

Test Instruction

Contamination and Dose Rate Measurements at the DN30-X Package

0045-PA-2021-002 Rev0

Prepared	Checked	Released DAHER
Y. van Wijk	M. Hennebach	F. Hilbert
 28.06.2021	 28.06.2021	 28.06.2021

CONTENT

List of Revisions.....	3
1 Objective and scope	4
2 Primary documents	4
3 Date of inspection	4
4 Qualification of personnel	4
5 Measuring equipment	5
5.1 Contamination measurement equipment.....	5
5.2 Dose rate measurement equipment	5
6 Measuring sequence.....	5
6.1 Determination of contamination.....	5
6.2 Determination of the dose rate	6
7 Admissible limit value.....	9
7.1 Non-fixed contamination.....	9
7.2 Dose rate	9
8 Test record.....	9
9 Non-conformances and deviations	9
9.1 Contamination.....	9
9.2 Dose rate	9
10 Documentation	9
Attachment 1	11
Attachment 2	14
Attachment 3	17
Attachment 4	19

LIST OF REVISIONS

Revision	Date of revision	Modifications
0	28.06.2021	Original

1 OBJECTIVE AND SCOPE

The objective of this test instruction is to specify the conditions for the contamination and dose rate measurements at DN30-X packages before transport. This includes also the measurement of the non-fixed contamination at the outer surface of the DN30-X Protective Structural Packaging (PSP) or package. According to this test instruction it is ensured that the package meets the following regulations for the transport of radioactive material:

- Regulations for the Safe Transport of Radioactive Material, 2018 Edition, SSR-6, IAEA 2018,
- European agreement concerning the international carriage of dangerous goods by road (ADR),
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)
- International Maritime Dangerous Goods Code (IMDG-Code) and

in the version valid at the time of the transport.

2 PRIMARY DOCUMENTS

Primary documents are:

Handling instruction 0045-HA-2021-001	Use and handling of the DN30-X package
--	--

3 DATE OF INSPECTION

The measurements are performed at the loaded DN30-X package in accordance with the primary documents.

4 QUALIFICATION OF PERSONNEL

Personnel will be appointed by the health physics department of the site where the DN30-X packages are handled in accordance with their operating authorization and the radiation protection instructions. Personnel must be familiar with the test procedure.

5 MEASURING EQUIPMENT

5.1 Contamination measurement equipment

Contamination measuring instruments must be adequate for performing the measurements. They must be calibrated with adequate test radiation sources, such as Am-241 for α -emitters and Cs-137 or Sr/Y-90 for β -emitters. Calibration must be carried out according to DIN ISO 7503 Part 3 or an equivalent international standard.

Other test radiation sources are acceptable if such test radiation sources are generally used at the site of dispatch and if they are calibrated according to DIN ISO 7503 Part 3 or an equivalent international standard.

The measuring instrument and the used measurement method must be appropriate to measure non-fixed contamination with or exceeding the following minimal values:

β - and γ -emitters as well as low toxicity α -emitters

0,4 Bq/cm²

- All other α -emitters

0,04 Bq/cm²

The used measuring instruments and their corresponding characteristic data are to be recorded in the measuring instrument protocol given in Attachment 2.

5.2 Dose rate measurement equipment

Dose rate measuring instruments must be adequate for performing the measurements, taking into account the type of radiation and the energy spectrum. The instruments must permit to detect a minimum dose rate of 0.5 μ Sv/h. Measuring instruments for Gamma dose rates must be calibrated.

The used measuring instruments and their characteristic data are to be recorded in the corresponding measuring instrument protocol given in Attachment 2.

6 MEASURING SEQUENCE

6.1 Determination of contamination

Non-fixed contamination shall be determined by means of a wipe test according to DIN ISO 7503 Part 2 or an equivalent international standard, taking into account ADR section 4.1.9.1.2 or para. 508 of SSR-6.

Wipe test samples shall be carried out at least in those areas indicated in the measurement protocol in Attachment 3. Furthermore, wipe test samples have to be taken at all areas where contamination may occur because of loading and handling.

As a rule, the following boundary conditions must be observed:

Material for wipe test:	Dry, round filter paper
Surface to be checked:	300 cm ²
Removal factor:	0.1
Efficiency of the wipe test for Beta/Gamma emitters:	0.5
Efficiency of the wipe test for Alpha emitters:	0.25

The contamination level is determined using the following formula:

$$A = (n - n_b) / (\varepsilon_i \times F \times S \times \varepsilon_s)$$

where

n = counting rate in s⁻¹

n_b = background in s⁻¹

ε_i = response characteristics of the measuring instrument

F = removal factor

S = wiped surface in cm²

ε_s = efficiency of the wipe test

The measurement results shall be documented using the measurement protocol given in Attachment 3.

Contamination measurement must take place before the dose rate measurement.

6.2 Determination of the dose rate

6.2.1 General requirements

Dose rate shall be measured and recorded at least at the points indicated in the measurement records (ref. to Attachment 4).

The surface measuring point with the maximum dose rate shall be retained as a reference point to determine the dose rate at a distance of 1 m of the package. The measured values shall be entered as specified in the corresponding measurement records.

The measuring range shall be selected insofar that the display will be in the upper third, if possible. Only gamma radiation is measured due to the negligible neutron radiation. Background radiation at the point of measurement shall be subtracted from the measured result.

The neutron radiation is accounted for by multiplying the value of the maximum dose rate after subtracting the background radiation from the measured dose rate by a factor of 1.05.

