

**Federal Office for the
Safety of Nuclear Waste Management**



**DAHER NUCLEAR
TECHNOLOGIES GmbH**
Margarete-von-Wrangell-Straße 7
63457 Hanau

31.1.2018
Hennig

Certificate of Approval

D/4305/AF-96 (Rev. 10)

for a package design of Type A for fissile radioactive materials

Pursuant to the application filed by company DAHER Nuclear Technologies GmbH, Hanau, on May 28, 2018 (Ref.: 0007-SVK-2018-001) the container with the manufacturer designation "BU-D" is approved as Type A package design for fissile radioactive materials, according to the following regulations for transport by road, rail, sea and air:

Regulations for the Safe Transport of Radioactive Material, 2012 Edition, International Atomic Energy Agency (IAEA), No. SSR-6,

European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) (BGBl. 1969 II p. 1489), Attachments A and B in the version of the publication dated November 29, 2017 (BGBl. 2017 II p. 1520, last modified by the 27th ADR Modification Decree of October 5, 2018 (BGBl. 2018 II p. 443),

Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) - Enclosure C of the Agreement concerning International Railway Traffic (COTIF Agreement) of May 9, 1980 (BGBl. 1985 II p. 130), in the version of the publication dated May 16, 2008 (BGBl. 2008 II p. 475, 899; 2009 II p. 1188, 1189; 2010 II p. 1273; 2012 II p. 168, 169, 1338), last modified by the 21th RID Modification Decree of November 5, 2018 (BGBl. 2018 II p. 494),

International Maritime Dangerous Goods Code (IMDG-Code), Amendment 38-16, in the official german translation published on November 10, 2016 (VkBli. 2016 p. 718),

International Civil Aviation Organization – Technical Instructions for the Safe Transport of Dangerous Goods by Air, Edition 2019/2020,

Regulations for the Domestic and International Transport of Dangerous Goods by Road, Rail and Inland Waterways (Dangerous Goods Regulations Road, Rail and Inland Navigation- GGVSEB) in the version of the publication dated March 30, 2017 (BGBl. 2017 I p. 711, 993, 3859), last modified by article 19 of the decree dated November 29, 2018 (BGBl. 2018 I p. 2034),

Regulations for Maritime Transports of Dangerous Goods (Dangerous Goods Regulations Sea - GGVSee) in the version of the publication dated December 7, 2017 (BGBl. 2017 I p. 3862; 2018 I p. 131),

Air Traffic – Approval – Order in the version of the publication dated July 10, 2008 (BGBl. 2008 I p. 1229; 2012 I p. 1032; 2013 I p. 2749; 2016 I p. 1548), last modified through article 1 of the decree of March 30, 2017 (BGBl. 2017 I p. 683) in combination with the ICAO Dangerous Goods Regulations (ICAO Technical Instructions)

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in combination with the Guideline for the procedure of licensing package designs for the transport of radioactive material, of radioactive materials in special form and low dispersible radioactive materials (R003) in the version of the publication dated June 9, 2016 (VkB. 2016 p. 430) and with the BAM Dangerous Goods Guidelines for quality assurance measures of packagings for competent authority approved package designs for the transport of radioactive material (BAM-GGR 011) Rev. 1 dated October 1, 2018 (Amts- und Mitteilungsblatt der BAM 2018 p. 109).

It is certified that the Federal Agency for the Safety of Nuclear Waste Management is the Competent Authority authorized by the Federal Ministry of Transport and Digital Infrastructure according to chapter 7.9 of the IMDG Code.

