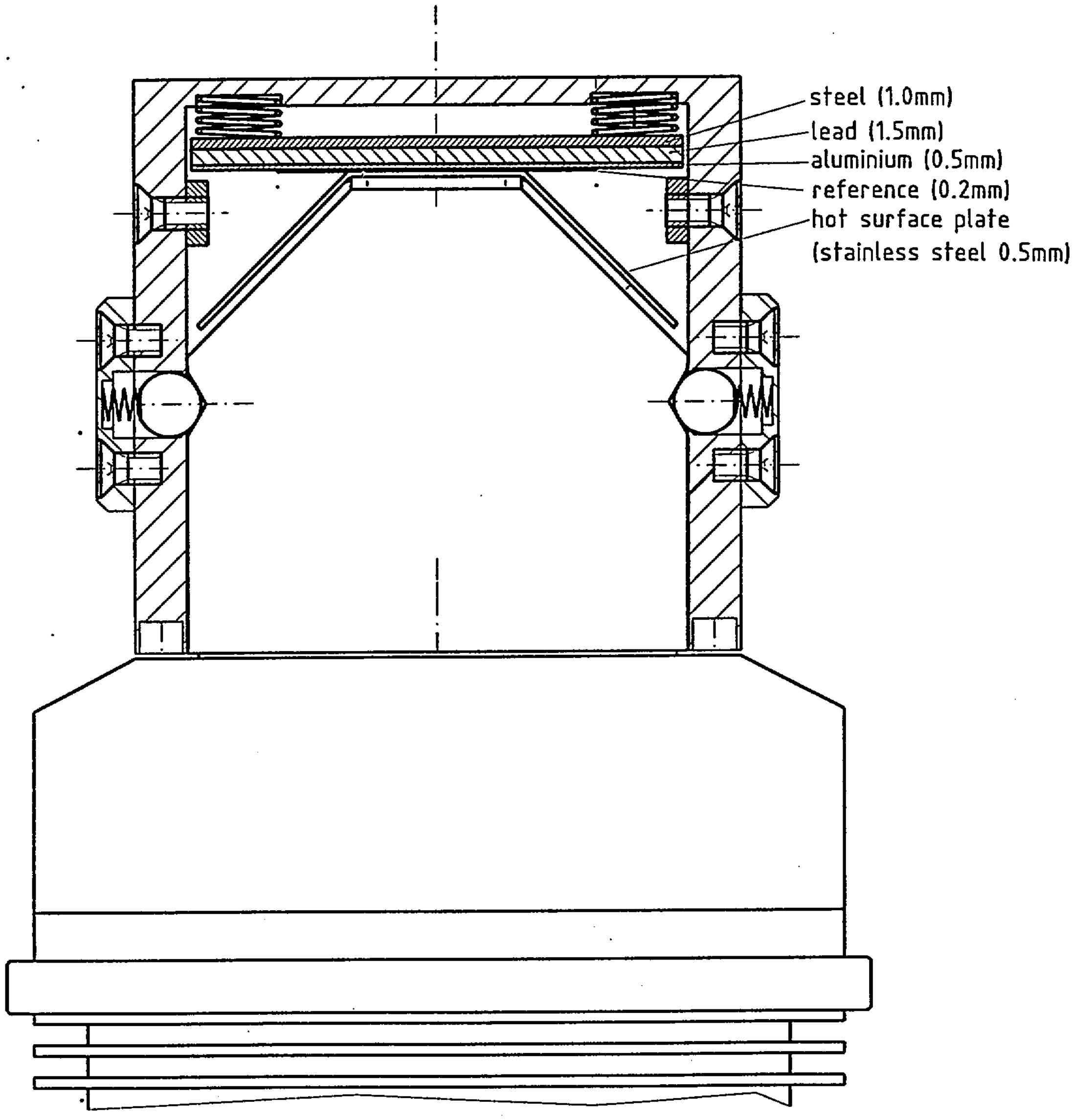


Ag 99.9%

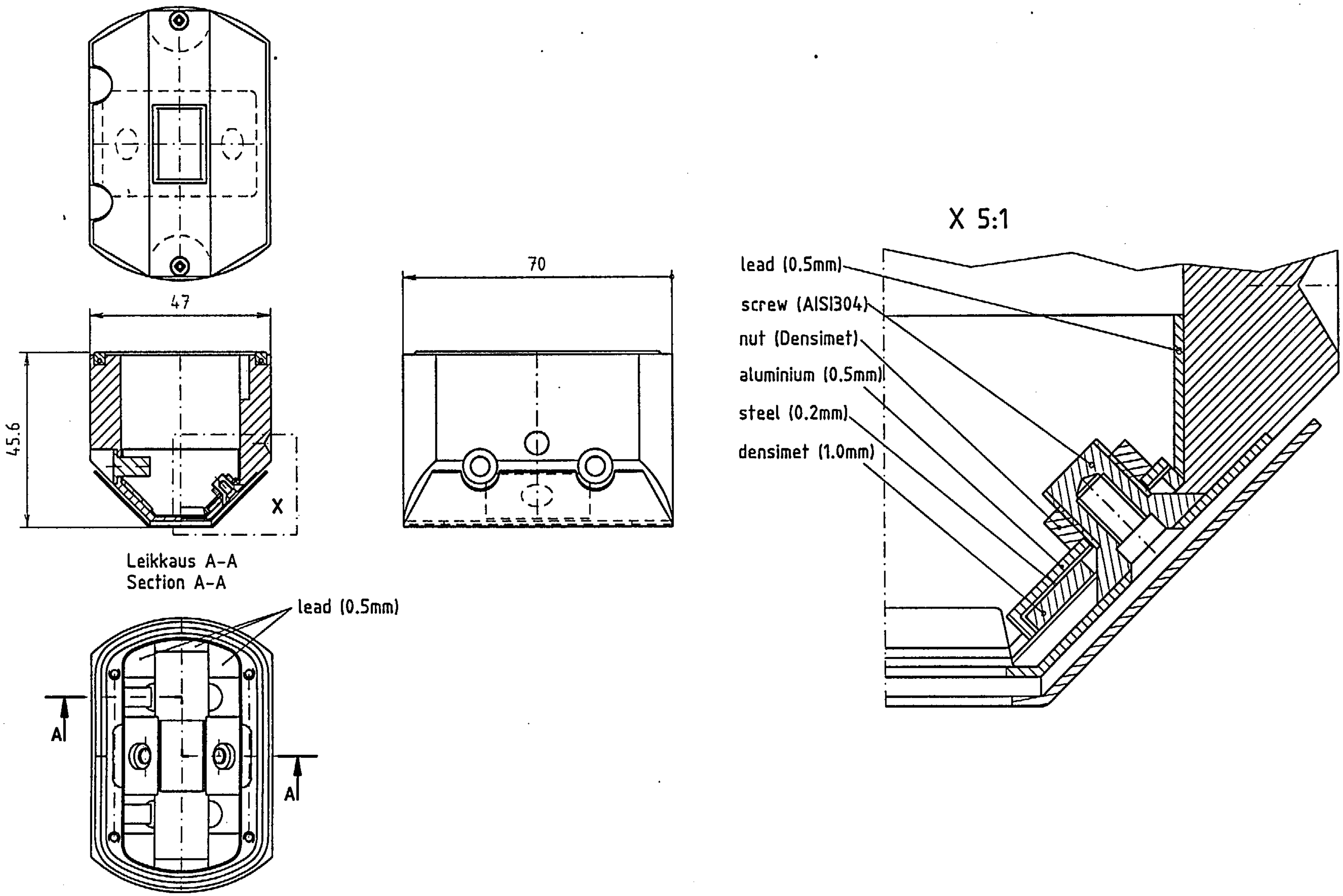
Detector collimator

3.12.1999

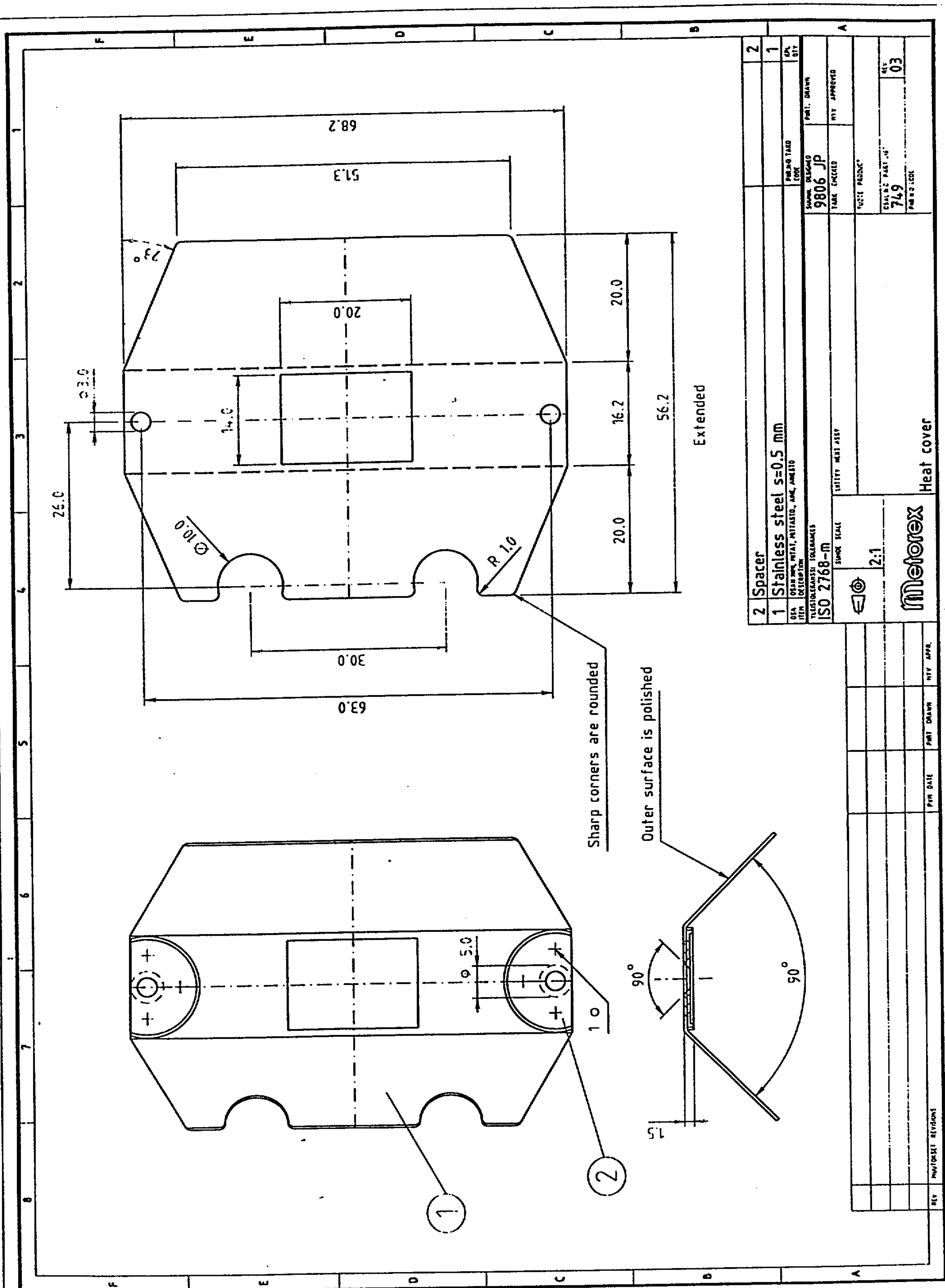
Attachment 6A



Attacment 6B



p12


68.2
51.3
23°
20.0
14.0
Ø3.0
26.0
Ø10.0
R 1.0
30.0
63.0
20.0
16.2
20.0
56.2
Extended
Sharp corners are rounded
Outer surface is polished
Ø 5.0
90°
90°
1.5
1
2
2 Spacer
1 Stainless steel s=0.5 mm
ISO 2768-m
2:1
9806_JP
749
03
Metorex
Heat cover

Metorex

December 28,1999

Free fall tests of the modified SIPS probe 1888

The test were made in two phases because on the basis of earlier experience it was expected that most likely drops in the axial directions would cause damages and the idea was to avoid these in the beginning.

Before each drop the cable was disconnected from the probe because otherwise it would have easily turned the probe from the intended attitude.

Phase one:

The tests were made according to the following conditions:

- drop heights 1 and 2 meters
- drop surface concrete floor
- one drop in 3 different attitudes, right, left and top side towards the floor
- visual and functional examinations after each drop
- radiation measurements after each drop