Measurement results are recorded using the measurement protocol given in Attachment 4.

The dose rate measurements shall be carried out after the contamination measurement.

6.2.2 Measurement of the dose rate at the DN30-X package

Transport of packages containing commercial grade UF_6 with an enrichment of max. 5 % in U-235, either loaded or heels cylinders, has been carried out for decades in large numbers. The dose rates at the surface of such packages are on one hand well below the allowable dose rates and on the other hand the distribution of the dose rates is well known by experience.

The dose rates at the surfaces of packages containing a higher enrichment of U-235 are expected to be even lower as the concentration in U-238 is lower. The consideration of ALARA principles calls for the limitation of the number of measuring points for such packages to reduce the overall exposure of the radiation protection personnel.

The measuring points are specified in the measurement protocol for content “30B-X cylinders” given in Attachment 4.

The dose rate shall be measured and recorded at least at the indicated measurement points 1 to 5. From experience with UF_6 transports, the point of maximum dose rate at the surface is expected around measurement point 3; however, this has to be verified by the measurement.

In case the measurement of the gamma dose rate in 1 m distance (measurement point A1) is not possible due to geometrical constraints (i. e. the DN30-X package is mounted to a flatrack), the gamma dose rate at 1 m distance may be calculated by multiplying the maximum value at the surface with a factor of 0.25.

6.2.3 Measurement of the dose rate at the vehicle loaded with DN30-X packages with their longitudinal axis in lateral direction

In case the vehicle respectively the flatrack is loaded with the DN30-X packages with their longitudinal axis in lateral direction of the vehicle, the lateral surface of the vehicle matches with the front surfaces of the DN30-X packages. Subject to ALARA principles, the dose rate needs not to be measured twice but can be transcribed from the records for the DN30-X package wherever such dose rate values are available.

In any case, the dose rate at measurement points 5, 6, 7 and 8 shall be measured and recorded for the surface of the vehicle as shown in the respective protocol in Attachment 4.

Measuring points A1, A2 and A3 shall be measured perpendicular from the max. dose rates at the surface of the vehicle in lateral direction and in the rear. Generally, measurement at 2 m distance in the front has no value, as the driver cabin provides distance and shielding. Instead, measurement point C1 shall be measured and recorded for information purposes.

6.2.4 Measurement of the dose rate at the vehicle loaded with DN30-X packages with their longitudinal axis in longitudinal direction

In case the vehicle respectively the flatrack is loaded with the DN30-X packages with their longitudinal axis in longitudinal direction of the vehicle, the surface of the vehicle does not match the surfaces of the DN30-X packages.

The dose rates shall be measured and recorded as indicated in the measurement protocols in Attachment 4.

Measuring points A1, A2 and A3 shall be measured perpendicular from the max. dose rates at the surface of the vehicle in lateral direction and in the rear. Generally, measurement at 2 m distance in the front has no value, as the driver cabin provides distance and shielding. Instead, measurement point C1 shall be measured and recorded for information purposes.

7 ADMISSIBLE LIMIT VALUE

7.1 Non-fixed contamination

The following limit values for non-fixed contamination shall not be exceeded during the transport of the DN30-X package:

Beta/Gamma emitters and Alpha-Emitters with low toxicity	All other Alpha-Emitters
4.0 Bq /cm ²	0.4 Bq /cm ²

7.2 Dose rate

The following limit values for dose rates shall not be exceeded during the transport of the DN30-X package:

Measuring point	Limit Value
Package surface	2.0 mSv/h
Exterior surfaces of vehicle	2.0 mSv/h
2 m distance from vehicle	0.1 mSv/h

8 TEST RECORD

After the tests have been carried out, a test protocol according to Attachment 1 shall be written. This record has to be signed by the inspector and the responsible person for radiation protection of the consignor or the consignee, respectively.

9 NON-CONFORMANCES AND DEVIATIONS

If values exceeding the admissible limits are found during the check, the following procedures shall be followed:

9.1 Contamination

If contamination values exceed the limits, the DN30-X package shall be decontaminated so that the limits are met.

9.2 Dose rate

It is not acceptable that the maximum dose rates exceed the allowable limits. Packages where the maximum dose rates exceed the limits must not be shipped.

10 DOCUMENTATION

Test results shall be documented on the forms indicated in Attachment 1 to Attachment 4 or in site specific forms and records which contain at least the information required in the forms in Attachment 1 to Attachment 4.

The records in Attachment 2 to Attachment 4 have to be signed by the examiner performing the measurements and the responsible person for radiation protection of the site.

The test protocol in Attachment 1 has to be signed by the responsible person for radiation protection and the consignor.

ATTACHMENT 1

Test protocol for contamination and dose rate measurements

Protokoll-Nr. Protocol no.		Seite Page	1/1	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	-------------------------

Verlader/Entlader consignor/consignee					
Anlage plant			Anlagenteil part		
Transportdatum transport date			Referenz-Nr. reference no.		
Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	

1. Nicht-festhaftende Kontamination non fixed contamination

Messprotokoll-Nr. measurements protocol no.		Datum date	
Beta/Gamma-Strahler und Alphastrahler niedriger Toxizität Beta/Gamma-rays and Alpha rays low toxicity		Alle anderen Alphastrahler all other Alpha rays	
Grenzwert limit	Messwert measured	Grenzwert limit	Messwert measured
4,0 Bq/cm ²		0,4 Bq/cm ²	

