

5/13/87

703-654-7151

Masonite Corporation
P.O. Box 232
Stuart VA 24171

Richard L. Woodruff
U.S.N.R.C. Region 3
101 Marietta Street Suite 2900
Atlanta GA 30325

RECEIVED

'87 JUN -4 AM 11:16

Dear Mr. Woodruff:

WE will be installing at our particleboard facility in Stuart Virginia a new forming line which will include four radioactive density gauges. The state health department in Virginia directed me to you to find out if our equipment will need a regulatory license. I have sent with this letter the informat on I have on these units. Because the density gauges are a part of the forming machine and not sold to us direct by the manufacturer I do not have more information at this time.

With this information can you inform me on any licenses required, and if so, send the necessary forms to this address. Any further information you have on this subject would be appreciated.

Sincerely,

Bill Cummins

William G. Cummins
Technical Director

BB01040348 870708
REG2 LIC30
45-24922-01 PDR

Log	June-2-87
Remitter	
Check No.	3807923
Amount	\$230
Fee Category	3P
Type of Fee	APP
Date Check	6/10/87
Date Completed	6/10/87
By:	<i>[Signature]</i>

A)

DOCUMENTS FOR THE TRAVERSING DENSITY (LUGE

KENNZEICHNUNG

18,5 GBq

Strahler 500mCi für traversierende
Flächengewichtsmeßanlage

DESIGNATION

18.5 GBq

Radioactive source 500 mCi for traversing
Weight Per Unit Area Gauge

Fagus-GreCon GmbH & Co. KG
Hannoversche Straße 58
3220 Alfeld

Hauptabteilung
Kerntechnik und Strahlenschutz:
Besucheradresse:
Hannover-Kirchröde, Bunteweg 2
Telefon (0511) 5102-1
Telex 9 230 176
Telefax (0511) 5102-200

Richten Sie bitte Zuschriften nur an den
TUV Hannover und nicht an Einzelpersonen

Ihr Zeichen	Ihre Nachricht vom	Unser Zeichen	Akten-Nr.	Tel.-Durchwahl	Datum
		KTSS-JB/Sche		215/209	25.02.1986

Strahlerhalter mit pneumatischer Abdeckung

Sehr geehrte Damen und Herren,

Sie baten uns um eine gutachterliche Stellungnahme zum Einsatz des Strahlerhalters nach Zeichnung Nr. C BW01.2.03.

Zur Prüfung erhielten wir von Ihnen die o. g. Zeichnung sowie ein Muster des Strahlerhalters einschließlich eines Am 241-Strahlers mit einer Aktivität von 22,2 GBq (600 mCi).

Der Strahlerhalter soll als Bestandteil einer Flächengewichtsmeßanlage bei der Herstellung und Verarbeitung von Spanplatten eingesetzt werden.

Wir haben das uns eingereichte Muster und die Unterlagen in bezug auf den Strahlenschutz bei geschlossenem Verschuß geprüft. Die Eignung zum vorgesehenen Zweck haben wir nicht geprüft.

Das Gehäuse besteht seitlich aus 5 mm und im Bodenbereich aus 10 mm starkem lackiertem Stahlblech (St 37 K). Die Strahlenaustrittsöffnung in dem aus 5 mm vernickeltem Stahlblech (St 37 K) bestehenden Deckel ist durch eine 0,03 mm dicke Titanfolie verschlossen. Das radioaktive Präparat, hier Americium 241 bis 22,2 GBq, ist als umschlossener radioaktiver Stoff im Sinne der Strahlenschutzverordnung in einem oben offenen Hohlzylinder aus Hartblei eingesetzt. Der Zylinder ist von unten in das Strahlerhaltegehäuse eingeschraubt. Zwischen der Ti-Folie des Gehäuses und dem Strahler befindet sich in Ruhestellung eine Verschußscheibe aus 3 mm dickem Wolfram.

Technischer Überwachungs-Verein Hannover e.V.

- 2 -

Deckel und Hohlzylinder haben je eine Dichtung aus PVC, die Gehäusedurchführungen für Kabel- und Steuerluftanschluß sind ebenfalls abgedichtet. Die Abluft des pneumatischen Verschlußantriebs wird nach außen geführt. Das Strahlerhaltergehäuse ist somit nach außen vollständig abgedichtet. Eine detaillierte Darstellung ist der Zeichnung Nr. C BW01.2.03 zu entnehmen.

Die Dosisleistungen an der Oberfläche des Gehäuses betragen in Ruhestellung (Verschluß geschlossen) im seitlichen Bereich max. $2 \mu\text{Sv/h}$ ($0,2 \text{ mrem/h}$), oberhalb max. $10 \mu\text{Sv/h}$ (1 mrem/h) und unterhalb max $2 \mu\text{Sv/h}$ ($0,2 \text{ mrem/h}$). In 10 mm Abstand von der Oberfläche des Gehäuses wurden oberhalb der Titanfolie noch $7 \mu\text{Sv/h}$ ($0,7 \text{ mrem/h}$) gemessen. Die Messungen wurden mit einem geeichten Dosisleistungsmeßgerät TOL/E, Fabrik-Nr. 1955, der Firma Berthold, durchgeführt. Dieses Gerät arbeitet mit einer luftäquivalenten Ionisationskammer mit variabler Gasverstärkung im Energiebereich von 10 keV bis 1,3 MeV praktisch energieunabhängig.

Die ermittelten Dosisleistungswerte am Strahlerhaltergehäuse liegen bei geschlossener Strahlenaustrittsöffnung unterhalb des Grenzwertes für den Kontrollbereich nach der Strahlenschutzverordnung (StrlSchV). Weitere Abschirmmaßnahmen sind nicht erforderlich.

Für die Messungen der Dosisleistung in Strahlstellung (Verschluß geöffnet) empfiehlt sich eine Messung beim jeweiligen Betreiber der Anlagen, da Meßgut und Bauteile der Maschinen als Streukörper wirken und die Meßergebnisse beeinflussen. Strahlenschutzmessungen an einer Maschine, die mit einer Flächengewichtsmeßanlage mit 22,2 GBq Am 241 ausgerüstet war, zeigten, daß hier bei Betrieb der Anlage an den zugänglichen Aufenthaltsplätzen Dosisleistungen bis zu $2,5 \mu\text{Sv/h}$ ($0,25 \text{ mrem/h}$) auftraten.

Durch den Einbau des Hohlzylinders in das Stahlgehäuse ist der Strahler ausreichend gegen Beschädigung durch die übliche betriebliche Beanspruchung geschützt. Wir gehen davon aus, daß die Meßeinrichtung keinen chemisch aggressiven Medien und auch keinen außergewöhnlichen Temperaturen ausgesetzt ist. Undichtheiten am Strahler werden bei den für Am 241 vorgeschriebenen wiederkehrenden Dichtheitsprüfungen festgestellt.

Technischer Überwachungs-Verein Hannover e.V.

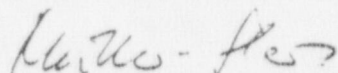
- 3 -

Die Verschlußstellung wird an einem Sichtfenster am Strahlerhaltergehäuse angezeigt. Eine rote Markierung zeigt den geöffneten Strahlenausritt und eine grüne Marke den Ruhezustand an. Ergänzend hierzu sollte auch noch durch deutlich erkennbare Warneinrichtungen (z. B. Warnlampen) die Verschlußstellung an der Produktionsmaschine angezeigt werden.

Gegen den uns vorgestellten Strahlerhalter mit pneumatischer Abdeckung bestehen unsererseits keine Bedenken. Die ermittelten Dosisleistungen sind ausreichend niedrig und die vorgenommenen Strahlenschutzmaßnahmen entsprechen den geltenden Vorschriften.

Mit freundlichen Grüßen

Der Leiter der
Zentralabteilung Strahlenschutz
und Entsorgungstechnik

i. A. 
(Dr. Müller-Glewe)

Translation
(Br) July 18, 1986

Letter from TOV Hannover e.V.
Am TOV 1
3000 Hannover 1

Emitter support with pneumatic cover

Dear Sirs,

You asked us for an expert opinion concerning the use of the emitter support according to drawing no. C BW01.2.03.

