

**CERTIFICATE OF COMPLIANCE  
FOR SPENT FUEL STORAGE CASKS**

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The U.S. Nuclear Regulatory Commission is issuing this Certificate of Compliance pursuant to Title 10 of the *Code of Federal Regulations*, Part 72, "Licensing Requirements for Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste" (10 CFR Part 72). This certificate is issued in accordance with 10 CFR 72.238, certifying that the storage design and contents described below meet the applicable safety standards set forth in 10 CFR Part 72, Subpart L, and on the basis of the Final Safety Analysis Report (FSAR) of the cask design. This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72, as applicable, and the conditions specified below.

Certificate No.	Effective Date	Expiration Date	Docket No.	Amendment No.	Amendment Effective Date	Package Identification No.
1014	05/31/00	05/31/20	72-1014	16	TBD	USA/72-1014

Issued To: (Name/Address)

Holtec International  
Holtec Technology Campus  
One Holtec Blvd.  
Camden, NJ 08104

Safety Analysis Report Title

Holtec International Inc.,  
Final Safety Analysis Report for the  
HI-STORM 100 Cask System

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72, as applicable, the attached Appendix A (Inspections, Tests and Evaluations) and Appendix B (Technical Specifications) for aboveground systems except Version E, HI-TRAC MS, MPC-32M, and Version 1 of MPC-32 and MPC-68; the attached Appendix C (Inspections, Tests and Evaluations) and Appendix D (Technical Specifications) for the HI-STORM 100S Version E, HI-TRAC MS, MPC-32M, and Version 1 of MPC-32 and MPC-68M; or the attached Appendix A-100U (Inspections, Tests and Evaluations) and Appendix B-100U (Technical Specifications) for underground systems, and the conditions specified below:

### I. Technology

- a. Model No.: HI-STORM 100 Cask System

The HI-STORM 100 Cask System (the cask) consists of the following components: (1) interchangeable multi-purpose canisters (MPCs), which contain the fuel; (2) a storage overpack (HI-STORM), which contains the MPC during storage; and (3) a transfer cask (HI-TRAC), which contains the MPC during loading, unloading and transfer operations. The cask stores up to 32 pressurized water reactor fuel assemblies or 68 boiling water reactor fuel assemblies.

The HI-STORM 100 Cask System is certified as described in the Final Safety Analysis Report (FSAR) and in the U.S. Nuclear Regulatory Commission's (NRC) Safety Evaluation Report (SER) accompanying the Certificate of Compliance (CoC).

The MPC is the confinement system for the stored fuel. It is a welded, cylindrical canister with a honeycombed fuel basket, a baseplate, a lid, a closure ring, and the canister shell. All MPC components that may come into contact with spent fuel pool water or the ambient environment are made entirely of stainless steel or passivated aluminum/aluminum alloys such as the neutron absorbers. The canister shell, baseplate, lid, vent and drain port cover plates, and closure ring are the main confinement boundary components. All confinement boundary components are made entirely of stainless steel. The honeycombed basket, which contains neutron absorbing material, provides criticality control.

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There are twelve types of MPCs: the MPC-24, MPC-24E, MPC-24EF, MPC-32, MPC-32F, MPC-32 Version 1, MPC-32M, MPC-68, MPC-68 Version 1, MPC-68F, MPC-68FF, and MPC-68M. The number suffix indicates the maximum number of fuel assemblies permitted to be loaded in the MPC. All twelve MPC models have the same external diameter.

The HI-TRAC transfer cask provides shielding and structural protection of the MPC during loading, unloading, and movement of the MPC from the spent fuel pool to the storage overpack. The transfer cask is a multi-walled (carbon steel/lead/carbon steel) cylindrical vessel with a neutron shield jacket attached to the exterior. All transfer cask sizes have identical cavity diameters.

#### Above Ground Systems

The HI-STORM 100 or 100S storage overpack provides shielding and structural protection of the MPC during storage. The overpack is a heavy-walled steel and concrete, cylindrical vessel. Its side wall consists of plain (un-reinforced) concrete that is enclosed between inner and outer carbon steel shells. The overpack has air vent at the bottom and at the top to allow air to circulate naturally through the cavity to cool the MPC inside. The HI-STORM 100 UVH is an alternative version of the overpack, with a similar design, but no air vents. A loaded MPC is stored within the HI-STORM 100 or 100S storage overpack in a vertical orientation. The HI-STORM 100A and 100SA are variants of the HI-STORM 100 family and are outfitted with an extended baseplate and gussets to enable the overpack to be anchored to the concrete storage pad in high seismic applications. The version E can be arrayed in a free standing or anchored configuration.

