



Nuclear Services/Engineering Services

Passive Hardened Vents for BWRs

Background

Early probabilistic risk analysis performed in the post-TMI (Three Mile Island) era identified weaknesses in boiling water reactor (BWR) containments, particularly Mark I plants, due to their relatively small free volumes. This design could result in early containment failure if significant amounts of hydrogen were generated in the event of a severe accident. Eventually the U.S. Nuclear Regulatory Commission (NRC) required all Mark I plants to install a hard-piped wetwell vent (NRC Generic Letter 89-16). Vent sizing was based on the ability to relieve at least 1 percent of decay heat at containment design pressure. A standardized hard-piped design was not developed, and implementation was permitted using 10CFR50.59. As a result, the vent designs in currently operating BWRs vary greatly.

Why Westinghouse?

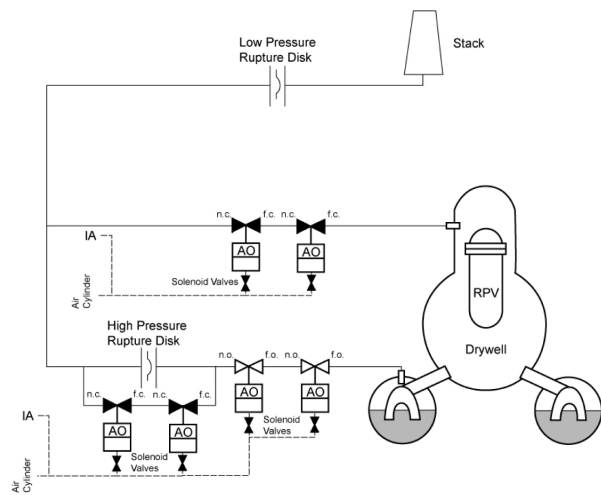
Westinghouse has more than 30 years of experience in supplying products and services to the BWR market, and also has knowledge of the extent of these variations. Following its acquisition by Toshiba in 2008, Westinghouse represents more than 20 percent of the worldwide nuclear operations experience base for BWR technology.

Description

The NRC Near-Term Task Force (NTTF) report of the Fukushima accidents has resulted in a recommendation (Recommendation 5.1) for “reliable” hardened vents to be installed at all Mark I and Mark II BWRs.

Westinghouse recommends a design philosophy that:

- Entails fail-safe containment pressure relief with no operator action or power supplies (AC or DC) required
- Is capable of venting both wetwell and drywell pathways, with priority given to wetwell venting
- Uses the vent at low containment pressure to aid in the ability of reactor core isolation cooling to operate for a longer time
- Dedicates vent piping to the venting function, with no shared safety functions



Westinghouse's recommended ideal hardened vent configuration

Westinghouse has extensive licensing and design experience in the containment venting capability that is consistent with an NRC-approved design.

Westinghouse is also a major market supplier of filtered vent technology, offering both wet and dry systems. During the course of evaluating and implementing a hardened vent system reconfiguration, Westinghouse can work with each plant's configuration to implement its recommended design and ensure that it will be able to accommodate the installation of a filter, if needed in the future.

Benefits

- Evaluation of existing hardened vent design
- Licensing support of new hardened vent design
- Generation and implementation of the design change package, including valve engineering support
- BWR system design and component engineering
- Probabilistic risk assessment