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| ONR Project assessment report  PR-01690 - Assessment of GB/3570/H(U)-96 Modification 2 for Low Weight Type 48Y Cylinders |



ONR Project assessment report

**Project name**: PR-01690 - GB/3570/H(U)

**Report title**: Assessment of GB/3570/H(U)-96 Modification 2 for Low Weight Type 48Y Cylinders

**Dutyholder/Applicant**: Urenco UK Limited

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# Executive summary

This report presents the findings of the ONR assessment of the proposed Category B Modification 2 to the GB/3570/H(U) package design that was submitted for approval by Urenco UK Limited (the applicant) to the Office for Nuclear Regulation (ONR) as the Great Britain (GB) competent authority.

The modification is required to allow the transport of two low weight Type 48Y cylinders, where the measured mass of uranium hexafluoride (UF6) in the cylinders is lower than the minimum content specified in the extant GB/3570/H(U) (Rev.7) certificate of approval. It is proposed that the cylinders will be transported by road and sea from the National Atomic Research Institute (NARI) in Taiwan to the applicant’s Capenhurst site in the United Kingdom (UK).

Based on the assessment and inspection work carried out by ONR, it is concluded that the claims, arguments and evidence provided by the applicant are adequate to justify the safety of these low weight Type 48Y cylinders under all conditions of transport.

It is recommended that ONR’s Head of Regulation for the GB Transport Competent Authority:

* accepts this report to confirm support for the ONR technical and regulatory arguments that justify granting competent authority approval of the requested modification; and
* grants approval of the modification by signing the competent authority approval section of the applicant’s modification sheet, GB/3570/H(U)-96 Mod 2 Revision 2.

Table 1: List of abbreviations.

|  |  |
| --- | --- |
| Term/Acronym | Description |
| ANSI | American National Standards Institute |
| BTP | Blanket Thermal Protector |
| CA | Competent Authority |
| CoA | Certificate of Approval |
| EIMT | Examination, Inspection, Maintenance and Testing |
| GB | Great Britain |
| INER | Institute of Nuclear Energy Research |
| ISO | International Standards Organization |
| NARI | National Atomic Research Institute |
| ONR | Office for Nuclear Regulation |
| PAR | Project Assessment Report |
| PDSR | Package Design Safety Report |
| RQ | Regulatory Query |
| UF6 | Uranium Hexafluoride |
| UK | United Kingdom |
| UUK | Urenco UK Limited |
| WIReD | (ONR) Well Informed Regulatory Decisions |

Table of contents

[Executive summary 3](#_Toc207291764)

[1. Permission requested 6](#_Toc207291765)

[2. Background 6](#_Toc207291766)

[2.1. Overview of Package Design 6](#_Toc207291767)

[2.2. Regulatory History 6](#_Toc207291768)

[2.3. Purpose and Scope of Modification 7](#_Toc207291769)

[3. Assessment and inspection work carried out by ONR in consideration of this request 8](#_Toc207291770)

[3.1. Mechanical Engineering Assessment 8](#_Toc207291771)

[3.1.1. Thermal Performance 8](#_Toc207291772)

[3.1.2. Ageing Mechanisms 9](#_Toc207291773)

[3.1.3. Examination, Inspection, Maintenance & Testing 9](#_Toc207291774)

[3.1.4. Permissioning Inspection 9](#_Toc207291775)

[4. Matters arising from ONR’s work 10](#_Toc207291776)

[5. Conclusions 10](#_Toc207291777)

[6. Recommendations 10](#_Toc207291778)

[References 10](#_Toc207291779)

# Permission requested

1. Urenco UK Limited (UUK, the applicant) has applied (refs. [1, 2]) to the Office for Nuclear Regulation (ONR) as the Great Britain (GB) competent authority (CA) for approval of Modification 2 to the GB/3570/H(U) package design for the transport of two low weight Type 48Y cylinders from Taiwan to UUK’s Capenhurst site.
2. This Project Assessment Report (PAR) presents the basis of our regulatory decision regarding GB/3570/H(U)-96 Modification 2.