2. Dosisleistung dose rate

Messprotokoll-Nr. measurements protocol no.				Datum date	
Messpunkt measurements point		Grenzwert limit	Messwert (inkl. Neutronen-Dosisleistung) Measured (incl. neutron dose rate)		
Transport unter transport under	ausschließlicher Verwen- dung exclusive use		<input type="checkbox"/>	nicht ausschließlicher Verwendung not exclusive use	
Oberfläche des Versandstückes surface of package		2 mSv/h			
Nur bei nicht ausschließlicher Ver- wendung Only in case of not exclusive use 1m Abstand vom Versandstück at 1 m distance from package		0,1 mSv/h			
Fahrzeugoberfläche Vehicle surface		2 mSv/h			
2 m Abstand vom Fahrzeug 2 m distance from vehicle		0,1 mSv/h			

Die Grenzwerte werden eingehalten. / The requirements are fulfilled

Strahlenschutz radiation protection		Absender Consignor	
Datum date	Unterschrift signature	Datum date	Unterschrift signature

ATTACHMENT 2

Measuring instrument protocol: Contamination measuring instrument

Measuring instrument protocol: Gamma dose rate measuring instrument

Messgerät-Protokoll Kontaminationsmessgerät

Measuring instrument protocol: Contamination measuring instrument

Protokoll-Nr. Protocol no.		Seite Page	1/1	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	-------------------------

Verlader/Entlader consignor/consignee					
Anlage plant			Anlagenteil part		
Transportdatum transport date			Referenz-Nr. reference no.		
Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	

Allgemeine Angaben general information

Typen-Bezeichnung type	
Hersteller manufacturer	
Serien-Nr. serial no.	

Kalibrierquelle calibration source

Nuklid nuclide	
Strahlenart kind of radiation	
Kennzeichnung designation	
Aktivität zum Messdatum activity at date	
Nulleffekt N₀ ground level N₀	

Messgeräte Daten measuring instrument data

Ansprechvermögen für α -Strahlung sensitivity for α -radiation	
Ansprechvermögen für β -Strahlung sensitivity for β -radiation	
Kalibrierdatum calibration date	

Bemerkungen comments	
-------------------------	--

Prüfer examiner	Strahlenschutz radiation protection
--------------------	--

Datum date	Unterschrift signature	Datum date	Unterschrift signature
---------------	---------------------------	---------------	---------------------------



Messgerät-Protokoll Gamma-Dosisleistungsmessgerät

Measuring instrument protocol Gamma dose rate measuring instrument

Protokoll-Nr. Protocol no.		Seite Page	1/1	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader consignor/consignee					
Anlage plant			Anlagenteil part		
Transportdatum transport date			Referenz-Nr. reference no.		
Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	leer empty <input type="checkbox"/>	Behälter-Nr. Packaging no..	

Allgemeine Angaben general information

Typen-Bezeichnung type	
Hersteller manufacturer	
Serien-Nr. serial no.	

Eichung calibration

Eichstelle calibration	
Datum date	
Eich-Protokoll-Nr. calibration protocol no.	
Gültigkeitsdauer Eichung validity of calibration	

Messgeräte Daten measuring instrument data

Nachweisgrenze detection efficiency	
max. Messbereich max. range	
Genauigkeit precision	

Bemerkungen comments

Prüfer examiner	Strahlenschutz radiation protection
--------------------	--

Datum date	Unterschrift signature	Datum date	Unterschrift signature
---------------	---------------------------	---------------	---------------------------

ATTACHMENT 3

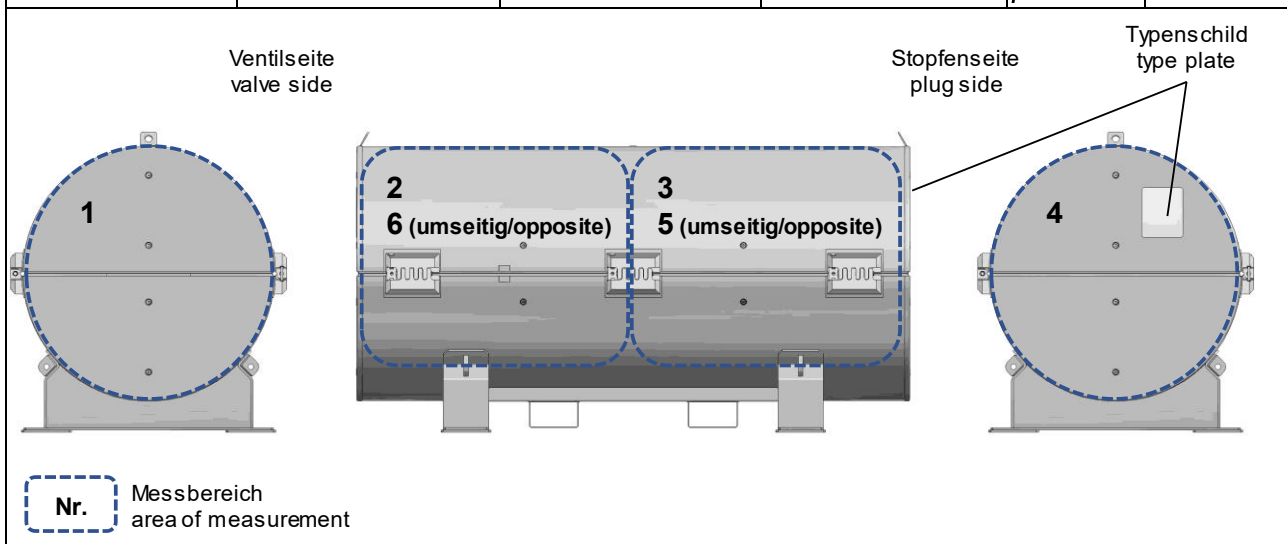
Measurement protocol for non-fixed contamination DN30-X

