



U.S. Department
of Transportation

Pipeline and
Hazardous Materials
Safety Administration

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

**COMPETENT AUTHORITY CERTIFICATION FOR A
TYPE B(U)F FISSILE
RADIOACTIVE MATERIALS PACKAGE DESIGN
CERTIFICATE USA/9381/B(U)F-96, REVISION 0**

The Competent Authority of the United States certifies that the radioactive material package design described in this certificate satisfies the regulatory requirements for a Type B(U)F package for fissile material as prescribed in the regulations of the International Atomic Energy Agency¹ and the United States of America² The package design is approved for use within the United States for import and export shipments made in accordance with applicable international and domestic transport regulations.

1. Package Identification - HI-STAR 180L.
2. Package Description and Authorized Radioactive Contents - as described in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9381, Revision 0 (attached).
3. Criticality - The minimum criticality safety index is 0.0. The maximum number of packages per conveyance is determined in accordance with Table 11 of the IAEA regulations cited in this certificate.
4. General Conditions -
 - a. Each user of this certificate must have in his possession a copy of this certificate and all documents necessary to properly prepare the package for transportation. The user shall prepare the package for shipment in accordance with the documentation and applicable regulations.
 - b. Each user of this certificate, other than the original petitioner, shall register his identity in writing to the Office of Engineering and Research, (PHH-23), Pipeline and Hazardous

¹ "Regulations for the Safe Transport of Radioactive Material, 2012 Edition, No. SSR-6" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

² Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

CERTIFICATE USA/9381/B(U)F-96, REVISION 0

Materials Safety Administration, U.S. Department of
Transportation, Washington D.C. 20590-0001.

- c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.
- d. Records of Management System activities required by Paragraph 306 of the IAEA regulations¹ shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the applicable requirements of Subpart H of 10 CFR 71.

5. Marking and Labeling - The package shall bear the marking USA/9381/B(U)F-96 in addition to other required markings and labeling.

6. Expiration Date - This certificate expires on May 31, 2026.

This certificate is issued in accordance with paragraph(s) 810 and 816 of the IAEA Regulations and Section 173.471 and 173.472 of Title 49 of the Code of Federal Regulations, in response to the May 28, 2021 petition by Holtec International, Camden, NJ, and in consideration of other information on file in this Office.

Certified By:



William Schoonover
Associate Administrator for Hazardous
Materials Safety

June 22, 2021
(DATE)

Revision 0 - Issued to endorse U.S. Nuclear Regulatory Commission
Certificate of Compliance No. 9381, Revision 0.

CERTIFICATE OF COMPLIANCE FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9381	0	71-9381	USA/9381/B(U)F-96	1 OF	4

2. PREAMBLE

- a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, *Code of Federal Regulations*, Part 71, "Packaging and Transportation of Radioactive Material."
 - b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.
3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

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|---|---|
| <p>a. ISSUED TO (<i>Name and Address</i>)</p> <p>Holtec International
1 Holtec Blvd.
Camden, NJ 08104</p> | <p>b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION</p> <p>Holtec International Report No. HI-2177805, <i>Safety Analysis Report on the HI-STAR 180L Package</i>,
Revision No. 2.</p> |
|---|---|

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

(1) Model No.: HI-STAR 180L

(2) Description

The HI-STAR 180L package is designed for transportation of undamaged irradiated Uranium Oxide (UO₂) Boiling Water Reactor (BWR) fuel assemblies in a basket, or of individual UO₂ fuel rods in quivers. The fuel basket provides criticality control; the packaging body provides containment boundary, moderator exclusion barrier, gamma and neutron radiation shielding, and heat rejection capability. The HI-STAR 180 L package uses two independent closure lids, with both closure lids designated as containment boundary components.

The cavity of the HI-STAR 180L package is approximately 4543 mm long. The package is approximately 5390 mm long without impact limiters and 8358 mm long with its impact limiters and impact limiter adapters. The approximate weight of the empty packaging (cask only) is 97 Metric Tons, and approximately 130 Metric Tons when including the basket, the shims, and the impact limiters. The maximum gross weight of the loaded HI-STAR 180L package is 156 Metric Tons.

Fuel Basket

The F-69L fuel basket is made of Metamic-HT, a metal matrix composite of aluminum and boron carbide, and serves both as structural material and neutron absorber material. Basket shims, between the fuel basket and the inside surface of the containment boundary, provide

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
	9381	0	71-9381	USA/9381/B(U)F-96	2 OF	4

5.(a)(2) Description (Continued)

for heat transfer and lateral structural support to the basket.

