

**Information Bulletin No. IB15-008 Rev.2**

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## **Use of ASME B31.1-2014 and B31.3-2014 in Alberta PWHT Requirements**

This Information Bulletin IB15-008 Rev. 2 supersedes IB15-008 Rev.1 issued September 29, 2015.

This information bulletin is issued to bring awareness of code changes and provide guidance to designers, owners and fabricators regarding the use of ASME B31.1-2014 Power Piping Code which was published on August 15, 2014 and ASME B31.3-2014 Process Piping Code which was published February 27, 2015. ASME B31.1-2014 and ASME B31.3-2014 are declared in-force under the Pressure Equipment Safety Regulation (PESR).

ASME B31.1 Power Piping Code and ASME B31.3 Process Piping Code establish rules for preheat and post weld heat treatment (PWHT) and provide exemptions from PWHT based on a material's P Number, thickness, strength, and in some case alloy content. These rules were not consistent in earlier editions (prior to 2014) of these two codes in terms of preheat requirements, preheat temperatures, the thicknesses that require PWHT, the definition of the thicknesses that require PWHT, the material properties that turn on the PWHT requirements, the holding temperatures, the holding times, the heating and cooling rates, and the terminology used to describe the requirements.

To eliminate inconsistencies for preheat and PWHT, changes have been made to technical requirements and format in the 2014 editions of the ASME B31.1 and ASME B31.3 Codes. To achieve consistent rules for materials by P-Number (P-No. 1, P-No. 3, etc.), these piping codes have been revised in many places.

Revisions include:

- Preheat temperature increase (e.g. P-No. 1 and P-No. 3 in both codes);
- PWHT holding temperature (e.g. P-No. 5A and P-No. 5B in ASME B31.1 and P-No. 3, P-No. 4, P-No. 5A, P-No. 5B, P-No. 6, P-No. 9A, and P-No. 10I in ASME B31.3);
- PWHT holding time (increased for P-No. 9A, and P-No. 9B in ASME B31.3);
- The thickness that requires PWHT (revised for P-No. 1 in both codes);
- The governing thicknesses for exemption from PWHT (e.g. P-No. 3, P-No. 4, P-No. 5A) ;
- The minimum holding time requirements have been reduced to 30 minutes for P-No. 15E material group and to 15 minutes for all other material groups;
- The hardness testing requirements have been deleted for all material groups;
- The PWHT requirements for P-No. 10 material group were deleted from Table 331.1.1 of ASME B31.3;
- Requirements for PWHT of P-No. 7 material group were added to Table 331.1.1 of ASME B31.3.

Persons responsible for piping design (owners and designers) should carefully review the piping codes and their specifications in light of these changes.

One change in particular has raised concerns. These piping codes now provide an exemption from PWHT of P-No. 1 materials (all groups) with no limitation on material thickness.

Concerns about this exemption include:

- Pressure piping systems constructed of P-No. 1 material without PWHT may not perform adequately, particularly when exposed to certain process fluids.
- The stricter welding controls for preheat and multi-layer welding technique required during construction may not always be adequate or achievable, resulting in welded pressure piping systems that are more prone to service induced deterioration.

These Codes have become less prescriptive. This leads to the need for more engineering analysis and good judgment. The Codes are relying on knowledgeable users (owners and designers) to specify PWHT (that is, to disallow the exemption) when they deem it necessary. Attention is directed to note 4 in Table 132.2 of ASME B31.1, or note 4 in Table 331.1.3 of ASME B31.3, which states "(4) No exemptions are permitted for PWHTs required by the designer or the WPS". Designers and owners of pressure piping systems made of P1 materials that will be constructed to ASME B31.1-2014 or ASME B31.3-2014 should review their piping specifications and designs to ensure PWHT is performed when required for service conditions, fabrication conditions, or other circumstances specified by the owner or designer.

Owner's inspectors need to be aware of this change in PWHT requirements, in order to ensure that the piping system construction meets the intent of the engineering design with respect to PWHT.

Fabricators should review PWHT requirements with the designer and the owner, and obtain their concurrence before using the PWHT exemption. Fabricators will also need to review their WPSs. If the new PWHT exemption will be used in piping construction, a welding procedure that addresses the required preheat and multi-layer technique must be used.

For piping repairs, alterations and tie-in welds to existing piping systems built prior to the 2014 Edition of ASME B31.1 and ASME B31.3, the stricter requirements for PWHT should be applied in accordance with the original design specification and the original code of construction.

The Pressure Equipment Sub-Council (PESC) reviewed the new PWHT requirements in ASME B31.1-2014 and ASME B31.3-2014 and recommended the adoption of both piping codes under the PESR. The PESC also provided a comment that the 2014 Edition of the piping codes puts the responsibility on the owner to demand PWHT when required for the intended service conditions.

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