Messprotokoll für nicht-festhaftende Kontamination

Measurement protocol for non-fixed contamination

Protokoll-Nr. Protocol no.		Seite Page	1/1	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader consignor/consignee						
Anlage plant				Anlagenteil part		
Transportdatum transport date				Referenz-Nr. reference no.		
Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..		
Messgerät measuring instrument				Messgerät-Protokoll-Nr. measuring instrument protocol no.		
Wischmaterial wipe material	trocken dry <input type="checkbox"/>	Medium medium		Entnahmefaktor efficiency	α-Strahler α-radiation	
	feucht wet <input type="checkbox"/>				β-Strahler β-radiation	



Messbereich area of measurement	nicht-festhaftende Kontamination non fixed contamination $\beta + \gamma$				nicht-festhaftende Kontamination non fixed contamination α			
	$N \text{ s}^{-1}$	$N_0 \text{ s}^{-1}$	$N-N_0 \text{ s}^{-1}$	Bq/cm^2	$N \text{ s}^{-1}$	$N_0 \text{ s}^{-1}$	$N-N_0 \text{ s}^{-1}$	Bq/cm^2
1								
2								
3								
4								
5								
6								

Messzeit measuring time	
----------------------------	--

Prüfer examiner	Strahlenschutz radiation protection
--------------------	--

Datum date	Unterschrift signature	Datum date	Unterschrift signature
---------------	---------------------------	---------------	---------------------------

ATTACHMENT 4

Measurement protocol for direct measurement of the dose rate at the DN30-X package (2 pages) loaded with HALEU UF₆, loaded or heels cylinders

Measurement protocol for dose rate at the vehicle loaded with 4 DN30-X packages with their axis in lateral direction (2 pages)

Measurement protocol for dose rate at the vehicle loaded with 3 DN30-X packages with their axis in lateral direction (2 pages)

Measurement protocol for dose rate at the vehicle loaded with 2 DN30-X packages with their axis in lateral direction (2 pages)

Measurement protocol for dose rate at the vehicle loaded with 1 DN30-X package with its axis in lateral direction (2 pages)

Measurement protocol for dose rate at the vehicle loaded with 2 DN30-X packages with their axis in longitudinal direction (2 pages)

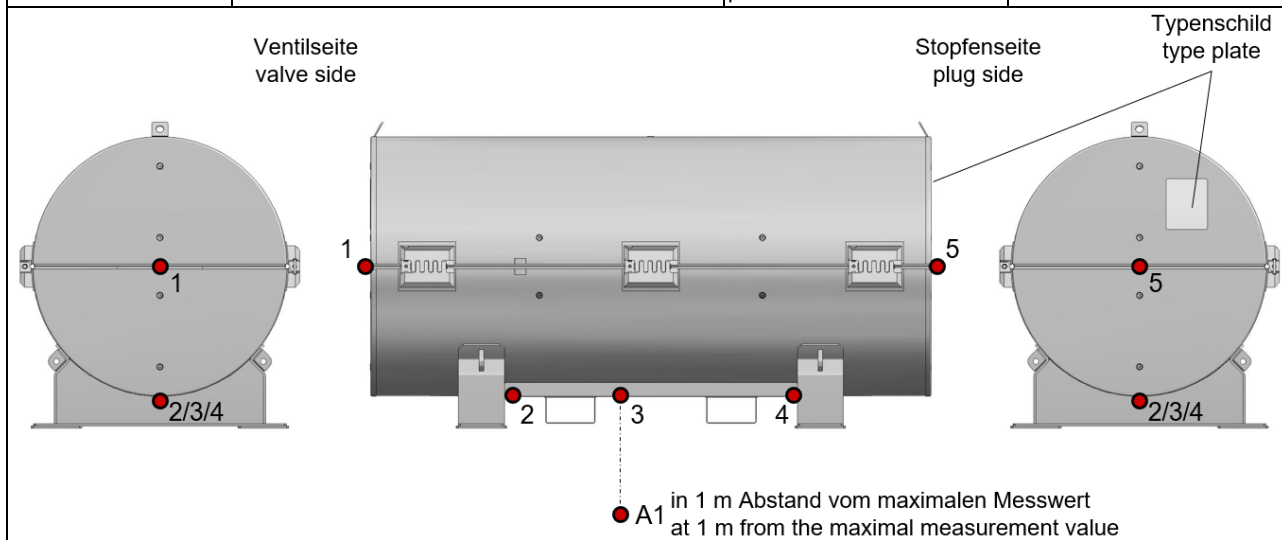
Measurement protocol for dose rate at the vehicle loaded with 1 DN30-X package with its axis in longitudinal direction (2 pages)

Messprotokoll für Dosisleistung am Versandstück

Inhalt: HALEU UF₆, beladene und Heels Zylinder
Measurement protocol for dose rate of the package
Content: HALEU UF₆, loaded and heels cylinders

Protokoll-Nr. Protocol no.		Seite Page	1/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader Consignor/consignee					
Anlage Plant				Anlagenteil Part	
Transportdatum Transport date				Referenz-Nr. Reference no.	
Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	
Messgerät Measuring instrument				Messgerät-Protokoll-Nr. Measuring instrument protocol no.	