Phase two:

The tests were continued under otherwise the same conditions but the attitudes were the two axial directions, front and back.

Results:

1. Phase one:

1.1. After all 3 drops from one meter height the shutters worked normally, visually the probe looked undamaged, no extra noise was detected when the probe was shaken and no increase in radiation level outside the probe was detected.

1.2. The first drop from two meters height was top side towards the floor. After that the shutters worked normally, no extra noise or extra radiation was detected. The handle was not any more quite firmly fixed. (See comment in the end of the report.)

1.3. Next drop was right side downwards. After that the shutters worked normally and no extra radiation was detected outside. Little extra noise was detected when the probe was shaken. The handle became almost loose because the threads in the plastic failed. The electric connections still worked, however. The handle was simply pushed back and the tests were continued.

1.4. The third drop was left side downwards. No extra radiation was detected and the noise had remained about the same. Visually the probe looked still the same as in the beginning (except for the handle). However, the A shutter did not open. Shutter B could not be tested in the ordinary way using the trigger, because the sequence is always such that this shutter opens only after shutter A is first opened and then closed even if no measurement is made using source A.

1.5. Next the probe was opened to see what had went wrong inside. It turned out that both ends of one of the plastic bridges that give support to the top part of the detector/Peltier cooler unit had broken and similarly one end of the other bridge. The detector/ Peltier cooler unit itself had not, however, moved anywhere. There were thus three loose plastic parts inside the probe causing obviously the detected noise. The reason why the A shutter did not open was that the motor/gear box had become loose and could not turn the shutter. When turned manually the shutter moved easily to the "open" position and the retracting spring returned it back without the least difficulty. Shutter B was found to function as it should when it was turned manually. One lead shield in the end cap located behind shutter A when seen from the detector had became loose.