Holder of approval: DAHER Nuclear Technologies GmbH (DNT)
Margarete-von-Wrangell-Straße 7
63457 Hanau

Documents:

1. DNT application dated 28.05.2018 (Ref.: 0007-SVK-2018-001),
2. Safety report 0007-BSH-2018-001, Rev. 0 of DNT dated 24.05.2018,
3. Expert comment of the Federal Agency for Materials Research and Testing (BAM) dated 7.2.2002 (Ref.: III.3/20821) and 5.4.2004 (Ref.: III.3/21011), letter of BAM dated 30.4.2004 (Ref.: III.32/Ku), expert comment of BAM dated 28.11.2005 (Ref.: III.3/21146) and 9.6.2006 (Ref.: III.32/21164), letters of BAM dated 6.9.2006, 5.3.2007 (Ref.: III.32/Dau) and 19.7.2007 (Ref.: III.32/Jo), expert comment of BAM dated 12.11.2008 (Ref.: III.3/21304), letter of BAM dated 20.1.2009 (Ref.: III.32/Dau) and expert comments of BAM dated 31.10.2013 (Ref.: 3.3 Ku) and 31.10.2018 (Ref.: 3.3/18023266/2018/Ku/02)

Concerning the demonstration of criticality safety, special reference is made to chapter 8 of the safety report NCS 0601, Rev. 3 and the Working Report No. KWU BT33/94/029 of Siemens dated 15.3.1994, the letter of Siemens dated 25.4.1994 (Ref.: BT33/4746/94), the report of Siemens dated 22.2.1999, the calculation note No. RN-01-03, Rev 2 of DNT dated 15.4.2004, calculation note No. RN-05-03, Rev. 0 of DNT dated 26.7.2005, and report 0007-BBR-2018-001, Rev. 1 of DNT, all included in safety report 0007-BSH-2018-001 (Rev. 0).

Manufacturer's designation: BU-D Container

Package identification: D/4305/AF-96

Validity of approval: until and including January 31, 2024

Criticality Safety Index (CSI): 0.71

Allowable content:

Depleted, natural and/or enriched uranium with a maximum enrichment (mass content of U-235) of 10% in accordance with the following table:

Enrichment (Mass content) of U-235	Composition	Form	max. mass of U-235 in the depleted, natural and en- riched uranium (kg)
≤ 4%	Uraniumoxide, Ammoniumdiuranate (ADU), Uranyl nitrate solid (UNH), Ammoniumuranylcarbonate (AUC), Uraniumtetrafluoride and/or Sodiumuranylacetate	Any ¹⁾	0.9
≤ 5%			0.8
≤ 10%	Uraniumoxide	Powder	0.65

- 1) Pellets and comparable forms of fissile material arrangements, which may form a lattice, are only allowed with a outer dimension of the pellets or the fissile material arrangements of 8 mm or more.

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Impurities may be contained in addition to the uranium, such as fluff, dust, sand, iron hydroxide.

The uranium compounds can additionally contain Gadolinium as a neutron absorber.

Not allowed however are impurities

- with additional dangerous properties,
- with a mean hydrogen density greater than water,
- with beryllium or deuterium with a mass greater than 1% of the fissile material mass. Excepted from this is deuterium in natural concentration in water.

If uranyl nitrate is part of the content no additional easy or normal oxidizing materials may be present in the content.

The H/U ratio within the package is unlimited; nevertheless, the material must be in solid form.

The mass of the content is limited to maximum 90 kg.

The total activity must not exceed 1 A₂.

Package design:

The package with the designation BU-D fulfills, as far as mechanical and thermal characteristics are concerned, and according to the above mentioned expert comments and letters of BAM, and as far as criticality safety and radiation shielding are concerned, according to evaluations performed by BfE, the requirements towards a Type A package for fissile radioactive materials (IAEA Regulations §§ 635 and 673).

The leakage of water into all voids was assumed for the criticality analysis.

Package description:

The package consists of an outer container made of steel sheet (213 l drum), which is closed with a clamping ring and sealed with an O-Ring gasket and an inner container closed by a flanged lid and a flat gasket. The inner container may contain up to 3 stainless steel pails containing the nuclear fuel. The nuclear fuel pails have a maximum inner diameter of 285 mm. Between the pails and the inner container a protection device is placed which is suitable for the pail diameter (distance frame or protection tube). The space between the outer and the inner container is filled with light concrete acting as thermal insulation; after loading, a disc of light concrete sheathed in steel sheet is set between the lids of the inner and the outer container.

