

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
	9378	1	71-9378	USA/9378/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

- | | |
|---|--|
| a. ISSUED TO (Name and Address)
Holtec International
1 Holtec Blvd.
Camden, NJ 08104 | b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
Holtec International Report No. HI-2188080 <i>Safety Analysis Report on the HI-STAR 100MB Package</i>
Revision 32, dated May 29 October 25, 2019 |
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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 100MB
- (2) Description

The HI-STAR 100MB packaging consists of the following major components: the packaging body, the multi-purpose canister (MPC) or the fuel basket, the impact limiters, and the personal barrier. The packaging has two cavity lengths, designated as XL and SL. ~~The impact limiters have two sets of designs, a standard set and the other designated as LW.~~

The packaging body, comprised of a nickel steel shell welded to nickel steel bottom and top flanges, provides the containment boundary, the helium retention boundary, gamma and neutron shielding and heat rejection capability of the package. The containment system consists of the inner shell, bottom and top flanges, top closure lid(s), closure lid inner O-ring seal, vent and drain port cover and inner seals, and bolts for the closure lids and port covers. The outer surface of the inner shell is buttressed with a layered combination of lead, steel and Holtite B neutron shielding material. The top flange has bolted closure lid(s) with machined concentric grooves for elastomeric seals. The packaging body also features collapsible trunnions.

The MPC, a welded cylindrical structure with flat ends, consists of a honeycombed fuel basket made from panels of Metamic-HT, a baseplate, canister shell, lid and closure ring. Fuel spacers may be used to minimize the assembly to MPC lid gap. There is only one MPC model, the MPC-32M, designated for use with this packaging. With the MPC configuration, applicable only to the Type XL package, the HI-STAR 100MB utilizes a single bolted lid.

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	9378	1	71-9378	USA/9378/B(U)F-96	2 OF	4

5.(a)(2) Description (continued)

The fuel basket, made of Metamic-HT both as a structural and neutron absorber material, exists in two configurations, the F-24 M and F-32 M. The F-24 M basket has flux traps. With the fuel basket configuration, only applicable to the Type SL package, the HI-STAR 100 MB has two bolted lids, with each lid equipped with two concentric seals.

Two identical AL-STAR impact limiters, ~~fabricated of aluminum honeycomb crush material completely enclosed by an all-welded stainless steel skin,~~ are attached to the top and bottom of the packaging with 16 bolts each. ~~The standard impact limiter set is fabricated of aluminum honeycomb crush material completely enclosed by an all-welded stainless steel skin and may be used with both Cask Types XL and SL. The Version LW impact limiter set is fabricated of aluminum casting and unidirectional crush material completely enclosed by an all-welded stainless steel skin and may only be used with the Cask Type SL F-24 M configuration.~~

The personal barrier, placed over the package lying in a horizontal orientation during transport, is a packaging component when in use, providing a physical barrier to prevent access to hot areas of the package.

The HI-STAR 100MB is designed for maximum heat loads of 32 kW (package with the F-32M or F-24M basket) or 29 kW (package loaded with the MPC-32M).

The packaging body cavity is approximately 165 3/8 inches long (SL configuration) or 191 1/8 inches long (XL configuration) with respective total lengths of the packaging body of 197 inches or 212 inches, respectively. Both versions have an inside diameter of 68 3/4 inches, and an outer diameter of approximately 99 1/4 inches without impact limiters, and 124 inches with the impact limiters installed.

The maximum packaging weights of the SL and XL versions are approximately ~~2538,6000~~ pounds and ~~2466,-24000~~ pounds respectively. The package, as configured for transport, i.e., including impact limiters, weighs from 288,000 lbs (SL version) to 300,000 lbs (XL version).

(3) Drawings

The packaging shall be constructed and assembled in accordance with the following drawings:

- (a) HI-STAR 100MB Cask Drawing No. 11070, Sheets 1-7, Rev. 32
- (b) F-24M Fuel Basket Drawing No. 11083, Sheet 1, Rev. 1
- (c) F-32M Fuel Basket Drawing No. 11082, Sheet 1, Rev. 1
- (d) MPC-32M Basket Drawing No. 11084, Sheet 1, Rev. 1
- (e) MPC Enclosure Vessel Drawing No. 3923, Sheets 1-9, Rev. 38
- (f) HI-STAR 100MB Impact Limiter Drawing No. 11101, Sheets 1-4, Rev. 2

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	9378	1	71-9378	USA/9378/B(U)F-96	3 OF	4

(g) Impact Limiter Version LW Drawing No. 11758, Sheets 1-4, Rev. 0

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	9378	1	71-9378	USA/9378/B(U)F-96	4 OF	4

5(b) Contents

(1) Type and form of material

Moderate to high burnup, up to 55 GWd/MTU, spent PWR UO₂ Zr cladding fuel with a maximum initial enrichment of 5 wt.% U-235 and a minimum cooling time of 3.5 years. The maximum weight of a fuel assembly, including assemblies containing non-fuel hardware, must not exceed 1680 lbs. Fuel assembly characteristics are listed in Table 7.7.1 of the application.

(2) Maximum quantity of material per package:

- (a) 24 or 32 PWR UO₂ fuel assemblies in the F-24M or F-32M basket, respectively.
- (b) 32 PWR UO₂ fuel assemblies in the MPC-32M.
- (c) Control rods are authorized for transport within spent PWR fuel assemblies.

6. The Criticality Safety Index (CSI) is 0.0.

7. 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 the Operating Procedures in Chapter 7 of the application; and
- (b) The package must meet the Acceptance Tests and Maintenance Program of Chapter 8.0 of the application.

8. Additional operating requirements of the Model No. HI-STAR 100MB package include:

- (a) Damaged fuel assemblies, fuel debris, and irradiated non-fuel hardware are not authorized for transportation.
- (b) Maximum allowable time for the completion of wet transfer operations, based on design basis maximum heat load and initial pool water temperature of 48.9°C, is 17.5 hours. The maximum allowable time maybe recalculated, with other cask heat loads and pool water measured temperatures, prior to loading operations, as specified in Section 7.1.7.3 of the application.
- (c) The vacuum drying operations do not prescribe time limits for (i) the F-24M and F-32 M baskets respectively, for high burnup fuel, provided the cask heat load is equal to or below 24 kW and 26 kW respectively, and (ii) the MPC-32M for both high burnup fuel and all configurations with moderate burnup fuel.

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- (d) The minimum specific power, the maximum moderator temperature, the maximum fuel temperature of each fuel design shall not exceed the values listed in Table 7.7.4 of the application.
- (e) The fuel burnup credit loading curve is applicable only to spent fuel assembly classes, loaded in the MPC-32M/F-32M, identified in Table 7.7.3(a) of the application.
9. The package shall be transported exclusive use only with the personnel barrier installed during transport.
10. Transport of fissile material by air is not authorized.
11. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.
12. Expiration date: August 31, 2024.

REFERENCES

Holtec International Report No. HI-2188080 *Safety Analysis Report on the HI-STAR 100MB Package*, Revision ~~23~~, dated ~~May 29~~October 25, 2019.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION



John McKirgan, Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: ~~August 9, 2019~~TBD.