1.6.The probe was assembled leaving the three small loose plastic parts and the loose lead plate simply away.

2. Phase two:

2.1. The probe was dropped from one meter height first the back facing down. (The handle became loose but the cable and wires remained connected.) No noise was detected when shaken, no extra radiation could be detected and visually the probe looked unchanged. The functioning of the shutters was not tested at this stage.

2.2. Next the probe was dropped from the same height the front end facing downwards. No changes in noise, radiation or outlook were found.

2.3. To see if something had happened inside, the probe was disassembled. Everything looked the same as after phase one. Especially the shutters were tested and were found to function in the same way as after phase one. The probe was then simply assembled anew.

2.4. The first drop from two meters height was again back end towards the floor. The detector seemed to have moved a little to the left and such a sound could be heard as if some quite big part had been moving a little (perhaps the detector/Peltier cooler unit). Visually the probe looked the same and no extra radiation was found.

2.5. Next drop was from the same height the front end facing downdards. After the drop the only difference to the previous situation was that the hot surface plate had become tightly pressed against the aluminium end cap.

2.6. Again the probe was disassembled for examinations. The detector/Peltier cooler unit could be slightly moved using moderate force but it remained well in place, however. Surprisingly the last "foot" of the two plastic bridges was still undamaged helping to keep the detector steady. The shutters were still functioning in the same way as after phase one turning smoothly the whole way to both directions. In the end cap one of the tungsten plates was broken in the middle and one end of it could be moved a little bit. The covering iron and aluminium plates fixed with a screw kept it easily in its place. On the outer surface of the end cap the semicircular ridges of the hot surface plate had pressed clear grooves to the cap.

Conclusion:

First of all, the radiation sources remained all the time well in their holders and the holders remained well fixed. Also the shutters remained all the time in their correct places so that they could be turned smootly open and closed. One of the shutters became unconnected from the motor/gear box so that it could not be electrically operated, but the retracting spring always turned the shutter to the "closed" position. No extra radiation could be found at any stage during the tests. The lead shield that became loose in the end cap is not of primary importance acting mainly as a shield against scatterd radiation. The fixing of the detector/Peltier cooler unit was now clearly better than in the original version and thus the unit moved only very little allthough the plastic supporting bridges were partially broken.
The end cap of the probe remained dimensionally unchanged so that the reference/shield end cover could easily be slipped on after the tests. Thus even if the shutter had remained in "open" condition the shield would have made the probe safely closed. As earlier the probability that the radiation sources would get out of the probe is very low, because the source is too big to slip out of the shutter and the shutter too big to slip out of the end cap.

Note:

The handle got loose at fairly early stage of the tests. This is partially due to the fact that this probe was used already earlier in such drop tests where the main interest was in the functioning of the measuring electronics. The probe was dropped a few times from one meter and the handle was somewhat damaged already then. Because the handle is not very important from radiation safety point of view, it was not changed. In spite of getting several times loose the handle remained electrically connected to the probe.

(After all the tests it is obvious that the axial directions were not more dangerous than the test, and thus the split into two phases was actually unncesssary.)

December 28, 1999

RADIATION PROFILES

To find out whether there are significant changes in the radiation profiles of the original design and the modified design, comparative measurements were made with the following radionuclide sources:

- Cd109 : 370 MBq, s/n RR-274, made by Isotope Product Laboratories
- Am241 :1110 MBq, s/n 9887LX, made by Amersham International plc
- Fe55 :1480 MBq, s/n RR-036, made by Isotope Product Laboratories

The same sources were used in both probes and the measurements were made as closely in the same positions as possible.

Two monitors were used to measure the radiations.
1. Series 900 mini monitor made by Mini-Instruments, s/n 027999, probe 42B having a 47 mg/cm2 thick Be window and NaI scintillation crystal of size 23mm dia by 1mm thick. Detects gamma radiation down to 4-5 keV.
2. Contamination survey meter RD-11 made by Wallac Controls Ltd, England, s/n 75209 having a GMP-526/S probe incorporating a 1.5-2 mg/cm2 mica end window.

The scintillation counter was used to measure low level radiations and the Geiger counter higher levels. Both instruments were originally calibrated in 1993 against a SmartION, Model 2100, s/n 002144 made by Mini-Instruments Ltd, England. (This instrument is owned by the Finnish Radiation and Nuclear Authority, earlier called the Finnish Centre for Radiation and Nuclear Safety, and it was calibrated in the same year at Winfrith NACRAC Laboratory, the calibration certificate number is 06934297.)Detector is of ion chamber type, window is aluminized polyesterwith total density of 7 mg/cm2, in front of the window a slide of density 1000 mg/cm2. Response curves given from 10 keV upwards.