For the examination you submitted to us the above mentioned drawing as well as a sample of the emitter support including an Am 241 emitter having an activity of 22.2 GBq (600 mCi).

The emitter support shall be used as an component of a weight per area measuring unit being applied to particle board production.

We have examined the model and the documents with regard to radiation protection with the cover being closed. We did not examine the suitability regarding the intended purpose.

The casing consists of lacquered sheet steel (St 37 K) having a thickness of 5 mm at the side and 10 mm at the bottom. The radiation aperture - located in the cover out of 5 mm nickel-faced sheet steel (St 37 K) - is sealed by a titanium foil of 0.03 mm thickness. The radioactive preparation, in this case Americium 241 up to 22.2 GBq - as sealed source as defined by the regulations for radiation protection - is put in a hollow cylinder open at the top out of drop lead. The cylinder is screwed from below into the emitter support casing. Between the titanium foil of the casing and the emitter there is a locking disk made out of 3 mm wolfram at rest.

Cover and hollow cylinder both have a seal out of PVC, the the casing ducts for connection of cables and compressed-air supply are sealed as well. The outgoing air of the pneumatic locking drive is lead to the outside. The emitter casing is thus being entirely sealed to the outside. A detailed outline is shown in drawing no. C BW01.2.03.

The dose rates on the casing's surface are in rest position (cover closed) of max. 2 $\mu\text{Sv/h}$ (0.2 mrem/h) at the side, on top max. 10 $\mu\text{Sv/h}$ (1 mrem/h) and below max. 2 $\mu\text{Sv/h}$ (0.2 mrem/h). At 10 mm distance from the casing's surface, 7 $\mu\text{Sv/h}$ (0.7 mrem/h) were measured above the titanium foil. The measurements have been executed by means of a calibrated dose rate measuring device TOL/E, make-no. 1955, of the Berthold company. In an energy range of 10 keV up to 1.3 MeV, this device works with an air equivalent ionization chamber with variable gas amplification virtually independently.

With the radiation aperture being closed, the dose rate values measured at the emitter support casing are below the limit value for the control area according to regulations of radiation protection (StrlSchV). Further shielding measures are not necessary.

For the measurements of the dose rate in radiation position (cover opened) it is recommended to effect the measurements at the respective works during production because the material to be measured and the machine components may act as dispersion body and thus influence the measuring results. Measurements of radiation protection at a machine that is equipped with a weight per unit area gauge with 22.2 GBq Am 241, have shown that, during operation of the machine, dose rates up to 2.5 $\mu\text{Sv/h}$ (0.25 mrem/h) appeared at places accessible to the personnel.

By installing the hollow cylinder in the steel casing, the emitter is sufficiently protected against damages which may be caused by operation requirements. We take it as basis that the measuring equipment is subject neither to chemically aggressive mediums nor to extraordinary temperatures. Leakages at the emitter can be stated on occasion of periodical tightness tests that are prescribed for Am 241.

The closed position is indicated at a window provided at the emitter support casing. The red marking shows the opened emitter aperture and a green marking shows the rest position. Additionally, the closed position should be indicated by means of adequate warning equipment (such warning lamps).

We do not have any objections concerning the emitter support with pneumatic cover presented to us. The discovered dose rates are sufficiently low. The radiation protection measures effected are in conformity with the valid standards and regulations.

Yours sincerely,

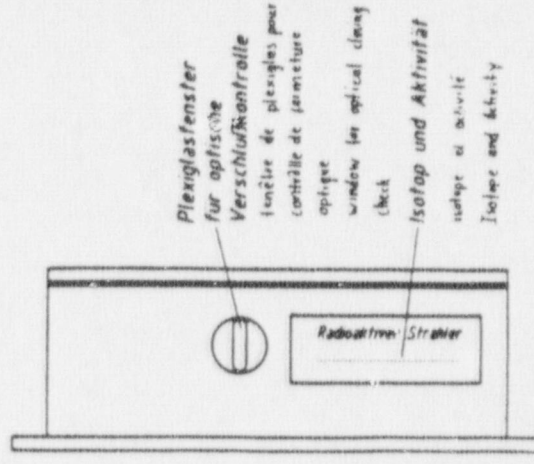
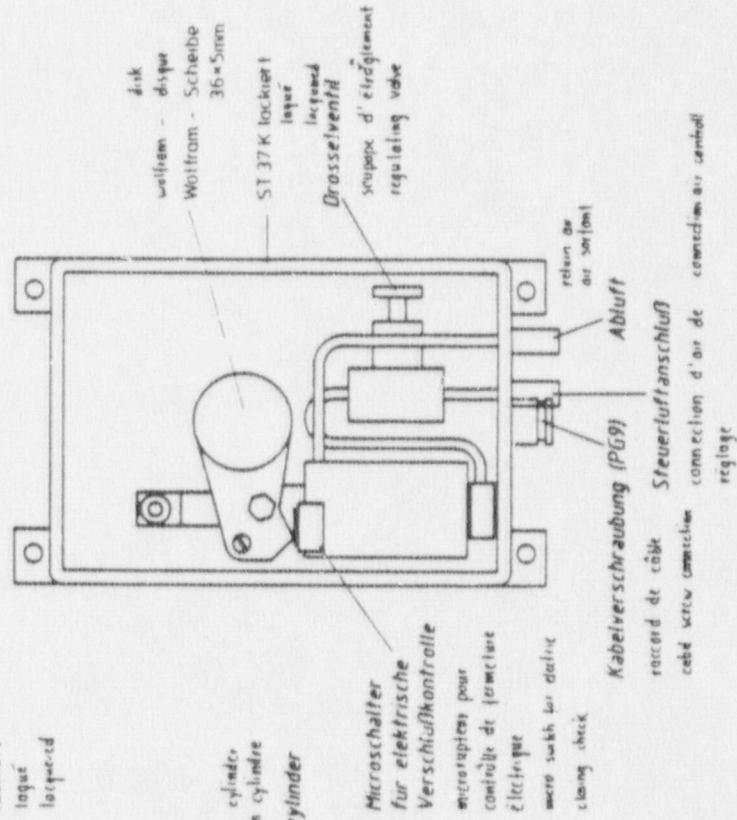
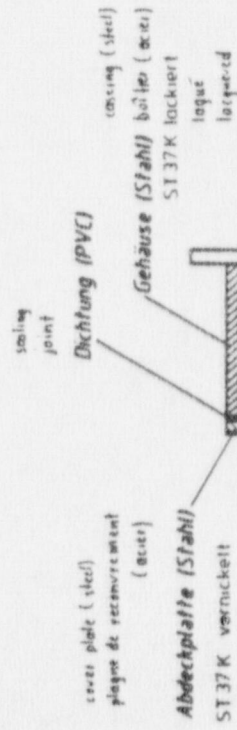
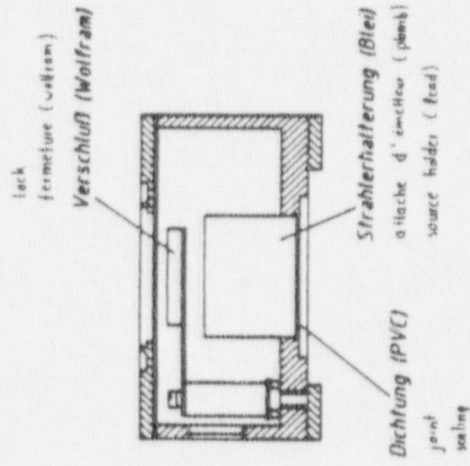
Head of Central Department
Radiation Protection and Waste Disposal

Dr. Müller-Glewe

correspond to the current prescriptions.