Messpunkte Measurement points	Gemessener Wert (M) Measured value	Untergrundstrahlung (B) Background radiation	Dosisleistung (M – B) Dose rate
	γ $\mu\text{Sv/h}$	γ $\mu\text{Sv/h}$	γ $\mu\text{Sv/h}$

Oberfläche Versandstück Surface of package

1			
2			
3			
4			
5			
Max. 1-5			
Max. over entire surface			



Messprotokoll für Dosisleistung am Versandstück

Inhalt: HALEU UF₆, beladene und Heels Zylinder
 Measurement protocol for dose rate of the package
 Content: HALEU UF₆, loaded and heels cylinders

Protokoll-Nr. Protocol no.		Seite Page	2/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Multiply line above by 1.05 for contribution of neutron radiation			
---	--	--	--

1m Abstand vom Versandstück (radial 1 m Abstand vom max Messwert an der Oberfläche)
1m distance from the package (radial 1 m distance from max. measured value at the surface)

Bestimmt durch Messung Determined by measurement	<input type="checkbox"/>	Berechnet durch Multiplikation des max. Werts an der Oberfläche mit 0.25 Calculated by multiplying the max. value at the surface by 0.25	<input type="checkbox"/>
---	--------------------------	---	--------------------------

A1			
----	--	--	--

Multiply line above by 1.05 for contribution of neutron radiation			
---	--	--	--

Prüfer examiner	Strahlenschutz radiation protection
--------------------	--

Datum date	Unterschrift signature	Datum date	Unterschrift signature
---------------	---------------------------	---------------	---------------------------

Messprotokoll für Dosisleistung am Fahrzeug 4 DN30-X lateral

Measurement protocol for dose rate of the vehicle 4 DN30-X lateral

Protokoll-Nr. Protocol no.		Seite Page	1/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader Consignor/consignee					
--	--	--	--	--	--

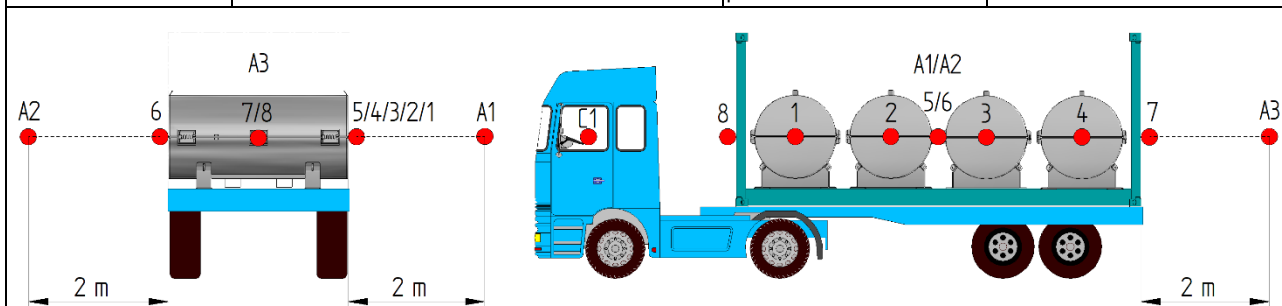
Anlage Plant				Anlagenteil Part	
-----------------	--	--	--	---------------------	--

Transportdatum Transport date				Referenz-Nr. Reference no.	
----------------------------------	--	--	--	-------------------------------	--

Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	
---------------------	--------	--	--------------------------------	--------------------------------	--

KfZ-Kennzeichen vehicle number plate					
---	--	--	--	--	--

Messgerät Measuring instrument				Messgerät-Protokoll-Nr. Measuring instrument protocol no.	
-----------------------------------	--	--	--	--	--



Messpunkte points of measurement	Gemessener Wert (M) Measured value	Untergrundstrahlung (B) Background radiation	Dosisleistung (M – B) Dose rate
	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$

Oberfläche Fahrzeug
[X] Übernahme des Maximalwerts aus den Protokollen für das Versandstück
Surface of vehicle
[X] Transferred from the maximal value of the protocols for the package

[1]			
[2]			
[3]			
[4]			
5			
6			
7			
8			

Messprotokoll für Dosisleistung am Fahrzeug 4 DN30-X lateral

Measurement protocol for dose rate of the vehicle
4 DN30-X lateral

Protokoll-Nr. Protocol no.		Seite Page	2/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Max. 1-8			
Max. over entire surface			
Multiply line above by 1.05 for contribution of neutron radiation			
2 m Abstand vom Fahrzeug 2 m distance from the vehicle			
A1			
A2			
A3			
Max. A1-A3			
Max. over entire vertical planes			
Multiply line above by 1.05 for contribution of neutron radiation			
C1 ¹⁾			
Prüfer examiner		Strahlenschutz radiation protection	
Datum date	Unterschrift signature	Datum date	Unterschrift signature

1) in Fahrerkabine (nur zur Information) / in driver cabin (only for information)

Messprotokoll für Dosisleistung am Fahrzeug

3 DN30-X lateral

Measurement protocol for dose rate of the vehicle

3 DN30-X lateral

Protokoll-Nr. Protocol no.		Seite Page	1/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader Consignor/consignee					
--	--	--	--	--	--