The calibration measurements were made so that 2 Am241 sources of different activity, 2 Cm244 sources of different activity, 2 Cd109 sources of different activity, 1 Fe55 source and 1 Cs137 source were used. Dose rates were measured with all 3 instruments at the same different distances from the sources using either aluminium or stainless steel plates of different thicknesses as absorbers or no absorber at all. The absorbers were used both to get different dose rates at the same distances and to take into account the effect of the hardening of nonmonoenergetic radiation passing through absorbers. Thus it was possible to get reasonably good estimates for dose rates under various conditions using the above two fairly simple monitors. Because the range of the calibration of the reference SmartION monitor did not go down to the energies of Fe55 source, this "calibration" is not actually true. - After the described calibration the condition of the monitors has been checked once a year based on known radiation sources and the same absorbers as above. The readings of the two above monitors have remained constant to better than +/- 15%. The latest check was made in February 1999.

Measurements of the radiation profiles

The following measurements were made with both probes:
1. Count rates at distances of 5, 10 and 30 cm from the probe window in the directions shown in figure 1 using each of the 3 sources (installed only one at a time). Readings were taken both shutter open and shutter closed.
2. Count rates as above according to figure 2 having a thick leaded glass plate as the sample.
3. Count rates as above according to figure 3 when the end cap was covered with a) old end cover, b) new end cover and c) the cover for small sample measurements.

In all the measurements the probes and the monitors were about 35 cm above the floor in horizontal position so that there was air between the probe and monitor. Thus scattering from floor and e.g. furnitures was minimized.

The results are given in the following tables. When looking at the numbers one must notice that in some directions and especially close to the probe even small differences in the measuring position may change the reading by 10-20%.
In the tables "NA" means that the radiation level is above the measuring ranges of the monitors, values that are in units of µSv/h are measured with the Geiger counter and the rest of readings are in units of counts/second and they are measured with the scintillation counter. For Fe55 source the dose rate readings are in mr/h units that are shown in the display. As said above a true calibration for this source was not possible.

The correspondence between the readings and dose rates are as follows:

Scintillation counter: maximum reading of 5000 c/s corresponds to the following superficial dose rates in µSv/h

Source	Absorber	Dose rate
Cd 109	nothing	9.0
	>1 mm steel or equivalent	2.8
Am241	anything	2.8

Conclusions

Looks that the hot surface plate and the modified source housing improve the safety, the former by leaving the source effectively deeper in the probe and the latter by reducing the opening of the housing. Thus the modified design seems to be better in this respect.

CD109 source

1. No sample, no covers

1.1 Shutter open:

Original design

Distance	A	B	C	D	E
5 cm	500	3500	NA	NA	3000
10 cm	300	1400	3500	NA	350
30 cm	200	950	1400	85 μSv/h	150

Modified design

Distance	A	B	C	D	E
5 cm	250	1800	NA	NA	1000
10 cm	170	500	2000	NA	170
30 cm	80	90	300	110 μSv/h	40

1.2 Shutter closed:

Original design

Distance	A	B	C	D	E
5 cm	80	100	100	50	30
10 cm	40	50	50	40	30
30 cm	20	25	25	30	40

Modified design

Distance	A	B	C	D	E
5 cm	15	15	20	15	10
10 cm	10	10	10	10	10
30 cm	<10	<10	<10	<10	<10

2. Leaded glass sample

2.1 Shutter open:

	Original design			Modified design		
Distance	A	B	C	A	B	C
5 cm	2500	500	150	400	80	100
10 cm	400	150	100	120	35	40
30 cm	70	25	20	20	15	10

2.2 Shutter closed:

	Original design			Modified design		
Distance	A	B	C	A	B	C
5 cm	10	10	100	10	10	20
10 cm	10	<10	30	<10	<10	<10
30 cm	<10	<10	10	<10	<10	<10

3.a1 Old end cover, shutter open

	Original design				Modified design			
Distance	A	B	C	D	A	B	C	D
5 cm	700	100	350	80	Cover can not be used			
10 cm	200	35	100	80				
30 cm	30	15	20	10				

3.a2 Old end cover, shutter closed

	Original design				Modified design			
Distance	A	B	C	D	A	B	C	D
5 cm	15	<10	<10	70				
10 cm	10	<10	<10	25				
30 cm	<10	<10	<10	10				

3.b1 New end cover, shutter open

	Original design				Modified design			
Distance	A	B	C	D	A	B	C	D
5 cm	600	30	600	200	400	25	120	70
10 cm	150	20	150	90	100	15	60	35
30 cm	30	10	30	20	15	10	15	10

3.b2 New end cover, shutter closed

	Original design				Modified design			
Distance	A	B	C	D	A	B	C	D
5 cm	10	10	10	80	10	10	10	15
10 cm	<10	<10	<10	25	<10	<10	<10	<10
30 cm	<10	<10	<10	10	<10	<10	<10	<10