# Background

## Overview of Package Design

1. The GB/3570/H(U) packaging comprises an ISO 7195 or ANSI N14.1 standards specification (refs. [3, 4]) Type 48X/Y cylinder fitted with valve protection and a blanket thermal protector (BTP).
2. The authorised package contents are solid depleted, natural or reprocessed (232U maximum concentration 0.005mg/gU) non-fissile or fissile excepted uranium hexafluoride (UF6).

## Regulatory History

1. A new package design approval under the GB/3570/H(U)-96 marking was issued in May 2004 and this approval has been renewed a number of times since. At the time of UUK’s application, the most recent renewal had taken place in May 2020 with the issue of the GB/3570/H(U)-96 (Rev.6) certificate of approval (CoA) (ref. [5]).
2. Following submission of the application, we commenced work on renewal of the GB/3570/H(U) package design approval (ref. [6]). This permissioning work was completed in June 2025 and we issued the GB/3570/H(U) (Rev.7) CoA (ref. [7]), to be effective from 1 August 2025.
3. During our assessment of the modification, the applicant amended their modification application under:

* GB/3570/H(U)-96 Mod 2 Revision 1 (ref. [8]) to correct the cylinder serial numbers and revise the loaded cylinder weights; and
* GB/3570/H(U)-96 Mod 2 Revision 2 (ref. [9]) to accommodate our renewal of the package design approval and request, if necessary, approval of the modification against the GB/3570/H(U) (Rev.7) CoA.

1. Our assessment of the applicant’s modification was made against the GB/3570/H(U) (Rev.7) CoA, which is now in effect.
2. All outstanding issues from the most recent renewals of package design approval and our inspections were resolved through the June 2025 renewal (ref. [6]). Three Level 4 regulatory issues were raised during our permissioning assessment to address identified shortfalls, but these did not preclude renewal of the GB/3570/H(U) package design approval and do not impact on our assessment of this modification.

## Purpose and Scope of Modification

1. The National Atomic Research Institute (NARI)[[1]](#footnote-2) in Taiwan (formally the Republic of China) had an inventory of Type 5A, Type 8A, Type 30B and Type 48Y cylinders containing UF6 that had been stored for over 40 years.
2. A project was initiated to transfer this cylinder inventory to the Capenhurst site in the United Kingdom (UK) that has completed the transport of:

* the Type 5A and Type 8A cylinders in the UX-30 5A/8A package by special arrangement under the GB/4123/X (Rev.1) CoA (ref. [10]); and
* the Type 30B and Type 48Y cylinders under relevant CoAs, where demonstrably compliant with those CoAs.

1. There remain two Type 48Y cylinders with content weights (ref. [9]) that are less than the minimum weight of 11,875 kg UF6 for a full Type 48Y cylinder specified in the extant GB/3570/H(U) (Rev.7) CoA:

* cylinder serial number 2007 - 11,458 kg UF6; and
* cylinder serial number 105642 - 9,971.53 kg UF6.

1. A modification is therefore required to transport these low weight Type 48Y cylinders from Taiwan to Capenhurst under the GB/3570/H(U) (Rev.7) CoA. It has been submitted as a Category B modification because of the potential safety impact, requiring CA approval under the applicant’s arrangements and in line with our guidance (ref. [11]).

# Assessment and inspection work carried out by ONR in consideration of this request

1. In accordance with the regulatory permissioning strategy (ref. [12]) and our transport permissioning instruction and guidance (refs. [13, 14]), we have carried out a targeted and proportionate assessment of the applicant’s proposed modification.
2. The modification requires assessment because a smaller mass of solid UF6 will melt faster under the statutory thermal tests and potentially impact on the thermal performance and integrity of the package under accident conditions of transport. Our assessment of the modification has therefore included assessment by an engineering specialist inspector. Given the nature of this modification, no assessment was required by criticality, shielding or human factors specialist inspectors.
3. We inspected the applicant’s management systems during renewal of the GB/3570/H(U) package design approval and judged them to be consistent with relevant good practice (ref. [15]). No further inspection work was proposed in our regulatory permissioning strategy, however we later judged that a permissioning inspection was necessary to underpin our mechanical engineering assessment.