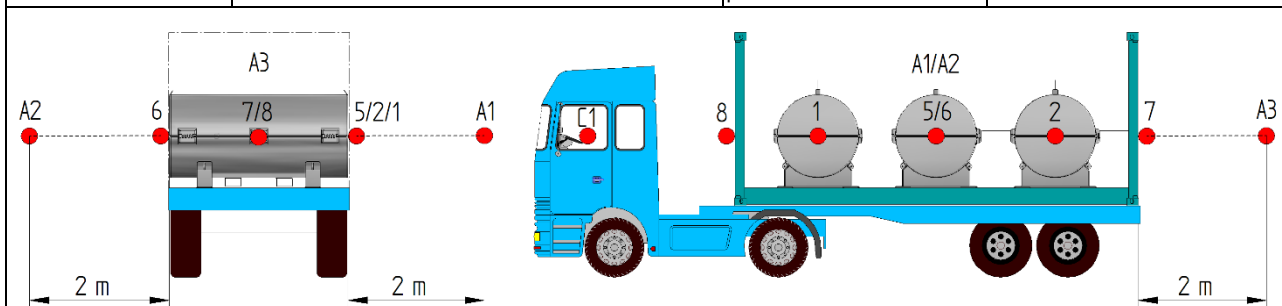
Anlage Plant				Anlagenteil Part	
-----------------	--	--	--	---------------------	--

Transportdatum Transport date				Referenz-Nr. Reference no.	
----------------------------------	--	--	--	-------------------------------	--

Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	
---------------------	--------	--	--------------------------------	--------------------------------	--

KfZ-Kennzeichen vehicle number plate					
---	--	--	--	--	--

Messgerät Measuring instrument				Messgerät-Protokoll-Nr. Measuring instrument protocol no.	
-----------------------------------	--	--	--	--	--



Messpunkte points of measurement	Gemessener Wert (M) Measured value	Untergrundstrahlung (B) Background radiation	Dosisleistung (M – B) Dose rate
	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$

Oberfläche Fahrzeug
[X] Übernahme des Maximalwerts aus den Protokollen für das Versandstück
Surface of vehicle
[X] Transferred from the maximal value of the protocols for the package

[1]			
[2]			
5			
6			
7			
8			
Max. 1,2, 5-8			
Max. over entire surface			

Messprotokoll für Dosisleistung am Fahrzeug

3 DN30-X lateral

Measurement protocol for dose rate of the vehicle
3 DN30-X lateral

Protokoll-Nr. Protocol no.		Seite Page	2/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	-------------------------

Multiply line above by 1.05 for contribution of neutron radiation			
2 m Abstand vom Fahrzeug 2 m distance from the vehicle			
A1			
A2			
A3			
Max. A1-A3			
Max. over entire vertical planes			
Multiply line above by 1.05 for contribution of neutron radiation			
C1¹⁾			
Prüfer examiner		Strahlenschutz radiation protection	
Datum date		Datum date	
Unterschrift signature		Unterschrift signature	

1) in Fahrerkabine (nur zur Information) / in driver cabin (only for information)

Messprotokoll für Dosisleistung am Fahrzeug 2 DN30-X lateral

Measurement protocol for dose rate of the vehicle 2 DN30-X lateral

Protokoll-Nr. Protocol no.		Seite Page	1/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader Consignor/consignee					
--	--	--	--	--	--

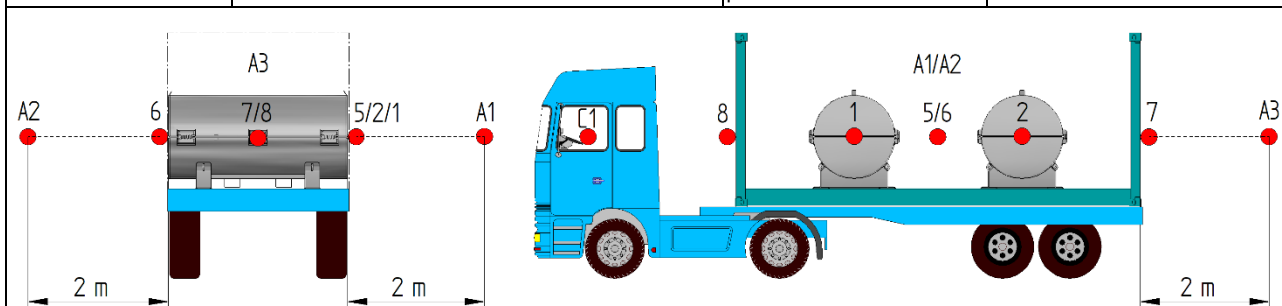
Anlage Plant				Anlagenteil Part	
-----------------	--	--	--	---------------------	--

Transportdatum Transport date				Referenz-Nr. Reference no.	
----------------------------------	--	--	--	-------------------------------	--

Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	
---------------------	--------	--	--------------------------------	--------------------------------	--

KfZ-Kennzeichen vehicle number plate					
---	--	--	--	--	--

Messgerät Measuring instrument				Messgerät-Protokoll-Nr. Measuring instrument protocol no.	
-----------------------------------	--	--	--	--	--



Messpunkte points of measurement	Gemessener Wert (M) Measured value	Untergrundstrahlung (B) Background radiation	Dosisleistung (M – B) Dose rate
	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$

Oberfläche Fahrzeug
[X] Übernahme des Maximalwerts aus den Protokollen für das Versandstück
Surface of vehicle
[X] Transferred from the maximal value of the protocols for the package