3.c1 Small sample cover, shutter open

	Original design				Modified design			
Distance	A	B	C	D	A	B	C	D
5 cm	600	30	1000	400	200	30	200	80
10 cm	150	20	500	70	90	15	90	35
30 cm	30	10	30	15	20	10	20	10

3.c2 Small sample cover, shutter closed

	Original design				Modified design			
Distance	A	B	C	D	A	B	C	D
5 cm	10	10	10	80	10	10	10	15
10 cm	<10	<10	<10	20	<10	<10	<10	10
30 cm	<10	<10	<10	10	<10	<10	<10	<10

Fe55 source

1. No sample, no covers

1.1 Shutter open:

Original design

Distance	A	B	C	D	E
5 cm	80	150	450	NA	200
10 cm	30	50	150	NA	100
30 cm	10	15	25	(7 mr/h)*	20

Modified design

Distance	A	B	C	D	E
5 cm	80	150	400	NA	250
10 cm	40	50	150	NA	100
30 cm	10	10	20	(9mr/h)*	25

1.2 Shutter closed:

Original design

Distance	A	B	C	D	E
5 cm	15	15	15	10	10
10 cm	<10	<10	<10	<10	<10
30 cm	<10	<10	<10	<10	<10

Modified design

Distance	A	B	C	D	E
5 cm	<10	<10	<10	<10	<10
10 cm	<10	<10	<10	<10	<10
30 cm	<10	<10	<10	<10	<10

2. Leaded glass sample

2.1 Shutter open:

	Original design			Modified design		
Distance	A	B	C	A	B	C
5 cm	10	10	10	10	10	10
10 cm	<10	<10	<10	<10	<10	<10
30 cm	<10	<10	<10	<10	<10	<10

2.2 Shutter closed:

	Original design			Modified design		
Distance	A	B	C	A	B	C
5 cm	<10	<10	<10	<10	<10	<10
10 cm	<10	<10	<10	<10	<10	<10
30 cm	<10	<10	<10	<10	<10	<10

*) These are direct readings ; they can not be reasonably transformed to Sv units

3.a1 Old end cover, shutter open

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	<10	<10	<10	<10	Cover can not be used			
10 cm	<10	<10	<10	<10				
30 cm	<10	<10	<10	<10				

3.a2 Old end cover, shutter closed

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	<10	<10	<10	<10				
10 cm	<10	<10	<10	<10				
30 cm	<10	<10	<10	<10				

3.b1 New end cover, shutter open

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	<10	<10	<10	<10	<10	<10	<10	<10
10 cm	<10	<10	<10	<10	<10	<10	<10	<10
30 cm	<10	<10	<10	<10	<10	<10	<10	<10

3.b2 New end cover, shutter closed

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	<10	<10	<10	<10	<10	<10	<10	<10
10 cm	<10	<10	<10	<10	<10	<10	<10	<10
30 cm	<10	<10	<10	<10	<10	<10	<10	<10

3.c1 Small sample cover, shutter open

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	<10	<10	<10	<10	<10	<10	<10	<10
10 cm	<10	<10	<10	<10	<10	<10	<10	<10
30 cm	<10	<10	<10	<10	<10	<10	<10	<10

3.c2 Small sample cover, shutter closed

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	<10	<10	<10	<10	<10	<10	<10	<10
10 cm	<10	<10	<10	<10	<10	<10	<10	<10
30 cm	<10	<10	<10	<10	<10	<10	<10	<10

Am241 source

1. No sample, no covers

1.1 Shutter open:

Original design

Distance	A	B	C	D	E
5 cm	2000	5000	30 µSv/h	NA	5000
10 cm	400	1500	5000	NA	600
30 cm	150	250	750	20 µSv/h	100

Modified design

Distance	A	B	C	D	E
5 cm	550	4000	30 µSv/h	NA	5000
10 cm	250	1300	3000	NA	300
30 cm	150	200	450	20 µSv/h	70

1.2 Shutter closed:

Original design

Distance	A	B	C	D	E
5 cm	40	250	3000	180	30
10 cm	20	50	1700	80	10
30 cm	10	10	300	25	10

Modified design

Distance	A	B	C	D	E
5 cm	25	45	500	100	10
10 cm	10	15	250	50	10
30 cm	<10	10	40	15	<10

2. Leaded glass sample

2.1 Shutter open:

	Original design			Modified design		
Distance	A	B	C	A	B	C
5 cm	2500	400	150	1200	300	200
10 cm	800	150	100	350	120	100
30 cm	150	30	225	90	30	30

2.2 Shutter closed:

	Original design			Modified design		
Distance	A	B	C	A	B	C
5 cm	15	15	30	15	10	25
10 cm	10	10	10	10	10	15
30 cm	<10	<10	<10	<10	<10	<10

3.a1 Old end cover, shutter open

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	2000	50	500	250	Cover can not be used			
10 cm	650	25	250	100				
30 cm	100	10	50	30				

