



*Flowserve – Anchor Darling
RHR Shutdown Cooling Suction Valves*

RHR Shutdown Cooling Suction Valves

Problem

Flex-wedge and solid-wedge type gate valves installed in Residual Heat Removal (RHR) shutdown cooling suction lines that fail to open due to thermal binding.

Solution

Flowserve Anchor/Darling Double-Disc Gate valves – a design that is impervious to thermal binding.

Containment isolation valves in the RHR Shutdown Cooling Suction lines have been the source of significant maintenance and operating problems in all Boiling Water Reactors (BWR). Efforts to initiate shutdown cooling have frequently been thwarted by the inability of the operators to open the suction valves. Signals to open were met with tripped torque switches and, in some cases, burned out motors. Even attempts to declutch the actuator and manually open the valves were often unsuccessful. One plant routinely applied heat to a stuck valve after finding this allowed the valve to open. Other plants have replaced original actuators with much larger actuators.

In addition to operational problems, these valves have required frequent maintenance. Because they are containment isolation valves, they are subject to local leak rate testing (LLRT). It is very common for these valves to fail their type “C” tests and have to be disassembled for repair. Inspection typically reveals that either the disc or seat (or both) are cracked and require repair or replacement.

Since the majority of valves in this service were Flowserve Anchor/Darling flex-wedge gates, we investigated the root cause of these problems. After discussing the problem with system engineers, operators and maintenance personnel, Flowserve became convinced these valves were becoming thermally bound. The fact that applying heat to the valves caused them to become “unstuck” convinced us that our diagnosis was correct. The presence of radial cracking on the Stellite sealing surfaces of the discs and seats in valves that failed LLRTs is an additional sign these valves were becoming thermally bound.

Thermal binding is not a new issue. The Naval Reactors Program was aware of the problems decades ago and consequently avoided using wedge gate valves in safety-related applications. They installed double-disc gate valves, which are immune to thermal binding in all their primary systems. Likewise, several BWR owners have replaced their problem-plagued shutdown cooling suction flex-wedge gate valves with Anchor/Darling double-disc gate valves and found their operational and maintenance problems have been greatly reduced.

The publication of NRC Generic Letter 95-07 focused even more attention on thermal binding issues. If your BWR has a history of problems with RHR Shutdown Cooling Suction Valves and you would like information on a proven solution, contact your Anchor/Darling Valves Regional Manager.



Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can (and often does) provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing, selection, installation, operation and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

While the information and specifications contained in this literature are believed to be accurate, they are supplied for informative purposes only and should not be considered certified or as a guarantee of satisfactory results by reliance thereon. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding any matter with respect to this product. Because Flowserve is continually improving and upgrading its product design, the specifications, dimensions and information contained herein are subject to change without notice. Should any question arise concerning these provisions, the purchaser/user should contact Flowserve Corporation at any one of its world-wide operations or offices.

For more information about Flowserve Corporation, contact www.Flowserve.com or call USA 1-800-225-6989

Flowserve Corporation
Flow Control Division
Edward & Anchor/Darling Valves
1900 South Saunders St
Raleigh, NC 27603 USA

Toll – Free Telephone Service
(U.S. and Canada)
Day: 1-800-225-6989

After Hours Customer Service
1-800-543-3927

U.S. Sales Office
Phone: 919-832-0525
Fax: 919-831-3369

Website:
www.Flowserve.com