

Interpretation of CSA B149.1 and B149.3 Codes Application within Petroleum Refineries, Petrochemical Plants and Upstream Oil and Gas Sites in the Petroleum Industry in The Province of Alberta

1. SAFETY CODES ACT REQUIREMENTS

The *Safety Codes Act* under the Gas Code Regulation (AR 111/2010) adopted the new CSA series 2010 Gas Codes on September 1, 2010 and item 3 in this regulation addresses the approval of gas equipment as follows:

- 1) No person shall manufacturer, install, sell or offer for sale any equipment related to gas systems for use in Alberta unless the equipment has been:
 - (a) tested and certified by a certification organization accredited by the Standards Council of Canada, or
 - (b) inspected and accepted by a certification organization accredited by the Standards Council of Canada, and the equipment bears evidence of having been accepted in the manner authorized by the certification organization.
- 2) If a code, standard, or body of rules declared in force under the Act, with respect to gas systems, refers to approved equipment, that equipment must meet the requirements of this section.

2. PROVINCE WIDE VARIANCE FOR ENGINEERED DESIGNS FOR SITE SPECIFIC GAS-FIRED EQUIPMENT

In addition, Alberta Municipal Affairs upon consultations with the petroleum industry has issued a Province Wide Variance VAR-GAS-05-05 [Rev.3] for Engineered Designs for Site Specific Gas-Fired Process Equipment. This Variance provides a third option to Section 3(1) of the Gas Code Regulation (AR111/2010) that would permit the oil and gas industry to make use of gas-fired process equipment constructed to engineered designs, signed, sealed/stamped and dated by a Professional Engineer registered with APEGGA. In which case, the field approval by a third party such as a certification body accredited by the Standards Council of Canada would not be required. Such equipment would be also excluded from permitting regulations.

The intent of the variance is to allow necessary variations to the Gas Code Regulation (AR111/2010) based on sound engineering assessment and justifiable technical reasons for

such variations. Professional Engineer who applies the variance is expected to do due diligence to apply the Gas Code Regulation (AR111/2010) to a site-specific circumstance to maximum extent possible, and only vary from it when absolutely necessary. Any such variation must be documented and included in project documentation so that it is available for possible review in the future.

Since the variance is only a third option for the appliance approvals, the owner(s) of a Petroleum Refinery, Petrochemical Plant or Upstream Oil and Gas facility may still choose to request that the manufacturer, contractor or vendor obtain a special inspection and field approval by a third party (i.e. CSA, ITS, ULC, etc.) for the gas-fired process equipment that is supplied.

In either case: of approval by a certification organization, or by a Professional Engineer, the approval process itself must meet the requirements of Gas Code Regulation (AR111/2010). Specifically, the scope of the approval must include not only the details of the design of the appliance, but also approval of its site-specific installation, commissioning, and operating personnel training. Consequently, this field approval process cannot be used for generic, "shop" approvals of appliances produced in quantities or any appliances prior to their actual installation in the field.

3. GAS CODE REGULATION (AR111/2010) APPLICABILITY

- a) The installation of appliances, equipment, components, and accessories where gas is to be used for fuel purposes falls under the CSA B149.1-10 "Natural Gas and Propane Installation Code"
- b) The regulation is applicable to all gas fired equipment of all capacities. Appliances with input less than 400,000 BTU/hr are not excluded from the regulation.
- c) When the term "gas" is used, the regulation applies equally to any of the following gases or their mixtures: natural gas, manufactured gas, propane, propane-air; propylene, butane (normal butane or iso-butane) and butylenes. Therefore the Code is equally applicable to raw gas at the well site, casing off-gas, sour gas feed into the gas processing plant, sweet sales gas, or any off-gas produced in the gas or oil refining process, as long as any such gas or their mixture is used in gas-fired appliance or gas system for the purpose of producing energy.
- d) Regulation does not apply where the gas is used as a feedstock to petroleum processes.
- e) In appliances, which use gas for both purposes (as a fuel and feedstock) the Regulation is applicable to the portion of the appliance, which uses gas as fuel regardless of pressure, but not to the portion, which uses gas as feedstock.
- f) The Regulation defines "gas system" as any equipment or installation used or intended to be used in or in conjunction with processing, transmission, storage, distribution, supply, or use of gas, but does not include any thing excluded by the regulations from the definition of gas systems.
- g) Regulation refers directly to CSA B149.1-10 Code. Indirectly however, the CSA B149.1-10 in clause 4.2.3 references the CSA B149.3-10, "Code for the Field Approval of Fuel-Related Components on Appliances and Equipment." This Code contains the

requirements, which include valve train diagrams, for fuel related components and accessories and their assembly on an appliance utilizing gas, downstream of the manual shut-off valve specified in Clause 6.18.2 of CSA B149.1.

- h) CSA B149.3 Code defines "appliance" as "a device to convert gas into energy that includes any component, control wiring, piping or tubing, required to be a part of the device." Component is defined as: "any essential part of an appliance or equipment"
- i) Pressure piping upstream of the manual shut-off valve specified in Clause 6.18.2 of CSA B149.1 falls under the applicable process piping standard if the gas is used for process and is under jurisdiction of Alberta Boilers Safety Association (ABSA), and must be registered in accordance with their regulations.