1 2 3 4 5 6 7 8 9 10 11 12 13

18,5 GBq



GreCon

Strahlerhalter mit pneumatischer
Abdeckung

1986 Datum
211
Name
211
Date

15.01.1986
Name
Kreuzfeld
Date

Anmerkung

Dr

Dr

Dr

Dr

Dr

Dr

Dr

Dr

Dr

Dr

Dr

Dr

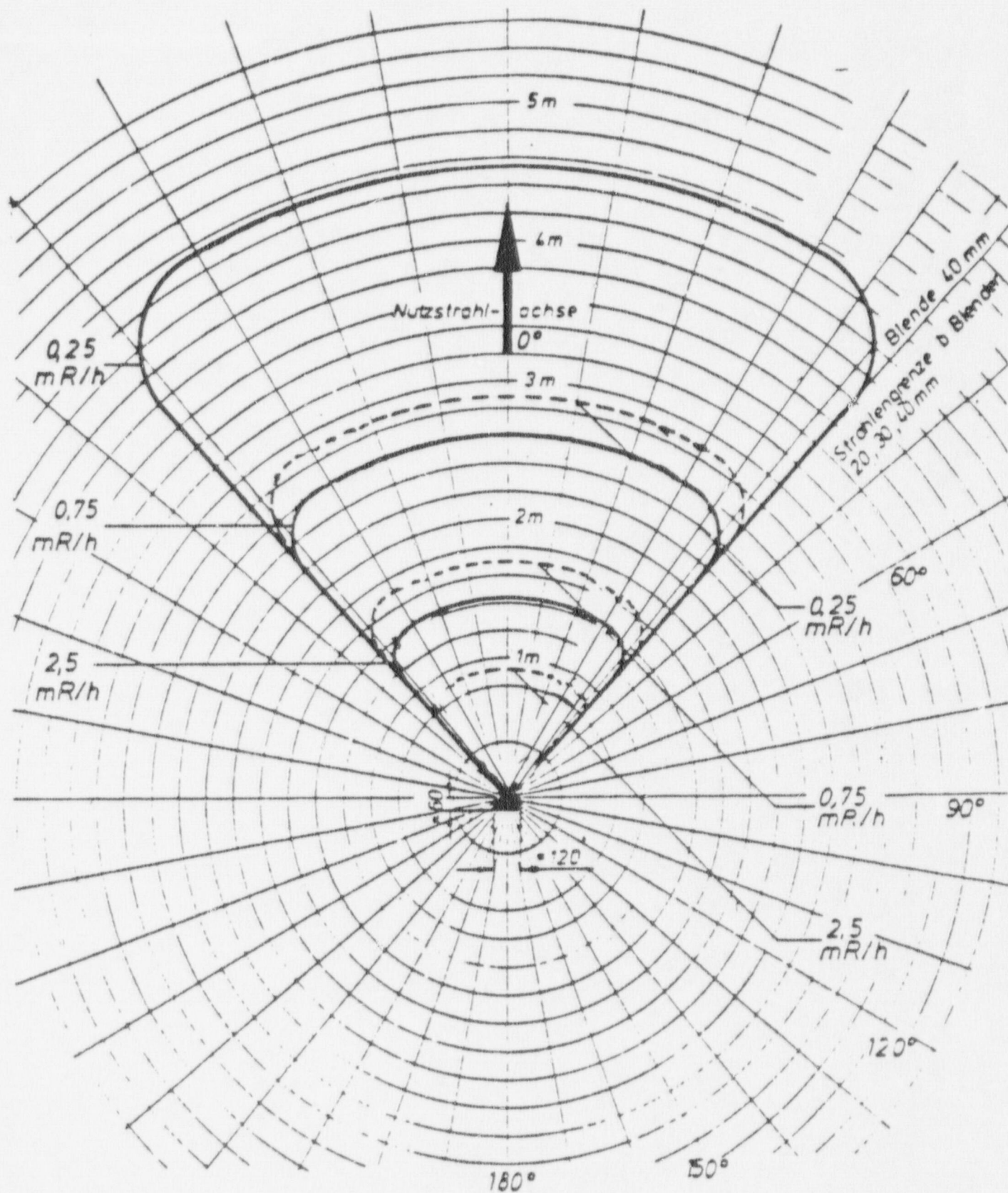
Dr

Dr

AW01703

Umgebungsstrahlung bei BW
Ambient radiation with BW
Rayonnement ambiant de BW

Strahler 200 - 500 mCi
Emitter
Emetteur



Strahler 200 - 500 mCi, Am 241
Emitter
Emetteur

— für 500 mCi, Am 241
for
pour

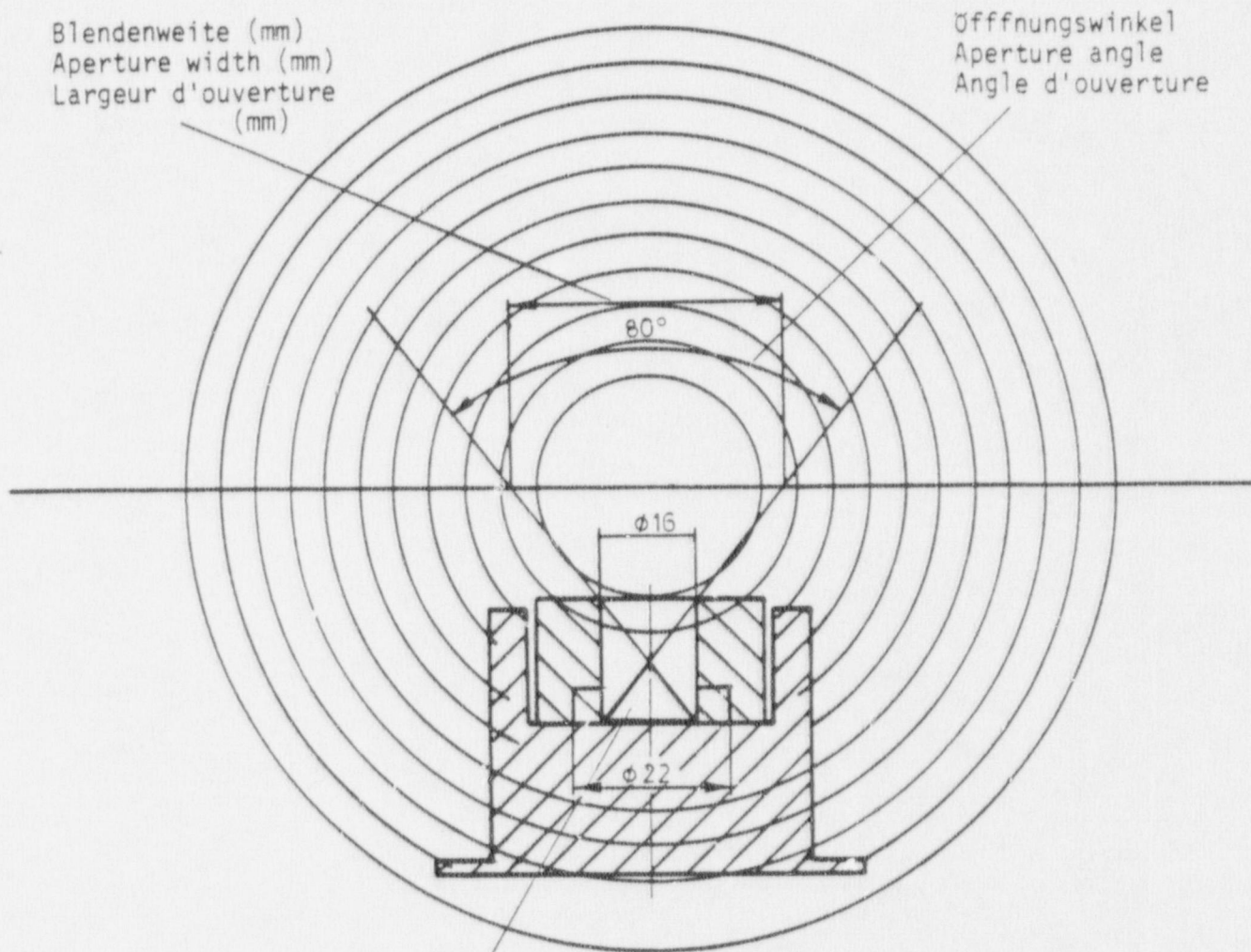
"Nutzstrahl" offen ohne Abstimmung
"effective beam" open without tuning