[1]			
[2]			
5			
6			
7			
8			
Max. 1, 2, 5-8			
Max. over entire surface			

Messprotokoll für Dosisleistung am Fahrzeug 2 DN30-X lateral

Measurement protocol for dose rate of the vehicle
2 DN30-X lateral

Protokoll-Nr. Protocol no.		Seite Page	2/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

**Multiply line
above by 1.05 for
contribution of
neutron radia-
tion**

**2 m Abstand vom Fahrzeug
2 m distance from the vehicle**

A1

A2

A3

Max. A1-A3

**Max. over entire
vertical planes**

**Multiply line
above by 1.05 for
contribution of
neutron radia-
tion**

C1¹⁾

Prüfer
examiner

Strahlenschutz
radiation protection

Datum
date

Unterschrift
signature

Datum
date

Unterschrift
signature

1) in Fahrerkabine (nur zur Information) / in driver cabin (only for information)

Messprotokoll für Dosisleistung am Fahrzeug 1 DN30-X lateral

Measurement protocol for dose rate of the vehicle 1 DN30-X lateral

Protokoll-Nr. Protocol no.		Seite Page	1/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader Consignor/consignee					
--	--	--	--	--	--

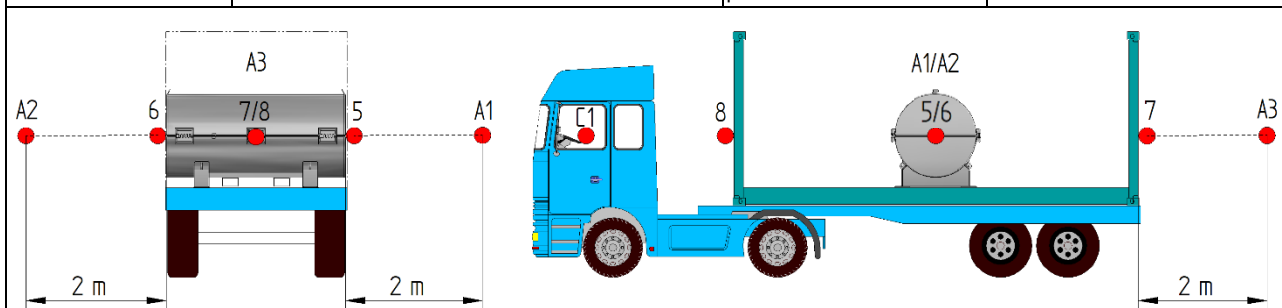
Anlage Plant				Anlagenteil Part	
-----------------	--	--	--	---------------------	--

Transportdatum Transport date				Referenz-Nr. Reference no.	
----------------------------------	--	--	--	-------------------------------	--

Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	
---------------------	--------	--	--------------------------------	--------------------------------	--

KfZ-Kennzeichen vehicle number plate					
---	--	--	--	--	--

Messgerät Measuring instrument				Messgerät-Protokoll-Nr. Measuring instrument protocol no.	
-----------------------------------	--	--	--	--	--



Messpunkte points of measurement	Gemessener Wert (M) Measured value	Untergrundstrahlung (B) Background radiation	Dosisleistung (M – B) Dose rate
	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$

Oberfläche Fahrzeug Surface of vehicle

5			
6			
7			
8			
Max. 5-8			
Max. over entire surface			
Multiply line above by 1.05 for contribution of neutron radiation			

Messprotokoll für Dosisleistung am Fahrzeug

1 DN30-X lateral

Measurement protocol for dose rate of the vehicle
1 DN30-X lateral

Protokoll-Nr. Protocol no.		Seite Page	2/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	-------------------------

2 m Abstand vom Fahrzeug 2 m distance from the vehicle

A1			
A2			
A3			
Max. A1-A3	/	/	
Max. over entire vertical planes			
Multiply line above by 1.05 for contribution of neutron radiation	/	/	
C1¹⁾			
Prüfer examiner		Strahlenschutz radiation protection	
Datum date	Unterschrift signature	Datum date	Unterschrift signature

1) in Fahrerkabine (nur zur Information) / in driver cabin (only for information)

Messprotokoll für Dosisleistung am Fahrzeug 2 DN30-X longitudinal

Measurement protocol for dose rate of the vehicle 2 DN30-X longitudinal

Protokoll-Nr. Protocol no.		Seite Page	1/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader Consignor/consignee					
--	--	--	--	--	--

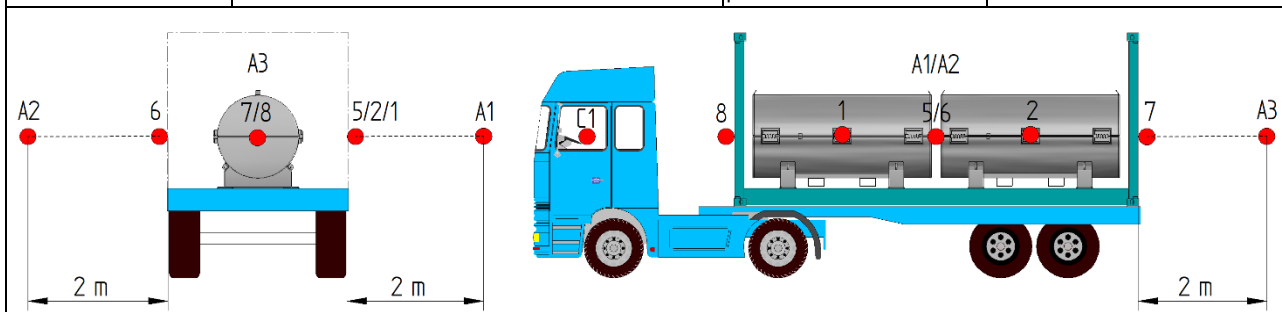
Anlage Plant				Anlagenteil Part	
-----------------	--	--	--	---------------------	--