The containment system consists of the inner container with its lid, gasket and screwed closing.

The confinement system consists of the inner container with its lid, gasket and screwed closing.

A schematic drawing of the package (Data Sheet No. 001-068-00, Index e) is enclosed as Enclosure 1.

The outer dimensions are: Diameter 608 mm, Height 890 mm

The masses of the package are: Tare weight approx. 160 kg, Gross weight max. 260 kg

With the present certificate correspond at the present time the packagings designated in Enclosure 2 by the respective parts list revisions (see also auxiliary directive No. 7).

Auxiliary directives and remarks:

1. All quality assurance measures for planning, accompanying controls and operation must be in agreement with the Dangerous Goods Guidelines of BAM "Quality Assurance Measures of Packagings for Competent Authority Approved Package Designs for the Transport of Radioactive Material" (BAM-GGR 011, in their valid revisions, respectively).
2. The new manufacture of packagings is only allowed according to the design documents with the highest revision index in enclosure 2 including the modifications according to remark No. 7 and by observing specification SB-02-02, Rev. 2 of company DNT.

3. This approval only is valid together with the acceptance certificates for the package design series, which must be sent to BAM and BfE uncalled. Deviations tolerated by BAM in accordance with BAM-GGR 011 as well as modifications in accordance with auxiliary directive No. 7 have to be documented in this acceptance certificate. For package design series which are already manufactured the deviations and modifications in accordance with auxiliary directive No. 7 tolerated by BAM have to be documented in the Documentation Book for the package design series.
4. It must be made sure that each user of the packaging will, before using the packaging for the first time, register with BfE and confirm that he is in possession of the Documentation Book, which especially contains the Approval Certificate, the Handling and Maintenance Instructions and the Instructions for Periodic Inspections, and that he observes this book. In this respect, the following documents must be mentioned in particular:
 - Handling Instructions HA-97-09, Rev. 4 "Handling of the BU-D Package", from DNT Company, dated 17.08.2018,
 - Testing instruction PA-03-05, Rev. 0 "Contamination Control and Dose Rate Measurement of the BU-D Packages", from DNT, dated 11.04.2003,
 - Testing instruction PA-00-01, Rev. 3 "Periodic Inspection of the BU-D Package", from DNT, dated 11.04.2003,
 - Inspection instruction PA-03-04, Rev. 1 "Inspections of the BU-D Package within the Scope of Maintenance, of Regular and Periodic Inspections", from DNT, dated 14.10.2013,

The use of documents with a higher revision index is only allowed in connection with this certificate after release by BAM and approval by BfE.
5. Each package according to this series design must be submitted to periodic inspections in due time. For design series that will exclusively be used outside the Federal Republic of Germany, the periodic inspections may be performed and certified by personnel authorized by the authorities of the concerned countries. Certifications proving that the periodic inspections were carried out must be sent to BAM and BfE uncalled.
6. Each package according to this series design must be durably marked with the above-mentioned identification and with the date (month, year) of the next periodic inspection.
7. Any modifications of drawings, parts lists and material specifications, on which the approval is based, must be released by BAM and approved by BfE before production may start.
8. This approval does not relieve the user from the duty to respect the regulations of the countries towards or through whose territory this package is transported.

Costs:

1. Based on § 12, Articles 1 and 2 of the Law on the Transport of Dangerous Goods (Gefahrgutbeförderungsgesetz - GGBefG), in the version published on July 7, 2009 (BGBl. I p. 1774, 3975), modified by article 5 of the law dated July 26, 2016 (BGBl. 2016 I p. 1843), combined with § 1 para. 2 of the Decree Concerning Fees for Measures during the Transport of Dangerous Goods (Gefahrgutkostenverordnung - GGBKostV) of March 7, 2013 (BGBl. 2013 I p. 466), last modified by article 2 of the decree dated December 7, 2017 (BGBl. 2017 I p. 3859), costs - fees and expenditures - will be charged for this notification. The costs arise from § 2 in connection with attachment 2 of the GGBKostV.
- 2 According to § 12 Article 1 of the GGBefG, related to § 13 Article 1 No. 1 of the Law on Administrative Expenses (VwKostG) of June 23, 1970 (BGBl. I p. 821), in the version valid until August 14, 2013 dated December 5, 2012 (BGBl. I p. 2415) these costs shall be carried by company DNT.
3. The assessment of costs will be notified separately.

