GB/2834B/B(M)F (Rev.13)

**CERTIFICATE OF APPROVAL OF PACKAGE DESIGN AND SHIPMENT FOR THE CARRIAGE OF RADIOACTIVE MATERIAL**

This is to certify that for the purposes of the Regulations of the International Atomic Energy Agency

* The Competent Authority of Great Britain in respect of inland surface transport, being the Office for Nuclear Regulation;
* The Competent Authority of the United Kingdom of Great Britain and Northern Ireland in respect of sea transport, being the Secretary of State for Transport;
* The Competent Authority of the United Kingdom of Great Britain and Northern Ireland in respect of air transport, being the Civil Aviation Authority; and
* The Competent Authority of Northern Ireland in respect of road transport, being the Department of Agriculture, Environment and Rural Affairs - Northern Ireland

approve the package design and shipment specified in Section 1 of this certificate, as submitted for approval by EDF Energy Nuclear Generation Limited (see Section 5)

as: Type B(M)F

by: Road and Rail in Great Britain.

Packaging identification: Mk A2 AGR Transport Flask (Design No. 2834)

Packages manufactured to this design meet the requirements of the regulations and codes on pages 3 and 4, relevant to the mode of transport, subject to the following general condition and to the conditions in the succeeding pages of this certificate.

In the event of any alteration in the composition of the package, the package design, the management system(s) associated with the package 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.

Expiry Date: This certificate cancels all previous revisions and is valid until the end of September 2027 (see Section 5).

COMPETENT AUTHORITY IDENTIFICATION MARK: GB/2834B/B(M)F

Signature: 

Date of Issue: 3 November 2023

Ian Barlow, Head of Transport Competent Authority

Office for Nuclear Regulation

Redgrave Court, Merton Road

Bootle, Merseyside

L20 7HS

on behalf of the Office for Nuclear Regulation; the Secretary of State for Transport; the Civil Aviation Authority; and the Department of Agriculture, Environment and Rural Affairs - Northern Ireland.

***This certificate does not relieve the consignor from compliance with any requirement of the government of any country through or into which the package will be transported.***

**REGULATIONS GOVERNING THE TRANSPORT OF RADIOACTIVE MATERIALS**

**INTERNATIONAL**

International Atomic Energy Agency (IAEA)

SSR-6 Regulations for the Safe Transport of Radioactive Material 2018 Edition

United Nations Economic Commission for Europe (UNECE)

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) 2023 Edition

Intergovernmental Organisation for International Carriage by Rail (OTIF)

Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) 2023 Edition

International Maritime Organization (IMO)

International Maritime Dangerous Goods (IMDG) Code 2020 Edition incorporating Amendment 40-20

International Civil Aviation Organization (ICAO)

Technical Instructions for the Safe Transport of Dangerous Goods by Air 2023-2024 Edition

**UNITED KINGDOM**

***ROAD***

GREAT BRITAIN ONLY:

The Energy Act 2013 (2013 c. 32); The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (SI 2009 No. 1348); The Energy Act 2013 (Office for Nuclear Regulation) (Consequential Amendments, Transitional Provisions and Savings) Order 2014 (SI 2014 No. 469)

NORTHERN IRELAND ONLY:

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (Northern Ireland) 2010, (SR 2010 No 160)

***RAIL***

GREAT BRITAIN ONLY:

The Energy Act 2013 (2013 c. 32); The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (SI 2009 No. 1348); The Energy Act 2013 (Office for Nuclear Regulation) (Consequential Amendments, Transitional Provisions and Savings) Order 2014 (SI 2014 No. 469)

***SEA***

British registered ships and all other ships whilst in United Kingdom territorial waters:

The Merchant Shipping Act 1995 (1995 c. 21); The Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997 (SI 1997 No. 2367); Merchant Shipping Notice MSN 1906 (M) The carriage of dangerous goods and marine pollutants: Amendments to international standards

***AIR***

The Air Navigation Order 2016 (SI 2016 No. 765); The Air Navigation (Dangerous Goods) Regulations 2002 (SI 2002 No.2786)

1. DESIGN SPECIFICATION
   1. Package Design
      * 1. The package design specification shall be in accordance with EDF Energy Engineering Generation Limited’s Report ‘Package Design Safety Report For the Mk A2 AGR Flask Design No. 2834’, reference E/REP/BRDB/0007/AGR/03 Rev 14 dated November 2023, and modifications to the package design approved by the authorities named on page 1 of this certificate under the established modifications procedure.
   2. Design Drawings
      * 1. The design is specified in the following drawings.

