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Finite Element Analysis (FEA) Requirements Regarding the Use of FEA to Support a Pressure Equipment Design Submission

Sections 15(1)(j), 16(1)(i) and 17(1)(c) of *Pressure Equipment Safety Regulation (PESR), AR 49/2006* provide for the Administrator to require any other information that is necessary for the Administrator to survey the design and determine whether it is suitable for registration. Section 9 of PESR provides for the Administrator and Safety Codes Officers to require a Professional Engineer's stamp on design submissions.

The AB-520 document, *Finite Element Analysis (FEA) Requirements Regarding the Use of FEA to Support a Pressure Equipment Design Submission*, has been issued by the Administrator and Chief Inspector for pressure equipment safety in Alberta to establish the minimum FEA documentation requirements that must be met. AB-520 is intended to be a useful guide for pressure equipment designers when they are designing pressure equipment, for which, the design has to be registered in Alberta.

Background

Section 40 of the *Safety Codes Act* and Section 14 of PESR specify the design registration requirements for pressure equipment which can not be exempted by Section 3 of the PESR or by the *Pressure Equipment Exemption Order, AR 56/2006 (PEEO)*. Registration of pressure equipment designs is conducted by ABSA's Design Survey and Engineering.

Section 6 of the PESR provides a list of codes and standards (hereunder referred to as codes) declared in force in Alberta. These Codes do not contain rules to cover all possible design and construction details. When detailed rules are not given, the intention is that the Manufacturer, subject to the acceptance of the Inspector (Design Surveyor in Alberta), shall provide details of design that will be consistent with the rules of the Code of construction and that will provide an equal, if not better, level of safety [for example: see paragraph U-2(g) of ASME BPVC, Section VIII, Div. 1 or paragraph PG-16.1 of ASME BPVC, Section I].

Finite Element Analysis (FEA) may be used to support pressure equipment design where the configuration is not covered by the available rules in the ASME code. We recommend that the designer check with ABSA whether the usage of FEA is necessary and acceptable. When using this method for justifying code compliance of the design, a complete FEA report having, as a minimum, the elements listed in AB-520 is required according to Sections 15(1)(j), 16(1)(i) or 17(1)(c) of PESR. As this analytical method requires extensive knowledge of and experience with pressure equipment design and the FEA software package involved, we require that the analysis and report be completed, certified and signed off by a Professional Engineer registered in any province or territory of Canada or any state of the United States of America, in accordance with Section 9 of PESR.

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