--- für 200 mCi, Am 241
for

18,5 GBq

Umgebungsstrahlung bei BW
Ambient radiation with BW
Rayonnement ambiant de BW

Strahler 500 mCi/ 18,5 GBq
Emitter
Emetteur —



Strahler Am 241; max. 500 mCi/18,5 GBq
Emitter
Emetteur

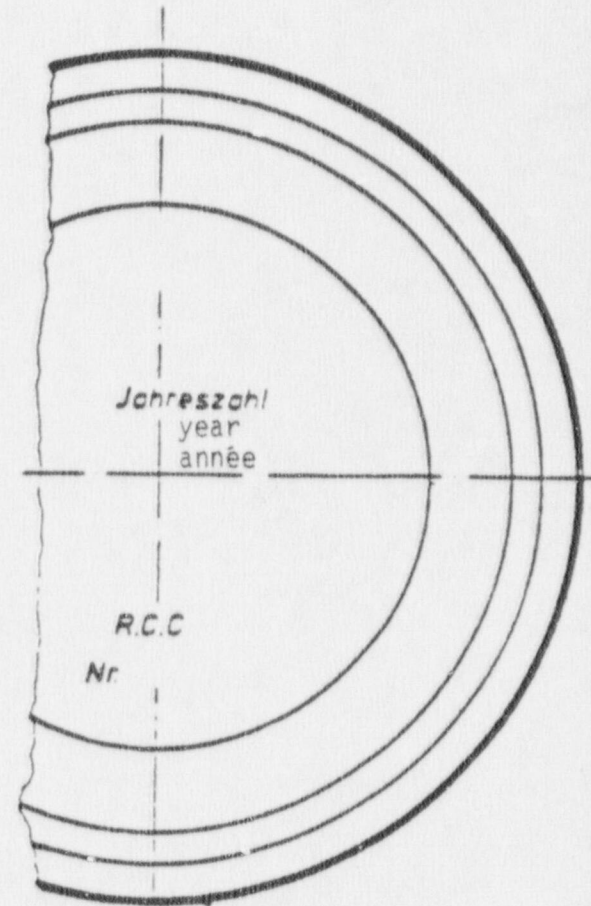
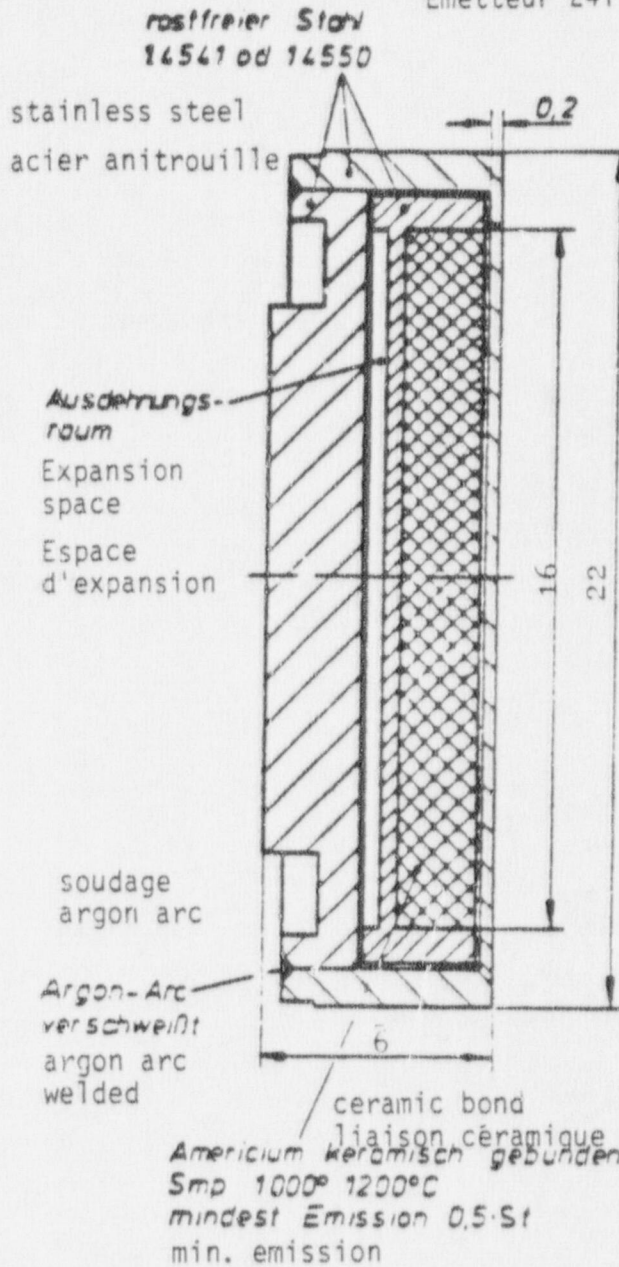
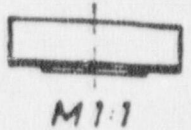
aktive Fläche $\phi 16$ mm
active area
surface active

Kapsel-Typ X.97
Capsule type X.97

Strahler 241 Am

Weight Per Area Measuring System
Emitter 241 Am

Unité pour mesurer le poids dans le plan
Emetteur 241 Am



designation "K"
Kennzeichnung mit "K"
(Keramik) engraved
ceramic engraved / céramique gravée
Hitze geprüft
30 Min. 800°C
heat-proof / résistant à chaleur

Der Strahler entspricht den Bedingungen eines hochsicheren "Strahler in besonderer Form"

The emitter is in conformity with the conditions for a utmost safe "emitter of special design".

L'émetteur répond aux conditions pour un "émetteur d'une façon speciale" extrêmement protégé.

Kapsel X. 97
Capsule X.97

*This is
AMC. 18
Amersham*

Sicherheitstest
Safety performance testing
Test de sécurité

ISO

IAEA

Klassifizierung
classification

besondere Form
special form
forme speciale



Reference..... GB/41/S

Certificate Issue..... 3

Certificate of Approval of Design for Special Form Radioactive Material

Title	
Capsule Assemblies X.97 and X.97/1	
Drawing Nos and Specification Reference	
Assemblies 3RC 11084/S Issue A and 3A 61247 Issue A Components 3RC 11085/S Issue B 3RC 11088/S Issue A 3RC 11086/S Issue B 3A 61248 Issue A 3RC 11087/S Issue B	
RSD/CTR/101 Dated 19 January 1981	
Radioactive Material	Maximum Activity
Americium 241 Strontium 90	2 Ci

THIS IS TO CERTIFY that the Secretary of State for Transport being, for the purposes of the Regulations of the International Atomic Energy Agency, the Competent Authority of Great Britain in respect of inland surface transport and of the United Kingdom of Great Britain and Northern Ireland in respect of sea and air transport and the Department of the Environment for Northern Ireland being the Competent Authority of Northern Ireland in respect of inland surface transport, have approved the above-mentioned Special Form Design. Radioactive material manufactured to the above-mentioned design qualifies as special form radioactive material and as such will meet the requirements of the regulations overleaf.

This Certificate of Approval applies only to the design as set out in the above named drawings and specifications submitted by Amersham International plc

In the event of any alteration to the above mentioned drawings and specifications or in any of the facts stated in the application for approval, this certificate will cease to have effect unless the Competent Authority is notified of the alteration and the Competent Authority confirms the certificate notwithstanding the alteration.

This Certificate Cancels all Previous Issues and is valid until 30 April 1987

Competent Authority
Identification Mark:

GB/41/S



M. J. Lunsack
Transport Radiological Adviser
Department of Transport
2 Marsham Street
London SW1P 3EB

On behalf of the Secretary of State
for Transport and the Department of
the Environment for Northern Ireland.

Regulations and Codes of Practice Governing the Transport of Radioactive Material

INTERNATIONAL

International Atomic Energy Agency (IAEA) Safety Series No 6 Regulations for the Safe Transport of Radioactive Materials 1973 Revised Edition (As amended).