3.a2 Old end cover, shutter closed

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	20	15	<10	30				
10 cm	15	10	<10	15				
30 cm	10	<10	<10	<10				

3.b1 New end cover, shutter open

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	2500	30	1000	400	1300	20	300	200
10 cm	800	20	500	150	400	15	170	120
30 cm	100	10	100	40	60	10	40	25

3.b2 New end cover, shutter closed

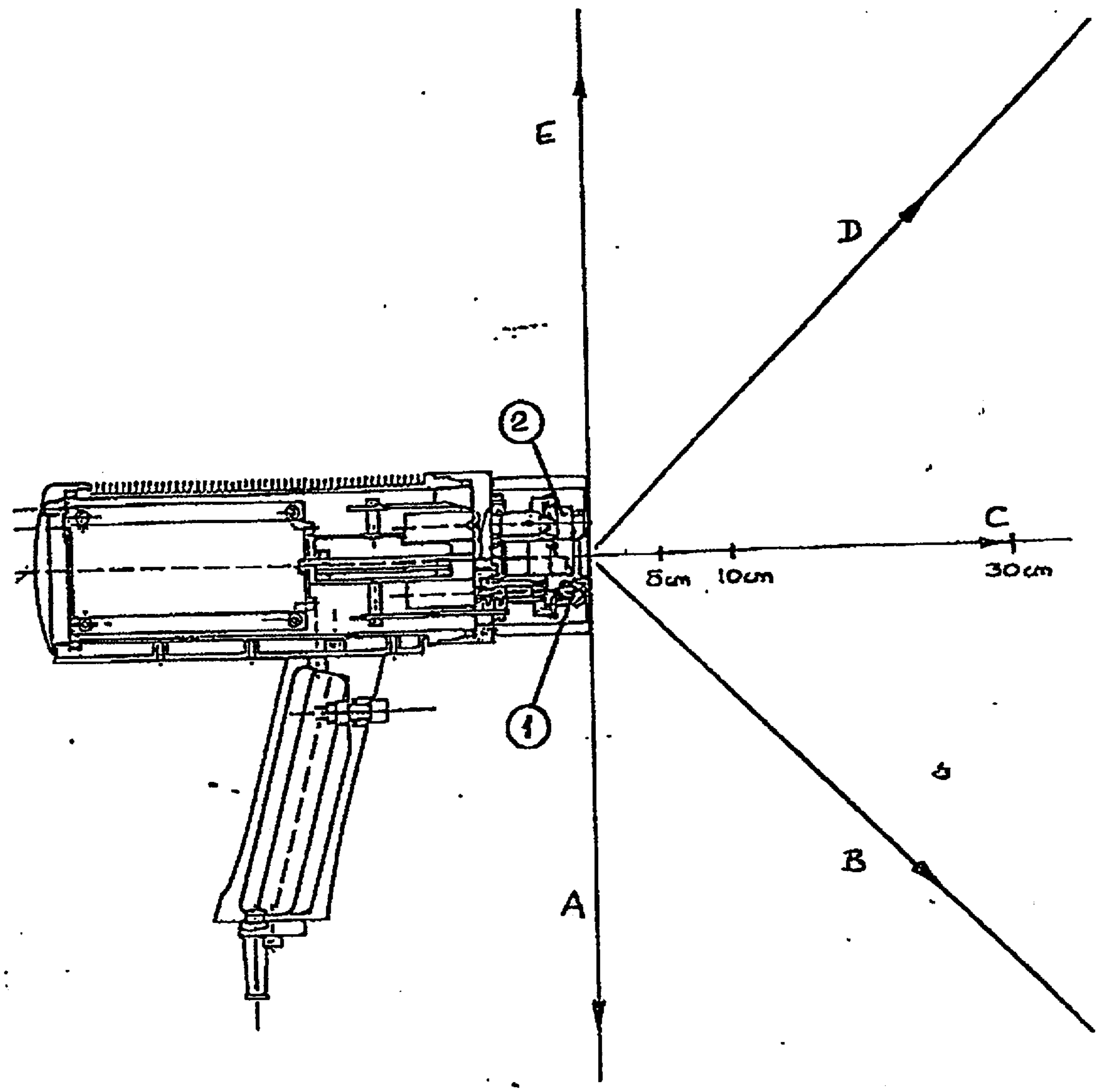
Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	20	15	10	40	15	15	10	30
10 cm	10	10	10	15	10	10	<10	10
30 cm	<10	<10	<10	10	<10	<10	<10	<10

3.c1 Small sample cover, shutter open

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	2000	25	1000	600	1300	20	600	220
10 cm	600	20	500	170	400	15	250	80
30 cm	100	10	100	25	60	10	60	10