Statement of rights of appeal:

Objections against this authorization may be filed within one month after its issuing with the Federal Agency for the Safety of Nuclear Waste Management in Berlin.

Salzgitter, January 30, 2019

In representation

(Stamp)

Thiele

Enclosures

Attachment

Enclosure 1: Data Sheet No. 001-068-00 (Index e)


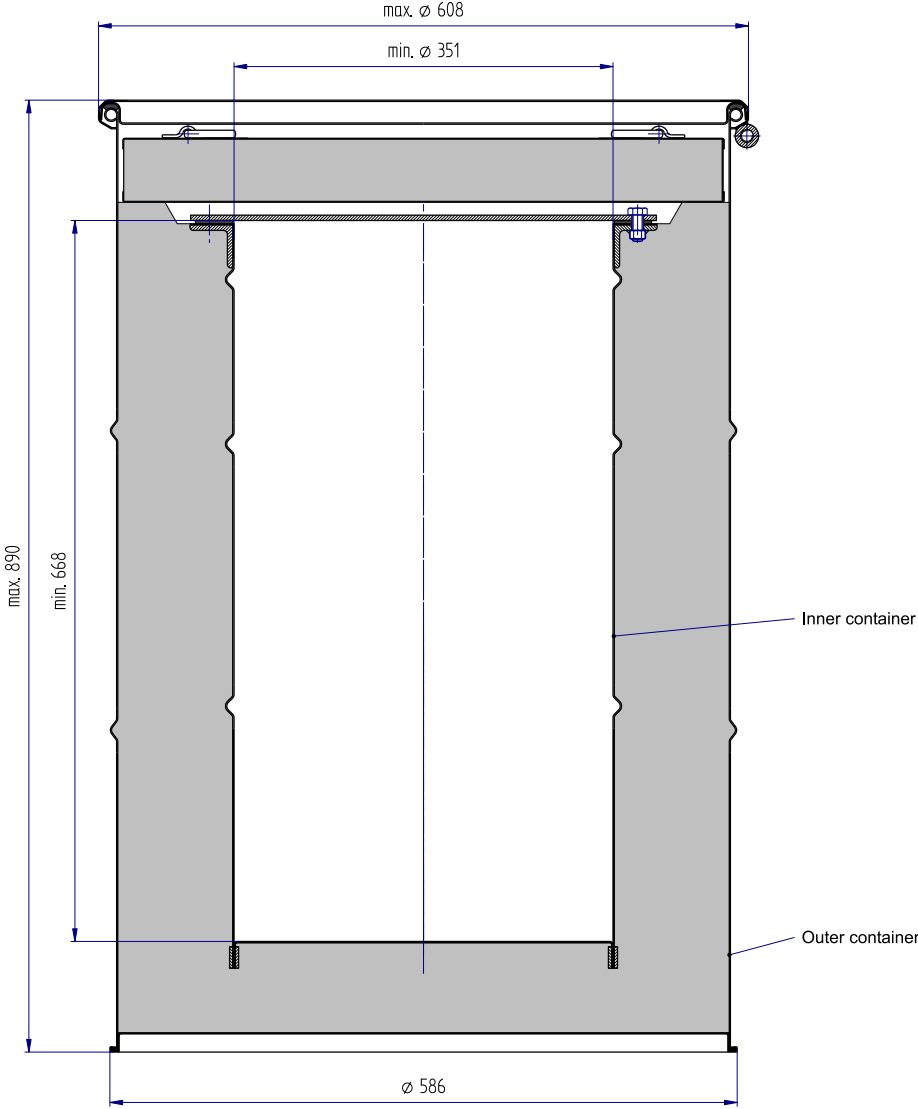
Enclosure 2: Type list

- Attachment to Certificate of Approval D/4305/AF-96 (Rev. 10) -

Rev. No.	Date of publication	Valid until	Reason for the revision
0 ^{*)}	30.01.1992	31.01.1995	First issue
1 ^{*)}	23.08.1995	31.08.1998	Complete new version, among others with the modification of the allowable contents and the transport index.
2 ^{*)}	14.08.1998	31.08.2001	Modification of the sections concerning Traffic Regulations, Holder of Approval, Documents, Validity, Auxiliary Directives and Remarks.
3 ^{*)}	08.08.2001	31.12.2001	Modification of the sections concerning Traffic Regulations, Holder of Approval, Documents, Validity, Auxiliary Directives and Remarks.
4	26.02.2002	28.02.2005	Conversion to the regulations based on the IAEA Regulations TS-R-1 including change of the package identification extension of the content; modification of the sections concerning Traffic Regulations, Documents, Marking, Validity, Allowable Content, Auxiliary Directives and Remarks.
5	23.06.2004	30.6.2006	Modification of the allowable content, Increase of the maximum allowable inner diameter of the pails, Inclusion of the carrier air, Revision of the handling, maintenance and test reports, Modification of the sections Traffic Regulations, Documents, Validity, Allowable Content, Auxiliary Directives and Remarks.
6	21.12.2005	31.12.2006	Modification of the Allowable Content: Modification of the sections Transport Regulations, Documents, Validity, Allowable Content, Auxiliary Directives and Remarks.