International Maritime Organisation (IMO). International Maritime Dangerous Goods Code – Class 7 Radioactive Substances.

International Civil Aviation Organisation (ICAO). Technical Instructions for the Safe Transport of Dangerous Goods by Air.

ROAD

Great Britain only. The Radioactive Substances (Carriage by Road) (Great Britain) Regulations 1974. SI No 1735: Code of Practice for the Carriage of Radioactive Materials by Road (1982 Impression). The Radioactive Substances (Road Transport Workers) (Great Britain) Regulations 1970. SI No 1827: The Radioactive Substances (Road Transport Workers) (Great Britain) (Amendment) Regulations 1975. SI No 1522.

Northern Ireland only. The Radioactive Substances (Carriage by Road) Regulations (Northern Ireland) 1983. SR 1983 No 344.

Europe only. European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR). Class 7.

RAIL

Great Britain only. British Rail publication BR 22426 (1977 Edition) – Dangerous Goods by Freight Train and by Passenger Train or similar service – List of Dangerous Goods and Conditions of Acceptance – Class 7 Radioactive Substances.

Europe only. International Convention concerning the carriage of goods by rail (CIM). Annex 1, International Regulations concerning the carriage of dangerous goods by rail (RID).

SEA

British ships registered in UK and other ships loading in UK ports or territorial waters only. The Merchant Shipping (Dangerous Goods) Regulations 1981: SI No 1747 and the Report of the Standing Advisory Committee on the Carriage of Dangerous Goods in Ships 1978 (The "Blue Book") Class 7.

PORT

~~UK only~~

AIR

UK only. The Air Navigation Order 1980 SI 1980 No 1965 and International Civil Aviation Organisation (ICAO). Technical Instructions for the Safe Transport of Dangerous Goods by Air.

Notes

1 Any questions relating to this Certificate should be addressed to the Transport Radiological Adviser, Department of Transport 2 Marsham Street, London SW1P 3EB
Telephone 01-212 7247
Telex 22221 Answer back DOE MAR G

2 This certificate does not relieve the consignor from compliance with any requirement of this or any other country through or into which any package containing the Special Form Radioactive Material specified overleaf may be transported.



The Radiochemical Centre

Amersham

CERTIFICATE OF RADIOACTIVE SOURCE INTEGRITY

QCS 158
Issue 4

Title : Low Energy Photon disc source - Assembly X97/0
 Assembly drawing : 3RC 11084/S
 Nuclide : Americium 241 (^{241}Am)
 Radiotoxicity group : A
 Maximum activity : 2Ci (74 GBq)

CLASSIFICATION : BSI/ISO C64444

RECOMMENDED WORKING LIFE : 15 years

Test sources : 200mCi ^{241}Am in source number 1906 } Assembled to drawing
 200mCi ^{241}Am in source number 1907 } 3RC 11084/S Issue A
 5µCi ^{137}Cs in source number Z3825 }
 5µCi ^{137}Cs in source number Z3826 }

Tests carried out in accordance with Recommendation of : BS.5288 : 1976
 ISO.2919 : 1980 (E)
 IAEA Safety Series No.6 : 1973
 ANSI.N542: 1977

Leak test method	TEMPERATURE	PRESSURE	IMPACT	VIBRATION	PUNCTURE	Units
	6	4	4	4	4	
Immersion	Pass	Pass	Pass	Pass	Pass	nCi
	0.03	0.04	0.04	0.05	0.20	
	0.03	0.04	0.04	0.04	0.08	
Re-immersion			0.03 0.03			nCi

(X) As specified in IAEA Safety Series No 6 : 1973 para 737

Quality Control Dept.

13 March 1981

Date

Radiation Sources Department

The Radiochemical
Centre Ltdregistered office:
White Lion Roadtelephone:
Little Chalfontcables:
Activitytelex:
83141

B)

DOCUMENTS FOR THE DENSITY GAUGE OF THE FORMER

- 2) The opening angles also include the penumbra-plates of the edges of radiation. Dispersing radiations do not occur outside of the opening angle which would be worth to be protected.
- Outside of the area of the opening angle the dosing capacity is always smaller than 0,75 mrem/h under all operating conditions.
- 3) In case of "Radiation Closed" The dosing capacity of the gamma-radiation is smaller than 0,75 mrem/h everywhere at the surface of the radiator holder, i.e. at the surface 10 cm distance from same until middle of the detector.
- 4) Shielding: The direct gamma-radiation of the nuclide Am-241 (60 and 30 kev) is being weakened to 1/10 of its intensity through

0,5 mm	lead
2,5 - 3 mm	steel or brass
30 mm	concrete, glass, aluminium

The double, triplicate of these layers weakens to 1/100, 1/1000 etc..

- 5) Widths of the Measuring Gaps: The measuring chamber shields to less than 0,75 mR/h in the radiation directions shaded by same, unless their material thicknesses in these directions amount to at least 5 mm of steel or brass. For shielding of the completely usefull radiation to less than 0,75 mR/h outside the measuring gap (no monitoring area) the following values have to be observed:

if		then	
max. width of diaphragm	resp.	largest opening angle	max. width of the measuring gap
20 mm		60°	135 mm
30 mm		72°	100 mm
40 mm		82°	75 mm

When exceeding the width of the measuring gap without additional shielding measure, the values as per item 1 of the explanations are applicable in small marginal areas of the useful radiation cone.

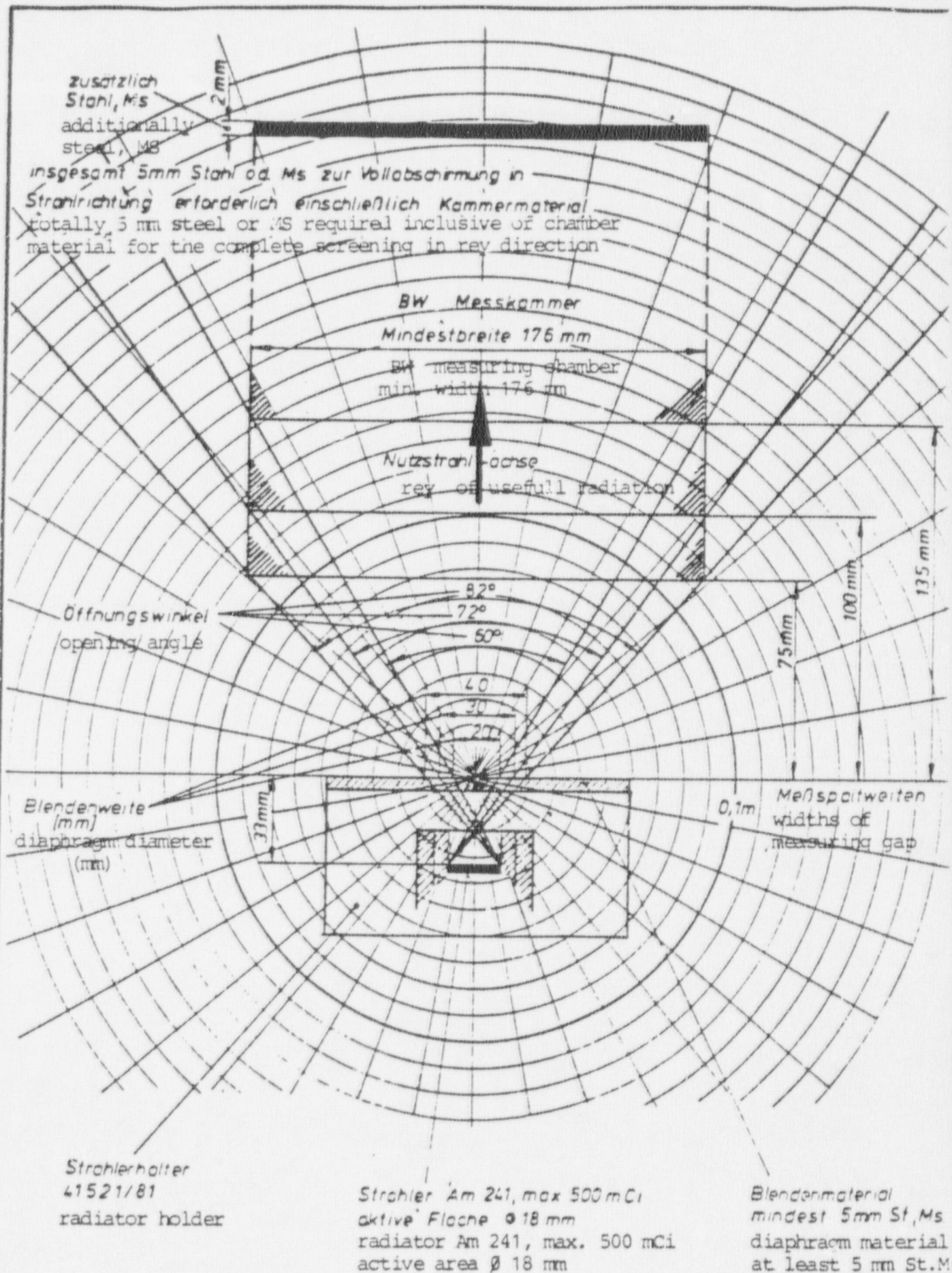
In case of additional suitable measures of shielding a project drawing can bear the note:

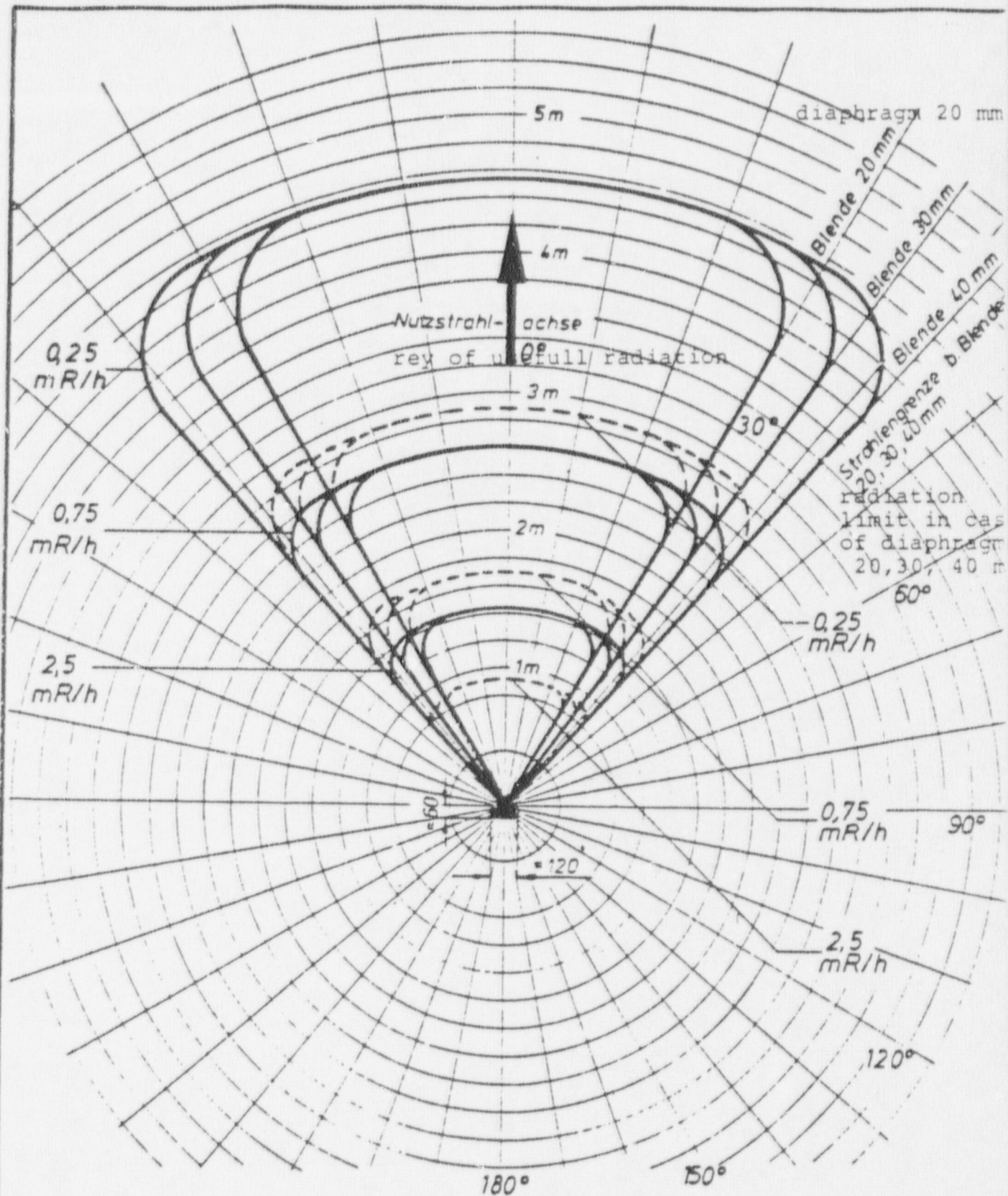
"the conditions for complete shielding in accordance with U-Sheet 41 521/81 U Am 2 are maintained."

6.)

The radition of the nuclide Am-241 generates a weak radiation of rapid neutrons in the radiator proper. The equivalent dosing capacity amounts to (active material, ceramic mass):

Distance from Radiator	Equivalent Dosing Capacity
9,5 cm	0,75 mrem/h
16,8 cm	0,25 mrem/h
1 m	0,007 mrem/h





Strahlerhalter 41521/81

200 bis 500 mCi, Am 241

radiator holder 41521/81

200 up to 500 mCi, Am 241

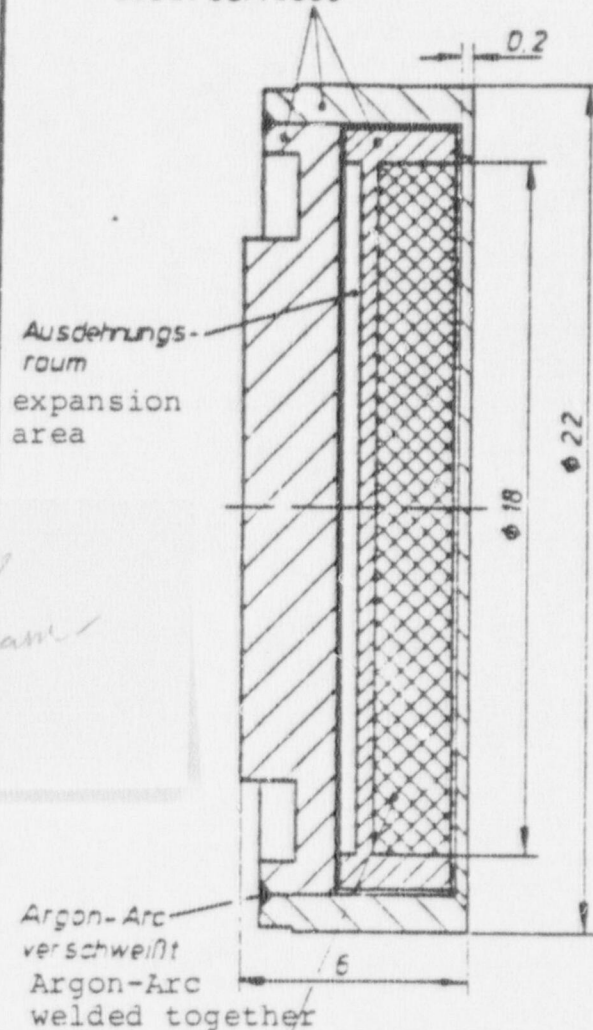
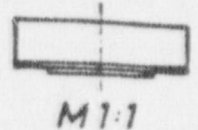
"Nutzstrahl" offen ohne BW Meßkammer