3.c2 Small sample cover, shutter closed

Distance	Original design A	B	C	D	Modified design A	B	C	D
5 cm	20	10	10	40	15	10	10	30
10 cm	<10	<10	<10	<10	<10	<10	<10	<10
30 cm	10	<10	<10	15	10	<10	<10	<10



① → Cd-109 OR Am-241 OR Fe-55
② → EMPTY

FIGURE 1 LOCATION OF DOSE RATE MEASUREMENT POINTS

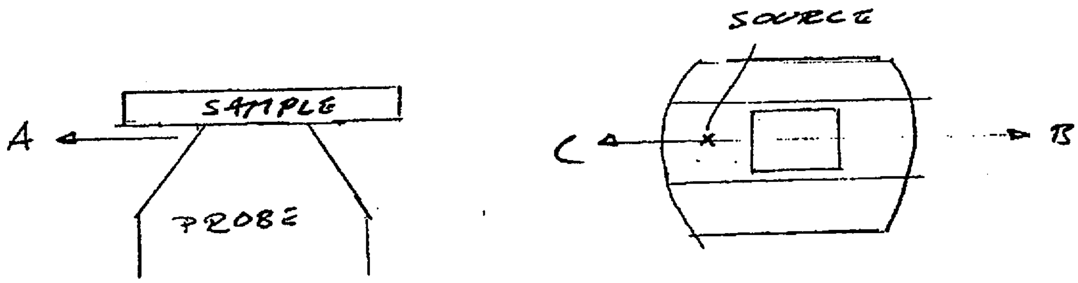


FIGURE 2

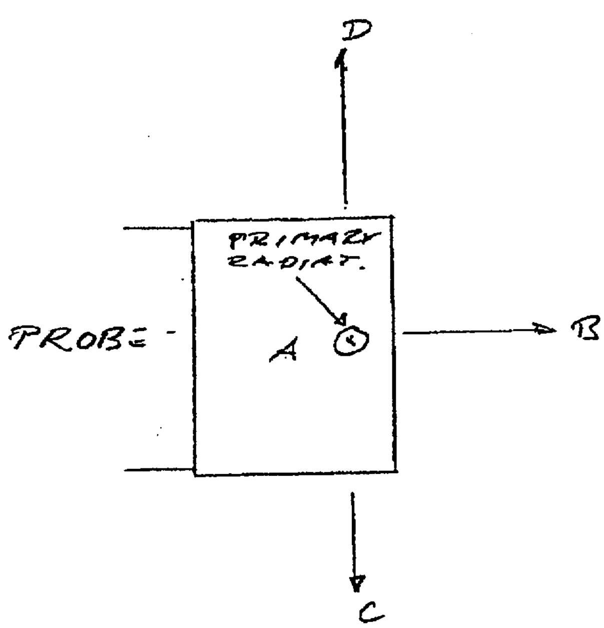


FIGURE 3

SFS CERTIFIED QUALITY SYSTEM

COPY

CERTIFICATE

No. 1017-02

(First issue 1993-12-07)

The Finnish Standards Association SFS has granted this certificate as proof that the quality system of

Metorex International Oy
Espoo

complies with the requirements of the standard

SFS-EN ISO 9001

Certification covers

Development, production and marketing of material analyzers for field, workshop and in-process applications. Development, production and marketing of detection equipment for security applications.

Certification is based on the following audit report

SFS96079

The certificate is awarded on the condition that the company's quality system remains in constant compliance with the afore-mentioned standard and the General Regulations ABC 200.

Helsinki 1996-02-19

Kari Kaartama, Managing Director

FINAS AKKREDITOINTI SUOMI FINLAND
S002

Finnish Standards Association SFS
Maistraatinportti 2,FIN-00240 Helsinki

EQNet MEMBER

SFS-SERTIFIOINTI OY
SFS-CERTIFICATION

VAKUUTUS
CONFIRMATION

1999-09-01

TÄMÄ TODISTAA, että laatujärjestelmäsertifikaatti

THIS IS TO CONFIRM that the Quality System Certificate

Nro/No 1017-02
1996-02-19
(Alkuperäinen myönnetty 1993-12-07)
(First issue 1993-12-07)

joka on myönnetty yritykselle:

granted to:

Metorex International Oy
Espoo

on voimassa.

is valid.

Sertifiointiprosessiin kuuluu kaksi seuranta-arviointia vuodessa. Yllämainitussa yrityksessä viimeisin seuranta-arviointi on tehty

The certification procedure includes follow-up audits twice a year. In the company above the latest follow-up audit was carried out

1999-08-18.

Se osoitti, että laatujärjestelmä vastaa standardin SFS-EN ISO 9001 ja yleisten ohjeiden ABC 200 vaatimuksia.

It proved that the quality system complied with the requirements of SFS-EN ISO 9001 and the General Regulations ABC 200.

SFS-SERTIFIOINTI OY

SFS-CERTIFICATION

Eeva Parviainen
johtaja
Director

IQNet
MEMBER