#### Underground Systems

The HI-STORM 100U System is an underground storage system identified with the HI-STORM 100 Cask System. The HI-STORM 100U storage Vertical Ventilated Module (VVM) utilizes a storage design identified as an air-cooled vault or caisson. Air inlets and outlets allow air to circulate naturally through the cavity to cool the MPC inside. The subterranean steel structure is seal welded to prevent ingress of any groundwater from the surrounding subgrade, and it is mounted on a stiff foundation. A loaded MPC is stored within the HI-STORM 100U storage VVM in the vertical orientation.

## II. Design Features

### a. Codes and Standards

The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), 1995 Edition with Addenda through 1997, is the governing Code for the HI-STORM 100 System MPCs, OVERPACKs, and TRANSFER CASKs, as clarified in item i below, except for Code Sections V and IX. The latest effective editions of ASME Code Sections V and IX, including addenda, may be used for activities governed by those sections, provided a written reconciliation of the later edition against the 1995 Edition, including addenda, is performed by the certificate holder. American Concrete Institute (ACI) 349-85 is the governing Code for plain concrete as clarified in Appendix 1.D of the Final Safety Analysis Report for the HI-STORM 100 Cask System.

#### i. Alternatives to Codes, Standards, and Criteria

Appendix A Table 3-1 and Appendix C Table 3-1 list approved alternatives to the ASME Code for the design of the MPCs, OVERPACKs, and TRANSFER CASKs of the HI-STORM 100 and 100U Cask Systems.

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## ii. Construction/Fabrication Alternatives to Codes, Standards, and Criteria

Proposed alternatives to the ASME Code, Sections II and III, 1995 Edition with Addenda through 1997 including modifications to the alternatives allowed by item i may be used on a case-specific basis when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or designee. The request for such alternative should demonstrate that:

1. The proposed alternatives would provide an acceptable level of quality and safety, or
2. Compliance with the specified requirements of the ASME Code, Section III, 1995 Edition with Addenda through 1997, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

- b. The NRC has approved an exemption request by the CoC applicant from the requirements of 10 CFR 72.236(f), to allow a Supplemental Cooling System to provide for decay heat removal in accordance with Section 3.1.4 of Appendices B and D.

## c. Heavy Loads Requirements

Each lift of an MPC, a HI-TRAC transfer cask, or any HI-STORM overpack must be made in accordance to the existing heavy loads requirements and procedures of the licensed facility at which the lift is made. A plant specific review (under 10 CFR 50.59 or 10 CFR 72.48, if applicable) is required to show operational compliance with existing plant specific heavy loads requirements. Lifting operations outside of structures governed by 10 CFR Part 50 must be in accordance with Section 4.2 and Sections 2.1.6 and 2.3 (if applicable) of Appendix A.

## d. Pre-Operational Testing and Training

## i. Dry Run Training Exercise

1. A dry run training exercise of the loading, closure, handling, unloading, and transfer of the HI-STORM 100 Cask System shall be conducted by the licensee prior to the first use of the system to load spent fuel assemblies. The training exercise shall not be conducted with spent fuel in the MPC. The dry run may be performed in an alternate step sequence from the actual procedures, but all steps must be performed. The dry run shall include, but is not limited to the following:
  2. Moving the MPC and the transfer cask into the spent fuel pool or cask loading pool.
  3. Preparation of the HI-STORM 100 Cask System for fuel loading.
  4. Selection and verification of specific fuel assemblies to ensure type conformance.
  5. Loading specific assemblies and placing assemblies into the MPC (using a dummy fuel assembly), including appropriate independent verification.
  6. Remote installation of the MPC lid and removal of the MPC and transfer cask from the spent fuel pool or cask loading pool.
  7. MPC welding, NDE inspections, pressure testing, draining, moisture removal (by vacuum drying or forced helium dehydration, as applicable), and helium backfilling. (A mockup may be used for this dry-run exercise.)
  8. Operation of the HI-STORM 100 SCS or equivalent system, if applicable.
  9. Transfer cask upending/downending on the horizontal transfer trailer or other transfer device, as applicable to the site's cask handling arrangement.
  10. Transfer of the MPC from the transfer cask to the overpack/VVM.

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11. Placement of the HI-STORM 100 Cask System at the ISFSI, for aboveground systems only.
12. HI-STORM 100 Cask System unloading, including flooding MPC cavity, removing MPC lid welds. (A mockup may be used for this dry-run exercise.)

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Dated TBD

## Attachments:

1. Appendix A
2. Appendix B
3. Appendix A-100U
4. Appendix B-100U
5. Appendix C
6. Appendix D