"usefull ray" open without BW measuring chamber

— für 500 mCi, Am 241

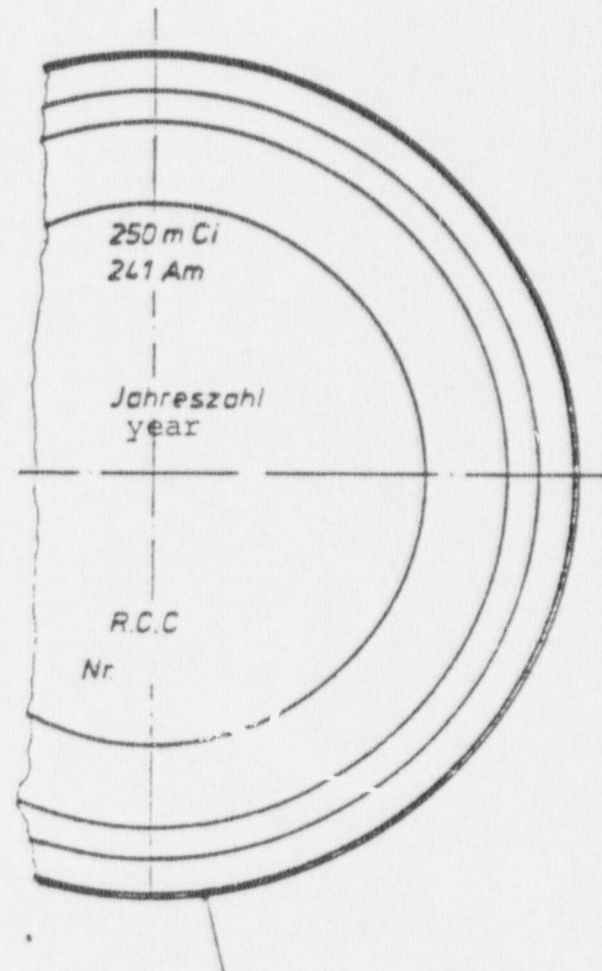
--- für 200 mCi, Am 241

rostfreier Stahl stainless steel
14541 od. 14550



AMC. 18
Amersham

Americium keramisch gebunden
Smp 1000° 1200°C
mindest Emission 0,5 St
Americium ceramically sintered
Smp 1000° 1200°C
min. emission 0,5 St.



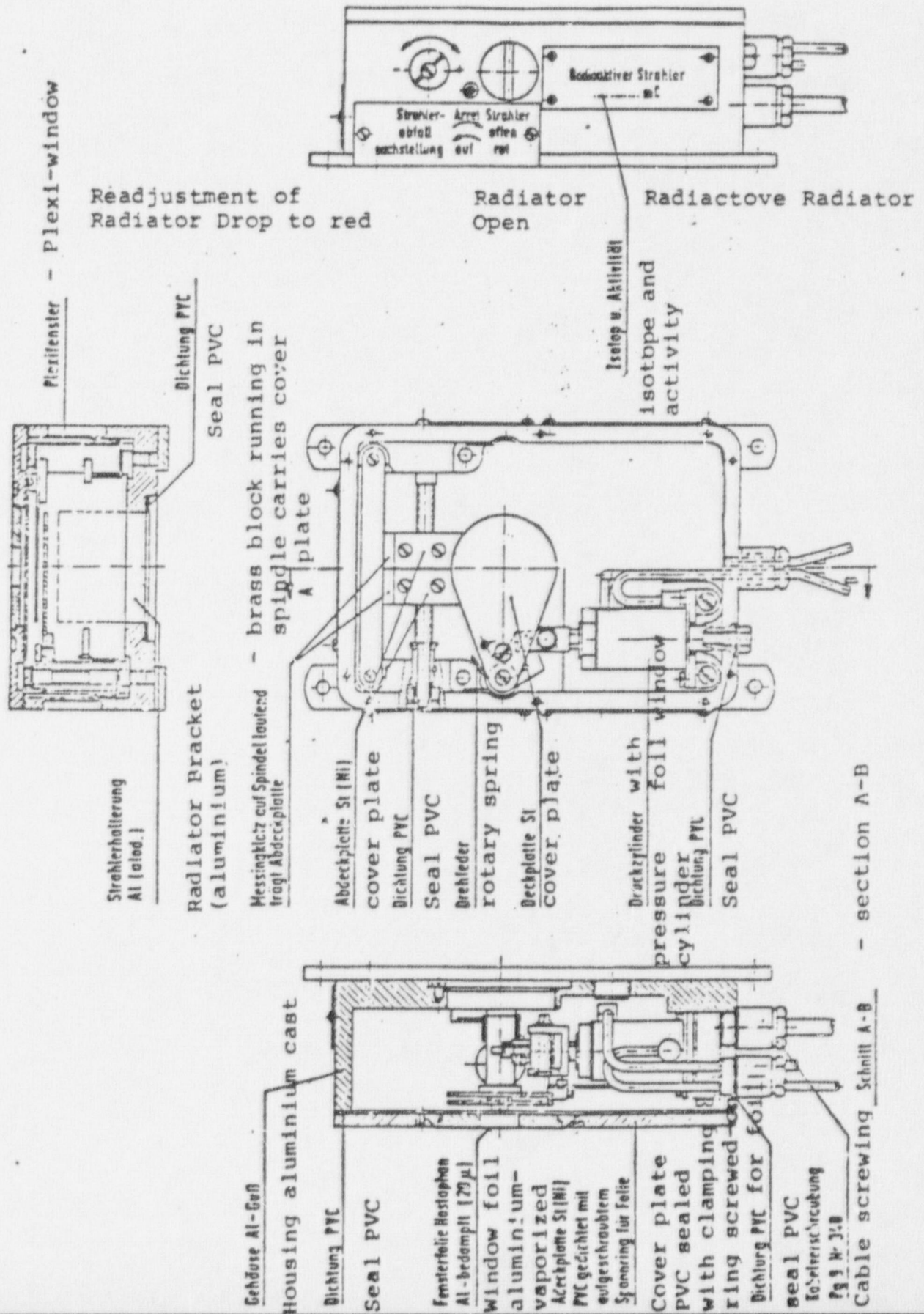
Kennzeichnung mit "K"
(Keramik) engriert
mark with "k"
(ceramics) Hitze geprüft
engraved 30 Min. 800°C
heat tested
30 min. 800°C

Attachement to Drawing Radiator 241 Am

- 1) The radiator corresponds with the conditions of a highly-safe "radiator in special shape" according to the Railway Traffic Regulations Attachement C, Class IV b, Rn 450, Bem. 4 and Rn 454 (3) or internationally of the CIM, attachment I (RID), same an. It thus also is "radioactive material in special form" according to JAEA, Vienna, Safety Series No. 6/1967 A 2.15 (b). Licence 6 B/SPC/54 Jss 1 of the Ministry of Transport/London - UK dated Nov. 26, 1969 belongs hereto.
- 2) Insert and body of ceramics must not be movable in the mounting.
- 3) Vide: Protection against Radiation - Licence 49830/0016 - $\frac{11}{13}$ St
Examination Prescription: 49930/0016 - $\frac{11}{13}$ Prü
St = 400 mCi effective, accordingly standard radiator 1962.

Weight: radiator 15 g,

Radiator Holder with Pneumatic Cover Drawing No. 41521/70/80/81/ of Messrs. Frieseke & Höpfner



- section A-B

Cable screwing Schnitt A-B

Physikalisch-Technische Bundesanstalt
33 Braunschweig, February 7, 1971
Bundesallee 100

Abteilung 6
(Federal Physico-Technical Institute)
Department 6

Messrs.
Priesske & Hoepfner GmbH
P.O.B. 72

852 Erlangen-Bruck

Subject: Examination of the Construction of Radiators and Radiator Holders with regard to § 2 (2) and § 44 of the First Decree for the Protection against Radiation (1. SSVO)

Re: Your Letter Nau/M dated November 30, 1972 with Construction Drawings Submitted

The following comments refers only to the safety of the structure of radiation sources and radiator holders against leakage of the radiation sources, the shielding effect of the radiator holders has not been considered in this respect.