## Mechanical Engineering Assessment

1. Our mechanical engineering assessment for this modification was reported in an assessment report (ref. [16]).
2. Our engineering assessor targeted their assessment on reviewing the applicant’s claims, arguments and evidence regarding the thermal performance of the package with low weight Type 48Y cylinders, ageing mechanisms and the inspection and maintenance of the cylinders during their storage in Taiwan.

### Thermal Performance

1. Our engineering assessor noted that the ISO 7195 and ANSI N14.1 standards do not specify a minimum content for Type 48Y cylinders and observed that the value specified in the GB/3570/H(U) CoA is simply 95% of the maximum fill limit rather than a safety limit derived from the Package Design Safety Report (PDSR) (ref. [17]). The assessor judged that the applicant’s analysis of thermal performance for the low weight Type 48Y cylinders was justified for the proposed modification.
2. The engineering assessor examined the applicant’s analysis of the thermal performance of the package with low weight cylinders under the statutory thermal tests for accident conditions of transport. Our assessor judged that the applicant’s modelling of vapour rupture failure of the cylinder was conservative and that there was no significant impact on the safety margin relative to the minimum specified content for a Type 48Y cylinder containing no less than 9,900 kg UF6, i.e. for the cylinders covered by this modification proposal.

### Ageing Mechanisms

1. Our engineering assessor judged that the applicant’s PDSR assessment of age-related degradation mechanisms was adequate given the requirement for routine examination, inspection, maintenance and testing (EIMT).

### Examination, Inspection, Maintenance & Testing

1. The GB/3570/H(U) (Rev.7) CoA requires that the packaging shall be used, handled and maintained in accordance with the ISO 7195:2020 or ANSI N14.1-2023 standards and Appendices F and U of the PDSR. We raised regulatory query RQ-01605 seeking evidence that these requirements had been met during storage in Taiwan and that the low weight Type 48Y cylinders were in an adequate condition for transport.
2. The applicant’s response provided evidence that these cylinders had been subject to ultrasonic and visual inspection of the cylinder wall thickness, lifting lug welds and general condition between 2022 and 2024 as part of the transport project. The applicant was unable to provide evidence of historical EIMT for loaded cylinders covering all the storage period in Taiwan.

### Permissioning Inspection

1. We were aware from our routine engagements with the applicant that other cylinders already transported from NARI were in storage at Capenhurst awaiting processing. Given the lack of historical EIMT evidence, we judged that a permissioning inspection was justified to inspect those cylinders and use our findings as evidence of the general condition of cylinders subject to similar storage conditions. We proposed to use this to underpin our engineering assessment and closed RQ-01605 on that basis.
2. During our permissioning inspection (ref. [18]) we:
3. inspected the general condition of ex-NARI Type 5A and Type 8A cylinders;
4. completed a walk-round of an ex-NARI Type 48Y cylinder and inspected its general condition, including lifting lugs and stiffening rings; and
5. reviewed UUK’s receipt inspection records for Type 30B and Type 48Y cylinders received from NARI.
6. Our engineering assessor judged that the inspected cylinders were in an adequate condition and indicative of the condition of any other cylinders subject to similar storage conditions. The assessor was satisfied that the recent EIMT of the low weight Type 48Y cylinders and a pre-shipment inspection are sufficient to ensure the cylinders are in a safe and compliant condition for transport.
7. Our engineering assessor recommended that GB/3570/H(U)-96 Mod 2 Revision 2 should be approved from an engineering perspective.