7	15.09.2006	31.07.2009	Deleting of the uranium mass limitation, new safety report; modification of the sections Transport Regulations, Documents, Validity, Allowable Content, Auxiliary Directives and Remarks.
8	05.02.2009	31.01.2014	Content restriction if uranyl nitrate is present; Modification of the sections Transport Regulations, Documents, Validity, Allowable Content, Package Design, Package Description, Auxiliary Directives and Remarks, Enclosures.
9	11.11.2013	30.11.2018	Modification of the sections Transport Regulations, Documents, Validity, Package Description, Auxiliary Directives and Remarks Remark: Certificate of Approval D/4305/AF-96 (Rev. 8) remains valid until 31.01.2014.
10	30.01.2019	31.01.2024	Modification of the Holder of Approval and the Allowable Content; Modification of the sections Transport Regulations, Documents, Validity, Auxiliary Directives and Remarks

^{*)} Revisions of the certificate of approval D/4305/AF-85

- Enclosure 1 to Certificate of Approval D/4305/AF-96 (Rev. 10) -

		DATA SHEET		No. 001-068-00		
<div><p>max. Ø 608 min. Ø 351 max. 890 min. 668 Ø 586</p><p>Inner container</p><p>Outer container</p></div> <div><p>Masses:</p><p>Tare approx. 160 kg</p><p>Gross approx. 260 kg</p></div>						
Designation Container BU-D						
Für diese Unterlage behalten wir uns alle Rechte vor. (Urheberschutz DIN 34)						
e	Nr. 060302 – Masse Tara von 100 kg auf 160 kg geändert	13.03.2006	Korn	1987	Tag	Name
d	Übernahme auf CAD	10.07.2002	Korn	Bearb.	04.11.	Adelmann
Index	Änderung	Tag	Name	Gepr.	04.11.	Knichelmann

- Enclosure 2 to Certificate of Approval D/4305/AF-96 (Rev. 10) -

**Type List
for Container BU-D**

Container of Type BU-D which were respectively will be manufactured according to the parts lists mentioned in the following are in agreement with the package design mentioned in this certificate of approval (see also auxiliary directives 2, 3 and 7).

Parts List Revision	Release by BAM
001-068, Index c	Letter of BAM dated 19.7.2007 (Ref.: III.32/Jo)

Salzgitter, January 30, 2019

In representation

Thiele