

Gate Valve Bonnet Failures From Thermal Expansion of Fluids at High-Temperature

SAFETY ALERT

ISSUE #: 07-2013

Enform

Enform is the health and safety association for Canada's upstream oil and gas industry. We provide leading health and safety training, programs and services, touching the lives of hundreds of thousands of workers each year. We are dedicated to the continuous improvement of safety with a vision of eliminating work-related incidents or injuries in the upstream oil and gas industry.

An Industry Product

This document was developed by industry for industry. Working collaboratively, Enform works with the submitting organization representative in developing these documents to improve the industry's hazard awareness. Canada's leading oil and gas industry trade associations support the use of shared information to help companies of all sizes improve performance.

Disclaimer

This document is intended to be flexible in application and provide guidance to users rather than act as a prescriptive solution. Recognizing that one solution is not appropriate for all users and situations, it presents accepted guidance that generally apply to all situations. While Enform believes that the information contained herein is reliable under the conditions and subject to the limitations set out, Enform does not guarantee its accuracy. The use of this document or any information contained will be at the user's sole risk, regardless of any fault or negligence of Enform and the submitting organization.

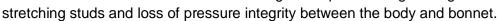
Copyright/Right to Reproduce Copyright for this document is held by Enform, 2013. All rights reserved. Enform encourages the copying, reproduction and distribution of this document to promote health and safety in the workplace, provided that Enform is acknowledged. However, no part of this publication may be copied, reproduced or distributed for profit or other commercial enterprise, nor may any part be incorporated into any other publication, without written permission of Enform.

For more information on this event, please contact: safety@enform.ca

By industry, for industry







Description of Incident:



What Caused It:

• Pressure build-up occurs in the gate valve cavity from thermal expansion of fluids. Extreme pressure build-up from fluid expansion can occur if the valve body is completely full of fluids (e.g., a grease/oil/water mixture) and heated to elevated temperatures. Such pressure can exceed the rated working pressure of the valve.

In a SAGD application, immediately after start-up, a gate valve bonnet failure caused a

have been incidents of valve failures during start-up. Resulting damage can include

release to atmosphere. In thermal applications throughout the oil and gas industry, there

- A valve with the ability to isolate the body cavity from the flow line may be at risk.
- Presence of grease or compounds designed to enhance sealing ability may exacerbate the condition.
- Grease or a grease/oil/water mixture when heated in a sealed enclosure can exceed 7000 psi (48.5 MPa) at 250 °F (121 °C).
- Gate valve body cavities that are not 100% full of fluids do not experience excessive pressure as the vessel was heated. Trapped air or gas allows room for thermal expansion.

Corrective/Preventive Actions:

- Before start-up for thermal applications, ensure the valve bodies have a void for fluids to expand into as the temperature rises.
- Before start-up, ensure valves are in good working order and have not been compromised by ice expansion damage.
- During start-up, position the valves' sealing mechanism (if possible) where the cavity is not isolated.







