

Forced Helium Dehydration (FHD) System



Holtec's Forced Helium Dehydration System (FHD) is used to remove the remaining moisture in a dry spent fuel transport and storage system after all of the water that can be practically removed through draining has been expelled from the cask. FHD is engineered for the purpose of removing moisture to where the partial pressure of the trace quantity of water vapor in cask cavity gas is brought down to ≤ 400 pascals (3 torr). FHD is licensed in both the HI-STORM and HI-STAR dockets (72-1014 and 71-9261, respectively). Holtec holds two patents (U.S. Patent Nos. 7,210,247B2 and 7,096,600B2) on the FHD technology; a third patent application is under review by the United States Patent and Trademark Office.

Helium gas is the working substance for FHD; however, other gases may be used. FHD was first deployed by Holtec in 2003 to dry Portland General Electric's Trojan spent fuel prior to storage. In its first industrial application, the FHD successfully dried 34 MPCs at Trojan containing intact as well as water-logged fuel. In addition to its use in the U.S. to dry upwards of 100 MPCs, FHD has successfully withstood comprehensive tests using simulated full length RBMK fuel assemblies at the Holtec Manufacturing Division in Pittsburgh, PA. The tests demonstrated that the forced gas dehydration method will dry Chernobyl's old, cold and severely waterlogged fuel without any difficulty.

Originally invented by Holtec in response to the USNRC's request to protect high burnup (brittle) fuel from overheating during the drying process FHD is proven to have additional benefits:

- Even in adverse conditions such as water-logged fuel, canisters with water-soaked neutron absorbers and fuel with low decay heat, the drying time is greatly reduced compared to traditional vacuum drying, by a factor of 5 or more;
- The dose to occupational workers is greatly reduced due to the shorter drying times;
- The spent fuel is maintained at a much cooler temperature compared to vacuum drying; and,
- The system prevents fluctuations of the spent fuel temperature protecting fuel integrity.

FHD is currently designed to interface with and dry spent fuel in Holtec's MPCs; however, it can be readily adapted to meet the requirements of other casks of different sizes, heat loads and closure designs. FHD is mounted on a skid frame that enables it to be readily transported to any nuclear site.

*The compact skid shown in the photograph above can be de-synthesized into two separate skids in the case of space constraints. The free air space requirements around the chiller and condenser units shall be provided to Holtec International.

FHD System Requirements

Main Skid Dimensions / Weight*:

✓ 80" x 96" x 71" high; 6,000 lbs maximum

Chiller Unit Dimensions / Weight*:

✓ 46" x 130" x 78" high; 3,000 lbs (dry)

Electrical Requirements:

- ✓ FHD Skid Main Power: 460-480 VAC, 92 amps, 3 phase, 6-Hz
- ✓ FHD Instrumentation Heat Trace: 120 VAC, 10 amps, 1 phase, 60 Hz
- ✓ FHD Dew Point Sensor: 120 VAC, 10 amps, 1 phase, 60 Hz
- ✓ FHD Chiller Unit Power: 460-480 VAC, 60 amps, 3 phase, 60 Hz