After examination of the construction drawings submitted and on the basis of the present experience gained with the radiation sources in question here or similar structures The Federal Physico-Technical Institute considers the construction of the radiator listed in table I to be sufficiently safe, so that they are to be regarded as enclosed radioactive substances in the sense of § 2 (3) of the First SSVO, provided that the following conditions will be met with:

1. The structure of the radiators must in its essential features correspond with the construction drawings submitted and deposited with the Physico-Technical Institute. In this case the physical and chemical constitution of the radioactive substance, the material and wall thickness of the enclosure as well as the kind of joining (soldering,

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welding etc.) have to be regarded as the essential characteristics. In case of ^{90}Sr -compounds the radioactive substance can also be present in form of ^{90}Sr -silver foil (ag-matrix) with the same kind of encapsulating.

The activity for each radiator must not exceed the maximum value indicated in column 4 of the table I for each type.

2. Prior to being incorporated into the measuring or gauging installations the radiators have to be checked for leakage and sufficient decontamination of the enclosure (inspection check). In this case the activity of the releasable radioactive substance must not exceed the max. permissible limit (0,01 μCi according to the regulations presently in effect). ^{85}Kr -radiators are considered to be sufficiently leakproof, if the emission of activity does not exceed 1 μCi per hour. The user has to be given a certificate on this inspection or acceptance check, from which the engraving of the radiator, the examination procedure as well as time and result can be seen. This examination should be carried out within 6 months prior to the delivery of the radiation source to the user.

3. The radiators have to be rigidly installed in the measuring or gauging installations, their radiators of which correspond in their construction features essential for the protection of the radiators (e.g. kind of sealing, availability of protective foils or protective covers on the outlet opening of the radiator) with the drawings deposited with the Federal Institute and listed in table II. In case new drawing numbers are being introduced only because of changes of the electrical connections for measurements, of the drive for measuring movements and the like, then the new drawing numbers are equal to those listed in the table II, provided that the construction characteristics

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serving to protect the radiator are identical.

4. Measuring installations must only be used under environmental conditions in which the protective foils or other kinds of sealing of the holders attached or provided - for the protection against the penetration of vapours, liquids or dust - at the outlet openings of the radiators are not being affected and the density of the enclosure of the radiators remains maintained.

5. Leakage tests through an officially authorized measuring section in accordance with § 44 of the First SSVO should be carried out in the intervals indicated in the table I, 5th column. These intervals can be doubled, if for this purpose leakage tests are being carried out by specialized personnel of the manufacturer within the framework of a customers service contract within half the time intervals of the table I, and a test certificate is being prepared for presentation at the Supervising Authority. In case the radiator holder has to be opened for the elimination of interruptions or defects, then prior to carrying out the repair a leakage test has to be effected by means of taking wiping samples. In addition the user of the installations has to immediately initiate leakage tests, if the suspicion for a leakage exists. In case of ⁸⁵Kr radiators the suspicion for a leakage exists e.g. then, if the radiation decreases by more than 1% every day. All leakages ascertained have to be announced to the Supervising Authority.

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6. The measuring or gauging installations must be used with undamaged protective foils on the outlet openings of the radiators of the radiator holders only. After each extraordinary load, however, at least every 6 months the health physicist competent for the user of these installations has to check these foils for damages (visual check). Defective foils have to be replaced without any delay.

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Table I

Summary of the Various Types of Radiators

Item No.	Nuclide	Construction No. 49 930/	Maximum Activity	Examination Intervals (§ 44 First SSVO)
1	Cs-137	0001 - $\frac{10}{24}$	20 Ci	up to 3 Ci acceptance or inspection test only above 3 Ci every 3 years
2	"	0001 - 26 +)	50 Ci	3 years
3	Co-60	0002-09	50 mCi	acceptance or inspection test only
4	"	0002 - $\frac{10}{18}$ +)	1 Ci	acceptance or inspection test only
5	"	0002 - $\frac{19}{26}$ +)	20 Ci	acceptance or inspection test only
6	Kr-85	0003 - $\frac{01}{07}$	250 mCi	acceptance or inspection test only
7	Kr-85	0003 - 10	1 Ci	acceptance or inspection test only
8	"	0003 - $\frac{11}{13}$	250 mCi	acceptance or inspection test only
9	"	0003 - $\frac{15}{17}$ - 14	250 mCi	acceptance or inspection test only
10	"	0003 - 18	900 mCi	acceptance or inspection test only
11	Pm-147	0004-06,-07	500 mCi	one year
12	"	0004 - $\frac{08}{10}$	1 Ci	one year
13	Sr-90	0006-01,-02,-07	50 mCi	three years
14	Sr-90	0006-12,-13,-03	50 mCi	three years
15	"	0006 - $\frac{08}{09}$	100 mCi	two years
16	"	0006 - $\frac{14}{18}$ +)	15 Ci	three years
17	TL-204	0007-01,-02	10 mCi	one year
18	Am-241	0016-01,-02,-15 +)	1,2 Ci	up to 1 Ci - three years above 1 Ci - two years
19	"	0016 - 05 +)	500 mCi	three years
20	"	0016 - 10 +)	200 mCi	three years
21	"	0016 - 16 +)	2,5 Ci	two years
22	"	0016 - $\frac{11}{13}$ - $\frac{19}{21}$ +)	1,25 Ci	up to 1 Ci three years above 1 Ci two years

+) Test Certificate as "Radiator in Special Form" (highly safe radiator) is available.

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Table II

Radiator Holder and Assignment of the Radiator Types

Radiator Holder Drawing No.	Type of Radiator Provided (Item No. as per Table I)
41 475/23	17
41 476	11, 13, 18, 22
41 499/278	18, 22
41 517/14, 15	13, 16, 18, 22
41 517/18, 19	21
41 517/32	7, 13, 18, 19, 22
41 517/41	19
41 518/02	1, 4
41 518/06	1, 4, 5
41 520/02, 05, 06	1, 4
41 520/07	2
41 520/13	1 (up to max. 0,1 Ci) 3
41 520/15	1 (up to max. 0,1 Ci), 3
41 521/81, 91, 92	6, 8, 9, 17, 13, 14, 17, 18, 20, 22
41 522/01	11, 14
41 570/01	8, 9, 11, 13, 18, 22
41 574/21	19
41 574/22	9
41 574/23	14
41 574/81	11
41 574/62, 63	9
41 574/64, 65	14
41 574/66	18, 22
41 574/67	12
41 574/68	15, 19
41 574/69	10

Physikalisch-Technische
Bundesanstalt
Abteilung 6
(Physico-Technical Institute)

33, Braunschweig, January 16, 1973
Bundesallee 100

Ref. No. 6.31 - 38223/73

Messrs.
Friesche & Hoepfner GmbH
852 Erlangen-Bruck

Subject: Examination of the Construction of Radiators and
Radiator Holders with regard to § 2(2) and § 44
of the First SSVG

Re.: Your Order No. LAB-S/34162 dated December 12, 1973
Your Letter dated December 11, 1973 (Nau/M) with
Construction Drawing Submitted

The comments of the Federal Physico-Technical Institute in
its version dated February 7, 1973 (Ref. No. 6.31-38666/73) is
being supplemented as follows:

Table I			
Item No.	Nuclide	Construction No.	Max. Activity
23	Kr-85	0003 - 19 49930/ 24	1 Ci
			Test Intervals (§ 44, First SSVG)
			acceptance and/ inspection test only

Table II

The radiator as per item No. 23 is being used in the same radiator
holders as it is the case with the radiator as per item No. 9.
All other items of the comments of the Federal Physico-Technical-
Institute are not being touched through this supplement.

Encl.
bill of costs

By Order
signature
(Prof. Dr. H.M. Weiss)

This comments constitute a supplement to that dated January 22, 1969
(Reference No. of the Physico-Technical Institute: 6.31-205/59);
the latter, however, is not being made ineffective therefore.

Encl.
bill of costs
By order: signature
(Professor Dr. H.M. Weiss)