

July 2013

G-02-13
(File number 16090-G01)

ENGINEERED DESIGNS FOR SITE SPECIFIC GAS-FIRED PROCESS EQUIPMENT

This bulletin has been jointly developed by Safety Services and the Gas Technical Council to inform owners, designers, engineers, vendors, builders, installers, contractors, equipment rental and leasing companies of the minimum requirements to ensure safe installation of gas appliances in Alberta. Under the ***Safety Codes Act and Regulations*** it is the responsibility of the above parties to ensure that the design, installation and operation of equipment comply with the *Act and Regulations*.

This information bulletin is issued as a companion document to VAR-GAS-01-13. Its intent is to provide guidelines for meeting the requirements of the above variance. This bulletin includes references to various acts, regulations, documents and codes but in no way limits these requirements.

The installation of gas appliances and equipment shall comply with all applicable requirements listed below.

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 manufacture, 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. REVISIONS TO GAS CODE REGULATION (AR 111/2010)

Alberta Municipal Affairs has issued a Province Wide Variance VAR-GAS-01-13, which provides two more options for Engineered Designs for Site Specific Gas-Fired Process Equipment:

- (c) inspected and accepted by an inspection body accredited by the Standards Council of Canada, and the equipment bears evidence of having been accepted in a manner authorized by the inspection body, or

- (d) inspected and accepted by a Professional Engineer and;
 - the gas-fired process equipment bears a permanent rating plate compliant with CSA B149.3-10, supported with a stamped engineering report including the design and safety characteristics, as well as, a review of installation, commissioning and start-up records of the equipment;
 - the designs of the Professional Engineer shall be signed, sealed/stamped, dated and conform to the Gas Code Regulation, including the CSA B149.1-10, B149.2-10, B149.3-10 Codes, and the guidelines as described in this Information Bulletin.

Options (b), (c) and (d) are not intended to be used as a means to accept appliances, equipment and components when certified products of similar type are available.

Note:

- Certified - (with respect to any appliance, accessory, component, equipment, or manufacturer's installation instructions) — investigated and identified by a designated testing organization as conforming to recognized standards, requirements, or accepted test reports. (*B149.1-10: 3 Definitions page 7*)

3. ENGINEERING DESIGNS

A Professional Engineer that is completing an inspection and acceptance of oil and gas industry gas-fired equipment or appliance used for process applications in petroleum refineries, petrochemical plants and upstream oil and gas sites in the following situations is allowed to use the Variance G-01-13 when:

- a) installing new non-certified equipment and appliances – a complete inspection and acceptance is required
- b) relocating non-certified equipment and appliances - a complete inspection and acceptance is required
- c) upgrading or altering existing certified, inspected and accepted, or non-certified appliances - a complete inspection and acceptance is required. The upgrading or altering of process appliances include such activities as changes to:
 - the burner(s) that modifies the operation,
 - the burner pressure or appliance capacity outside of its previously approved minimum to maximum operating range,
 - the burner management system
 - appliance application
 - appliance fuel type, voltage, instrument gas type
 - moving appliance between indoor and outdoor locations
 - fuel train configuration or components other than replacement parts through regular maintenance

Maintenance of appliances does not require inspection and acceptance under the regulation. This includes all activities required to ensure continuing safety and performance of an appliance according to its manufacturer's instructions. This may include cleaning, lubricating, refilling, painting, testing, replacing of worn out components with parts that provides equivalent operating characteristics, re-adjusting to original performance specifications.

4. 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" and the CSA B149.2-10 "Propane Storage and Handling 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) The regulation does not apply where the gas is used as a feedstock to petroleum processes or is being disposed of through incineration or flaring.
- 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 (see item d) above).
- f) The regulation refers directly to CSA B149.1-10 Code. Indirectly however, clause 4.2.3 in the CSA B149.1-10 and CSA B149.2-10, both reference 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 B149.1-10.
- g) The CSA B149 Codes define "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"
- h) Pressure piping upstream of the manual shut-off valve specified in Clause 6.18.2 of CSA B149.1 falls under:
 - CSA B149.1 if the gas is used only for fuel purposes
 - ASME B31.3 Process Piping - if the gas is used for process purposes or process/fuel purposes, then the piping is under jurisdiction of Alberta Boilers Safety Association (ABSA), and must be registered in accordance with their regulations.