# Matters arising from ONR’s work

1. There are no matters arising from our assessment of this modification.

# Conclusions

1. Based on the work carried out by ONR, I conclude that the proposed modification provides an adequate safety justification for the transport of the two low weight Type 48Y cylinders identified in paragraph 12 of this PAR from Taiwan to Capenhurst under the GB/3570/H(U) (Rev.7) CoA.

# Recommendations

1. I recommend that ONR’s Head of Regulation for the GB Transport Competent Authority:

* accepts this PAR to confirm support for the ONR technical and regulatory arguments that justify granting competent authority approval of the requested modification GB/3570/H(U) Mod 2 Revision 2; and
* grants approval of this modification by signing the competent authority approval section of the applicant’s modification sheet, GB/3570/H(U)-96 Mod 2 Revision 2 (ref. [9]).

# References

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| [1] | Urenco UK Limited, "Application for UK Competent Authority Modification to Certificate GB/3570/H(U): Modification to Minimum Net Weight of Contents for Type 48Y Cylinders with Manufacturers Serial Numbers 1919 and 105642", ONR/2024/19R, 17 July 2024, WIReD Ref: ONRW-2019369590-12770. |
| [2] | Urenco UK Limited, "Package Design Modification Approval Sheet - GB/3570/H(U)-96 Mod 2", July 2024, ONRW-2019369590-12769. |
| [3] | BS ISO 7195:2020, "Nuclear Energy - Packagings for the Transport of Uranium Hexafluoride (UF6)". |
| [4] | ANSI N14.1-2023, "Nuclear Materials - Uranium Hexafluoride - Packagings for Transport". |
| [5] | GB/3570/H(U)-96 (Rev.6), "Certificate of Approval of Package Design for the Carriage of Radioactive Material", May 2020, CM9 Ref: 2020/120900. |
| [6] | ONR, WIReD Permissioning Record PR-01208. |
| [7] | GB/3570/H(U) (Rev.7), "Certificate of Approval of Package Design for the Carriage of Radioactive Material", June 2025, WIReD Ref: ONRW-2019369590-20089. |
| [8] | Urenco UK Limited, "Package Design Modification Approval Sheet - GB/3570/H(U)-96 Mod 2 Revision 1", February 2025, WIReD Ref: ONRW-2019369590-22115. |
| [9] | Urenco UK Limited, "Package Design Modification Approval Sheet - GB/3570/H(U)-96 Mod 2 Revision 2", July 2025, WIReD Ref: ONRW-2019369590-22116. |
| [10] | GB/4123/X (Rev.1), "Certificate of Approval of Special Arrangement for the Carriage of Radioactive Material", June 2025, WIReD Ref: ONRW-2019369590-6226. |
| [11] | ONR, TRA-PER-GD-014 Issue 4, "Guidance for Applications for UK Competent Authority Approval", October 2023, CM9 Ref: 2019/335838. |
| [12] | ONR, WIReD Permissioning Record PR-01690. |
| [13] | ONR, ONR-TCA-IN-001 Issue 1, "Transport Permissioning", January 2025, CM9 Ref: 2022/47683. |
| [14] | ONR, ONR-TCA-GD-001 Issue 1, "Transport Permissioning", January 2025, CM9 Ref: 2018/386305. |
| [15] | ONR, WIReD Inspection Record IR-54033. |
| [16] | ONR, "Mechanical Engineering Assessment (AR-01592) to Support Permissioning (PR-01690) of GB/3570/H(U)-96 Modification 2", August 2025, WIReD Ref: ONRW-2126615823-7860. |
| [17] | Urenco UK Limited, "Safety Analysis Report in Support of Competent Authority Approval for Model 48 X and 48Y Cylinder Package Design to Transport Uranium Hexafluoride", UUK6144487 Revision 11, May 2025, WIReD Ref: ONRW-2019369590-20601. |
| [18] | ONR, WIReD Inspection Record IR-54004. |

1. Previously known as the Institute for Nuclear Energy Research (INER) [↑](#footnote-ref-2)