Transportdatum Transport date				Referenz-Nr. Reference no.	
----------------------------------	--	--	--	-------------------------------	--

Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	
---------------------	--------	--	--------------------------------	--------------------------------	--

KfZ-Kennzeichen vehicle number plate					
---	--	--	--	--	--

Messgerät Measuring instrument				Messgerät-Protokoll-Nr. Measuring instrument protocol no.	
-----------------------------------	--	--	--	--	--



Messpunkte points of measurement	Gemessener Wert (M) Measured value	Untergrundstrahlung (B) Background radiation	Dosisleistung (M – B) Dose rate
	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$	$\gamma \text{ } \mu\text{Sv/h}$

Oberfläche Fahrzeug Surface of vehicle

1			
2			
5			
6			
7			
8			
Max. 1, 2, 5-8			
Max. over entire surface			

Messprotokoll für Dosisleistung am Fahrzeug 2 DN30-X longitudinal

Measurement protocol for dose rate of the vehicle
2 DN30-X longitudinal

Protokoll-Nr. Protocol no.		Seite Page	2/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Multiply line above by 1.05 for contribution of neutron radiation			
2 m Abstand vom Fahrzeug 2 m distance from the vehicle			
A1			
A2			
A3			
Max. A1-A3			
Max. over entire vertical planes			
Multiply line above by 1.05 for contribution of neutron radiation			
C1¹⁾			
Prüfer examiner		Strahlenschutz radiation protection	
Datum date	Unterschrift signature	Datum date	Unterschrift signature

1) in Fahrerkabine (nur zur Information) / in driver cabin (only for information)

Messprotokoll für Dosisleistung am Fahrzeug

1 DN30-X longitudinal

Measurement protocol for dose rate of the vehicle

1 DN30-X longitudinal

Protokoll-Nr. Protocol no.		Seite Page	1/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	------------------

Verlader/Entlader Consignor/consignee					
--	--	--	--	--	--

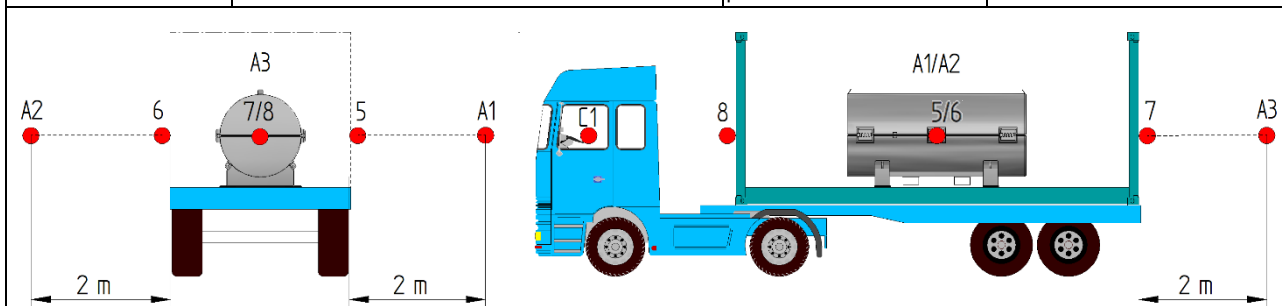
Anlage Plant				Anlagenteil Part	
-----------------	--	--	--	---------------------	--

Transportdatum Transport date				Referenz-Nr. Reference no.	
----------------------------------	--	--	--	-------------------------------	--

Behälter Package	DN30-X	beladen loaded <input type="checkbox"/>	Heels <input type="checkbox"/>	Behälter-Nr. Packaging no..	
---------------------	--------	--	--------------------------------	--------------------------------	--

KfZ-Kennzeichen vehicle number plate					
---	--	--	--	--	--

Messgerät Measuring instrument				Messgerät-Protokoll-Nr. Measuring instrument protocol no.	
-----------------------------------	--	--	--	--	--



Messpunkte points of measurement	Gemessener Wert (M) Measured value	Untergrundstrahlung (B) Background radiation	Dosisleistung (M – B) Dose rate
	γ $\mu\text{Sv/h}$	γ $\mu\text{Sv/h}$	γ $\mu\text{Sv/h}$

Oberfläche Fahrzeug Surface of vehicle

5			
6			
7			
8			
Max. 5-8			
Max. over entire surface			
Multiply line above by 1.05 for contribution of neutron radiation			

Messprotokoll für Dosisleistung am Fahrzeug

1 DN30-X longitudinal

Measurement protocol for dose rate of the vehicle
1 DN30-X longitudinal

Protokoll-Nr. Protocol no.		Seite Page	2/2	Prüfanweisung-Nr. Test procedure no.	0045-PA-2021-002
-------------------------------	--	---------------	-----	---	-------------------------

2 m Abstand vom Fahrzeug 2 m distance from the vehicle

A1			
A2			
A3			
Max. A1-A3			
Max. over entire vertical planes			
Multiply line above by 1.05 for contribution of neutron radiation			
C1¹⁾			

Prüfer examiner	Strahlenschutz radiation protection
Datum date	Datum date
Unterschrift signature	Unterschrift signature

1) in Fahrerkabine (nur zur Information) / in driver cabin (only for information)