4. RESPONSIBILITIES FOR COMPLIANCE OF OWNER (OCCUPIER), DESIGNER, MANUFACTURER, CONTRACTOR, VENDOR

In addition, the *Safety Codes Act* under Part 1, states Responsibilities for compliance is shared between the owner (occupier), designer, manufacturer, contractor, vendor or to the person who authorizes, undertakes or supervises the process or activity covered by the *Act* as follows:

a) Owners, Care and Control

The owner of any thing, process or activity to which this Act applies shall ensure that it meets the requirements of this Act, that the thing is maintained as required by the regulations and that when the process or activity is undertaken it is done in a safe manner.

b) Designer duties

A person who creates, alters, has care and control of or owns a design or offers a design for use by others shall ensure that the design complies with this Act and that it is submitted for review or registered if required by this Act, and if the design is deregistered, the person shall provide notice of its deregistration in accordance with the regulations.

c) Manufacturers' duties

A person who manufactures any thing or undertakes a process or activity to which this Act applies shall ensure that the thing, the process or the activity complies with this Act.

d) Contractors' duties

A contractor who undertakes construction, operation or maintenance of or builds or installs any thing to which this Act applies shall ensure that this Act is complied with.

e) Vendors' duties

A person who is a vendor in the ordinary course of business, other than as an employee or an agent, shall not advertise, display or offer for sale, for lease or for other disposal, or sell, lease, or otherwise dispose of, any thing to which this Act applies unless that thing complies with the Act.

5. RESPONSIBILITIES OF PROFESSIONAL ENGINEER APPROVING THE APPLIANCE

In order to comply with the Variance it shall be the responsibility of the professional engineer to ensure that:

- a) the engineered designs apply only to gas-fired equipment used for process applications in petroleum refineries, petrochemical plants and upstream oil and gas sites. The Safety Codes Act under Section **26** of the Administrative Items Regulation refers to engineered involvement with stamped and sealed designs.
- b) the engineered designs meet the intent of the currently Canadian Codes and Standards utilizing accessories, components or materials of a type and rating approved for the specific purpose. The design must consider safety of personnel and integrity of equipment.
- c) the design follows the CSA B149 Series of Codes Standards to the maximum extent possible and only varies from it where there is a justifiable technical reason to do so. Such reason must be based on sound engineering judgment and must be documented. Variations may include modifications to CSA B149.3 fuel train diagrams or use of non-certified components. Technical reasons, which can be justified may include for example special process, or special metallurgy requirements, but cannot include such reasons as component price, delivery, preference, or non-recognized owner or manufacturer standards.
- d) the certified components are utilized whenever possible; however, when a non-certified component must be used in a design due to lack of appropriate certified component, the professional engineer shall investigate and accept such alternate component as providing equivalent or better operational characteristics. In which case, the equivalency shall be demonstrated by using other recognized standards (ASME, ANSI, etc), accepted test reports (CRN, NACE, etc) and in conjunction with reputable performance.
- e) The certification of individual components does not automatically translate to the certification of the appliance, which must be evaluated as a complete assembly for its suitability for a given application and location, safety and compliance.
- f) The gas-fired process equipment displays a permanent rating plate to identify the design engineering and operational characteristics of the equipment compliant with the B149.3 Code
- g) The fuel gas piping systems are designed in accordance to the appropriate piping codes.
- h) The workers are competent to do the work, test, start-up, operate and maintain the equipment as directed by a professional engineer. The Safety Codes Act under Section **37** of the Administrative Items Regulation refers to reviews during construction by a Professional Engineers. This also meets the requirements under Part 3 of the Occupational Health and Safety Code covering specifications and certification and for worker training as required under Section 13 and 15 of the Occupational Health Safety Regulation.

- i) That records pertaining to design specifications, installation, operation and maintenance instructions are provided to the owner of the equipment to keep on file for Safety Codes Officers and/or OH&S inspectors to review on request.

In order to comply with this Province Wide Variance, the professional engineers are required to sign, then seal/stamp and date their designs. As a result this makes them fully responsible for ensuring that their designs comply with the Safety Codes Act. This will definitely increase the level of responsibility for the professional engineers, which may not have been evident in the past.

6. PENALTIES FOR NON-COMPLIANCE

A person who knowingly contravenes the *Safety Codes Act*, a condition in a permit, certificate or variance, or an order is guilty of an offence and is liable to penalties outlined in Section 68 of the *Act*:

- a) for a first offence, to a fine of not more than \$15 000 and, in the case of a continuing offence, to a further fine of not more than \$1000 for each day during which the offence continues after the first day or part of a day, or to imprisonment for a term not exceeding 6 months, or to both fines and imprisonment, and
- b) for a 2nd or subsequent offence, to a fine of not more than \$30 000 and, in the case of a continuing offence, to a further fine of not more than \$2000 for each day or part of a day during which the offence continues after the first day, or to imprisonment for a term not exceeding 12 months, or to both fines and imprisonment.

If a person is guilty of an offence under this Act, the court may, in addition to any other penalty imposed or order made, order the person to comply with this Act or any order, permit, certificate or variance, or all or any one or more of them, as the case requires.

Note;

Projects on a site that are identified under the gas regulation that do not fall within the scope of the variance shall be permitted, installed by certified gasfitters and inspected by a SCO in the gas discipline.

Sidney Manning
Administrator/Chief Inspector
Plumbing and Gas Safety