|  |  |  |  |
| --- | --- | --- | --- |
| **Design No.** | **Title (number of components)** | **Drawing / Drawing List** | **Issue** |
| 2834 | Outer / Flask Assembly Mk A2 AGR (one) | PED/XX/05910 | 38 |
| 2857 | Intermediate / Bottled Element Skip (8 Compartments) (one) | PED/XX/2312 | M |
| 2701 | Inner / Hinkley Point ‘B’ Type Bottle (up to eight) | GEN/XX/05732 | 009 |
| 2702 | Inner / Dungeness ‘B’ Type Bottle (up to eight) | GEN/XX/0661 | C |

* 1. Package Description and Materials of Manufacture
     + 1. The flask body is a single cuboid carbon steel forging onto which are attached cooling fins. The fins are of T Section and are welded to continuous vertical ligaments, 8 mm wide and 20 mm high, machined from the outer surface of the body forging. The fins are 18.6 mm thick, 113 mm high on the short side of the flask and 215 mm high on the long side. The fin pitch is 96 mm.
       2. The interspace between the fin backing plate and flask wall is filled with borosilicone neutron absorbing material for radiological shielding purposes and the outer surfaces of the body forging is covered by kaowool thermal insulation held within steel cover plates.
       3. The top corners of the body are shaped to provide shock absorbing features and the walls at the top are of thinner sections to provide an inset into which the lid is fitted.
       4. The lid is comprised of two separate but, normally, attached components. The shield lid is manufactured from a single forging and is around 400 mm thick. On the underside of the shield lid is attached a Lid Seal Member. This has a thin (5 mm) centre plate section, and a more robust rim which bears down on the seal face of the flask body. The rim carries two O-ring seals located in grooves which provide the sealing between the flask body and lid. The shield lid has shock absorbing snubbers on the top surface at each corner.
       5. The shield lid is retained to the flask body by chocks located in machined channels around the top of the lid and in the flask body upstand. The Lid Seal Member is secured onto the seal face by bolts which extend through the shield lid.
       6. A water level valve and a purge valve are located on opposite sides of the flask body. These allow the correct internal water level to be achieved and the remaining ullage space to be purged to Nitrogen, respectively. Lifting trunnions are bolted to opposite sides of the flask body to allow lifting and handling of the flask. A lid lifting pintle is bolted to the top centre of the shield lid to allow lifting of the lid only.
       7. See Appendix 1 for package illustration.
  2. Package Dimension and Weights
     + 1. Nominal dimensions: 2560 mm x 2312 mm x 2150 mm
       2. Maximum authorised gross weight: 53,300 kg
  3. Authorised Contents
     + 1. Contents as specified in paragraphs 1.13 and 1.14 below may be carried subject to the definitions and conditions specified in Section B8.3 of Appendix B of the document referred to in paragraph 1.1 of this certificate.
       2. Up to 8 bottled, intact AGR irradiated fuel elements, as defined in Section B4.5 of Appendix B of the document referred to in paragraph 1.1 of this certificate, using the fuel element bottles (DN 2701 or DN 2702).
       3. Non-fissile steel objects arising from AGR reactors may be carried in skip compartments not occupied by fuel elements, subject to the restrictions in Section B8.3.6 of Appendix B of the document referred to in paragraph 1.1 of this certificate.
       4. Debris is permitted, subject to the controls specified in Section B6 of Appendix B of the document referred to in paragraph 1.1 of this certificate.
       5. A temporary sign for skip identification to drawing FLA/XX/07122 may occupy a compartment of the 8-compartment skip.
  4. Restriction on Contents
     + 1. Fuel elements shall be cooled for no less than 60 days.
       2. The total heat output from the contents shall not exceed 10.0 kW. The heat output being derived using the PANTHER suite of computer codes.
       3. The total activity of the contents shall not exceed 200 PBq.
       4. The maximum fuel element rating shall not exceed 35 MW/t(U). The peak element irradiation shall not exceed 45.8 GWd/t(U). This is consistent with a stringer mean irradiation of between 38.0 and 40.0 GWd/t(U).
       5. The contents shall be immersed in water to the level of the weir in the water level valve. The water shall meet the requirements specified in Section B2 of Appendix B of the document referred to in paragraph 1.1 of this document.
  5. Containment System
     + 1. The containment system is formed by the package. There are two elastomeric seals in the lid, which are compressed to the main body of the package by tightening the lid bolts.
  6. Fissile Material Restrictions
     + 1. Unless the contents of the package and/or consignment meet the provision of paragraphs 417, 674 or 675 of IAEA SSR-6, the packages shall comply with the following fissile material approval.
     1. Fissile material approval B1
        1. Fissile material:

a) Uranium in the form of not more than 8 AGR fuel elements, each incorporating up to 36 stainless steel clad fuel pins and conforming generally to the drawings specified in Table B1 of the document referred to in paragraph 1.1 of this certificate. Each fuel pin shall meet one of the specifications in Table M(A)1 of the document referred to in paragraph 1.1 of this certificate.

b) Plutonium may be present as a consequence of irradiation.

* + - 1. Conditions:
         1. Beryllium, graphite (except from the fuel element graphite sleeves) and substances enriched in deuterium shall not be present.
      2. The confinement system is the AGR fuel transport flask DN 2834; the bottled element skip DN 2857; the fuel element bottle (DN2701 or DN 2702); and the stainless steel fuel cladding.
      3. Criticality Safety Index (CSI) = 0.
      4. The criticality safety documentation comprises Appendix M Part B of the document referred to in paragraph 1.1 of this certificate, which uses calculations from E/REP/BCCB/0110/AGR/18 Rev 000 dated December 2018, titled MONK10B Criticality Safety Calculations for AGR Transport (A & B certificates) and E/EAN/BCCB/0261/AGR/20 dated August 2020, titled Criticality Safety Sensitivity Calculations for AGR Transport (A & B certificates).
      5. This package design has been shown to be sub-critical following water ingress as required by paragraphs 680 and 681 of IAEA SSR-6. Special features to exclude water are not therefore required.
      6. The criticality safety case (see paragraph 1.28 above) assumed that the fissile material has been unirradiated to the point that neutron multiplication is maximised.
      7. Ambient temperature range for package design:

a) -10ºC to +30ºC (the higher temperature may be averaged over 24 hours).

* + - 1. Any fissile materials not specified in paragraph 1.24 are permitted to be present in only trace quantities, that is to say up to either a total of 1 g per package, or a concentration of 0.1 % by mass of the total fissile nuclides present.

1. use of package
   1. Information Provided in Safety Report on Use of Packaging
      * 1. The packaging shall be used and handled in accordance with Appendix Q of the document referred to in paragraph 1.1 of this certificate.
        2. The packaging shall be maintained in accordance with Appendix Q of the document referred to in paragraph 1.1 of this certificate.
        3. The package shall be moved under exclusive use as stated in the document referred to in paragraph 1.1 of this certificate.
   2. Actions Prior to Shipment
      * 1. Administrative controls shall ensure that the contents are in accordance with Section 1 of this certificate, and that the consignor and consignee hold a copy of the certificate and instructions on the use of the packaging.
   3. Supplementary Operational Controls
      * 1. The accessible surfaces of the package must not exceed 85°C (without insolation). Suitable measures must be taken to ensure that no access can be gained to surfaces with a temperature in excess of 85°C.
        2. The use of the package is restricted to movements with a maximum journey time of 28 days in ambient temperatures in the range specified in paragraph 2.9 below.
        3. The package shall not be sheeted over, other than in accordance with paragraph 2.8 below, or over-stowed by loose cargo.
        4. Sheeting over of the package is permitted subject to the maximum heat load not exceeding 1 kW and air circulation around the package being maintained so that reasonable cooling of the package is not inhibited.
   4. Range of Ambient Conditions for Package Design
      * 1. To compensate for the package design not meeting the requirements of IAEA SSR-6 paragraph 666, the use of the package is restricted to -10ºC to +30ºC (the higher temperature may be averaged over a period of 24 hours).
   5. Emergency Arrangements
      * 1. Before shipment takes place, adequate emergency arrangements must be made, copies of which shall be supplied to the GB Competent Authority on demand.
        2. Within Great Britain, if the consignor’s own, or other approved emergency plans, cannot be initiated for any reason, then the police shall be informed immediately.
   6. Nonconformity with IAEA SSR-6 Paragraphs 639, 655–657 and 660–666
      * 1. The requirements of paragraphs 639, 656 and 666 are not met.
        2. The requirements of paragraphs 659 to 666 have only been demonstrated for an ambient temperature range as specified in paragraph 2.9 above, and a maximum journey time of 28 days.
   7. Requirements of IAEA SSR-6 Paragraph 634
      * 1. Not applicable.
2. management systems
   * + 1. The management system(s) assessed as adequate in relation to this design by the authorities named on page 1 of this certificate, at the date of issue, are as specified in EDF Energy Engineering Generation Limited’s Report ‘Package Design Safety Report For the Mk A2 AGR Flask Design No. 2834’, reference E/REP/BRDB/0007/AGR/03 Rev 14 dated November 2023 referred to in Section 1 above, and comprise the following:

◼ EDF Energy Nuclear Generation Quality Policy, BE/POL/027 and;

◼ EDF Energy Nuclear Generation, Integrated Company Practice: Management of AGR Nuclear Fuel, BEG/ICP/FUEL/001/01 and;

◼ B311 Fuel Handling Plant Flask Quality Plan, QP/B311/324.

* + - 1. No alteration may be made to any management system confirmed as adequate in relation to this design, unless:
         1. the authorities named on page 1 of this certificate have confirmed the amended management system is adequate prior to implementation or use; or
         2. the alteration falls within the agreed change control procedures set out in the management system(s).
      2. Other management systems for design, testing, manufacture, documentation, use, maintenance, inspection, transport and in-transit storage operations may be used providing they comply with international, national or other standards for management systems agreed as acceptable by the authorities named on page 1 of this certificate.

1. ADMINISTRATIVE INFORMATION
   1. Related Approvals
      * 1. Not applicable.
   2. Shipment Approval
      * 1. In accordance with the requirements of IAEA SSR-6 paragraphs 825(a) and 825(b), packages meeting this design shall require multilateral shipment approval.
        2. Shipment approval for carriage into or through the United Kingdom is authorised by this certificate.
   3. Packaging Serial Numbers
      * 1. For the purpose of compliance with ADR / RID, the owner of the packaging shall be responsible for informing ONR of the serial number of each packaging manufactured to this design.
   4. Additional Technical Data / Information
      * 1. Not applicable.
2. CERTIFICATE STATUS
   1. Design and shipment approval issued to:

EDF Energy Nuclear Generation Ltd

Barnett Way

Barnwood

Gloucester

GL4 3RS

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| --- | --- | --- | --- |
| **Issue / Revision Number** | **Date of Issue** | **Date of Expiry** | **Reason for Revision** |
| 1 | 25 September 2003 | 30 September 2006 | Design approval issued under new regulations |
| 2 | 25 July 2005 | 30 September 2006  Extended by letter to 31 March 2007 | Issued to reflect the changes introduced by Category A modifications N0101 Issue 2 and N0104 Issue 2 |
| 3 | 23 March 2007 | 31 March 2012 | Issued on expiry of the previous certificate |
| 4 | 14 April 2010 | 31 March 2012 | Includes sea transport and minor amendments |
| 5 | 4 March 2011 | 31 March 2012 | Mod N0095 to increase maximum permitted uranium enrichment |
| Letter of Extension | 21 March 2012 | 30 September 2012 | Late submission for renewal and subsequent request for extension |
| 6 | 28 September 2012 | 31 March 2014 | Conditional renewal granted subject to satisfactory response to extant technical issues |
| 7 | 31 March 2014 | 3 April 2014 | Renewal based on modification N0190 |
| 8 | 29 April 2014 | 30 September 2017 | Reissued to address errors in previous issue |
| 9 | 6 March 2015 | 30 September 2017 | Issued based on modification N0182 |
| 10 | 11 November 2016 | 30 September 2022 | Revision based on modification N0210 |
| 11 | 2 May 2019 | 30 September 2022 | Revision based on modification N0181 and N0222 |
| 12 | 15 September 2022 | 30 September 2027 | Revision based on modification N0219 |
| 13 | 3 November 2023 | 30 September 2027 | Revision to grant 5-year flask major maintenance period under modification N0251 and issued as a combined certificate of approval of package design and shipment |

Appendix 1 – package illustration