Quiver

A quiver is a hermetically sealed container for individual fuel rods which may be leaking, broken or fragmented, i.e., fuel debris.

Packaging Body

The containment vessel is formed by a cylindrical nickel steel shell welded to a nickel steel baseplate at the bottom and a machined nickel steel forging at the top, with machined surfaces to fasten two independent cryogenic steel closure lids, each equipped with a set of concentric metallic seals. The containment system for the HI-STAR 180L cask consists of the containment shell, the containment base plate, the containment closure flange, the inner closure lid, the outer closure lid, inner and outer closure lid bolts, the inner closure lid port covers, the outer closure lid access port plug, and their respective metallic seals and welds. The outer surface of the cask inner shell is buttressed by the monolithic shield cylinder for gamma and neutron shielding.

The HI-STAR 180L package features two removable top trunnions (inserted into the containment closure flange) qualified as lifting points, and two removable bottom trunnions installed in the bottom forging.

Impact Limiters

The HI-STAR 180L package is fitted with two impact limiters fabricated of aluminum crush material completely enclosed by an all-welded austenitic stainless-steel skin. Both impact limiters interface with the body of the packaging, using impact limiter adapters, and are attached directly to the body of the packaging with 16 longitudinal bolts.

(3) Drawings

The packaging shall be constructed and assembled in accordance with the following Holtec International Drawing Numbers:

(a) HI-STAR 180L Cask Drawing 10942, Sheets 1-7, Rev. 4

(b) F-69L Fuel Basket Assembly Drawing 10961, Sheets 1-3, Rev. 5

(c) HI-STAR 180L Impact Limiters Drawing 12285, Sheets 1-5, Rev. 0

(d) HI-STAR 180L Impact Limiters Adapters Drawing 10955, Sheets 1-4, Rev. 2

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1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
	9381	0	71-9381	USA/9381/B(U)F-96	3 OF	4

5.(b) Contents

(1) Type, Form, and Quantity of Material

- (a) BWR, channeled or unchanneled, fuel assemblies and separated fuel rods meeting the specifications in Table 7.D.1 and the characteristics in Table 7.D.2 of the application.
- (b) Broken, leaking, or fragmented fuel rods, or otherwise purposely punctured (to relieve internal pressure) fuel rods with a nominal 3 mm, or larger, opening, are loaded into quivers. Quivers are placed in one region (4 cells) at the periphery of the basket, as specified in Figures 7.D.1 and 7.D.2 of the application.
- (c) The minimum initial fuel rod enrichment is 0.7 wt.% ²³⁵U, and the maximum initial enrichment of any UO₂ assembly is 5.0 wt.% ²³⁵U.
- (d) The post-irradiation minimum cooling time is 2 years and the maximum average assembly burnup is 66 GWD/MTU.
- (e) Allowable loading patterns are specified in Table 7.D.3 with fuel specifications for burnup, enrichment and cooling time in Table 7.D.4 of the application; Basket regions are defined in Table 7.D.5 and Figures 7.D.1 and 7.D.2 of the application. In each loading pattern, the fuel specification, the package heat load limits, and the locations of the quivers must be satisfied.
- (f) The maximum decay heat is 35 kW.
- (g) Requirements for fuel assemblies and dummy fuel assemblies for a partial loading of a package are specified in Table 7.D.1 of the application.

5.b.(2) Maximum Quantity of Material Per Package

- (a) 69 undamaged BWR fuel assemblies and/or dummy fuel assemblies, of which a maximum of 9 may be fuel assemblies, including up to 4 missing fuel rods not replaced with dummy rods.
- (b) 69 undamaged BWR fuel assemblies and/or dummy fuel assemblies of which a maximum of 4 may be quivers, each quiver containing up to 28 fuel rods.

5.(c) Criticality Safety Index (CSI)= 0.0

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

- (a) The package shall be prepared for shipment and operated in accordance with Chapter 7 of the application.

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	9381	0	71-9381	USA/9381/B(U)F-96	4 OF	4

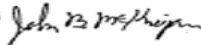
(b) The package shall meet the acceptance tests and be maintained in accordance with Chapter 8 of the application.

7. Transport of the Model No. HI-STAR 180L package must be performed under exclusive use shipment and with the personnel barrier installed.
8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.
9. Transport by air of fissile material is not authorized.
10. Expiration Date: May 31, 2026

REFERENCES:

Holtec International application "Safety Analysis Report on the HI-STAR 180L Package," Revision No. 2, dated April 27, 2021.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



Signed by McKirgan, John
on 05/05/21

John B. McKirgan, Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: May 5, 2021



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ORIGINAL REGISTRANT(S) :

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Camden, NJ, 08104
USA