5. RESPONSIBILITIES OF A PROFESSIONAL ENGINEER DESIGNING AND/OR INSPECTING AND ACCEPTING THE UNCERTIFIED EQUIPMENT OR APPLIANCE

Alberta Safety Codes Act under section 11 Professional Services states as follows:

"A person permitted to affix stamps or seals pursuant to the Architects Act or the Engineering and Geoscience Professions Act shall ensure that any professional service the person renders to which this Act applies, including the affixing of stamps and seals, complies with this Act."

This requirement applies equally to Professional Engineers designing an appliance and engineers inspecting and accepting such design in accordance with alternative (d) of the variance. The intent of alternative (d) is to allow a Professional Engineer registered with APEGA, in good standing, and experienced in the design, installation and commissioning of combustion systems, prepare and stamp third-party engineering approval reports equivalent

in scope to field approvals conducted in options (b) and (c) of the variance. In some instances where package equipment skids or other equipment configurations are purchased/imported without the designing engineer's involvement, the inspecting and accepting engineer may be the only one on record.

The Professional Engineer performing either the design or inspection and acceptance of a gas-fired appliance shall:

- a) Stamp, seal and date appliance designs or engineering approval reports in accordance with APEGA guidelines.
- b) Use comprehensive and documented engineering assessment methodology and due diligence to apply the Gas Code Regulation (AR111/2010) including the CSA B149.1-10, B149.2-10, B149.3-10 and C22.1-09 Part I Codes, and this Information Bulletin to a site-specific gas fired appliance installation
- c) Ensure that the design and installation uses certified equipment and components when available. Accessories, components or materials shall be of a type, construction and rating approved for the site-specific operating conditions, and application. When a non-certified component must be used in a design due to lack of an appropriate certified component, the professional engineer shall investigate and accept such alternate component as providing at least equivalent or greater operational characteristics. Equivalency shall be demonstrated with other recognized standards (ASME, ANSI, etc) and, accepted test reports (CRN, NACE, FM, etc) and in conjunction with reputable performance.
- d) Evaluate all components as a complete assembly for its suitability for a given application, location, safety and compliance. Certification of all individual components does not automatically translate to the compliance of the assembly.
- e) Ensure that the design addresses safety of the personnel, public, environment process and integrity of appliance, connecting it to other equipment, and that the appliance is protected from all of the potential hazards related to this installation including, but not limiting, to those specified in the above Codes. Codes shall be used only as a minimum requirement and not as a reason to ignore known or potential hazards.
- f) Deviate from the above Codes only when absolutely necessary for technical reasons. A justifiable, valid technical reason (VTR) for such variation shall be documented and included in the project documentation so that it is available for review. Variations may include modifications to CSA B149.3 fuel train diagrams or use of non-certified components. A VTR, which can be justified may include for example special processes, or special metallurgy requirements, but cannot include factors such as price, delivery, preference, plant, manufacturer, or other non-adopted standard.
- g) When such deviation is justified, provide an alternative solution with at least an equivalent or greater level of safety to that required by the Codes.
- h) Include in the scope of the design or approval report not only the details of the design of the equipment, but also approval of its site-specific installation, commissioning, start-up, and operating personnel training.
- i) Ensure that the gas-fired appliance displays a permanent (lasting for the life of the appliance) rating plate showing the design engineering and operational characteristics of the equipment in accordance with CSA B149.3-10 Code Section 11.
- j) Ensure that the components, wiring and installation are suitable for the electrical area classification as defined in the Canadian Electrical Code CSA 22.1 Part I Section 18, and the Alberta Code for Electrical Installations at Oil and Gas Facilities current Edition

- k) Ensure that the components are installed and used in accordance with their manufacturer's instructions.
- l) Ensure that the components are suitable for the gas they are in contact with.
- m) Ensure that records pertaining to design specifications, installation, operation and maintenance instructions are provided to the owner of the equipment and, available for Safety Codes Officers to review. As a minimum the following documentation shall be provided:
 - Description of any hazardous condition which may affect this appliance or its installation
 - Process and Instrumentation Diagram (P&ID)
 - Bill of Materials (BOM) or component data sheets showing the model number, manufacturer, construction, materials, ratings and certification of each relevant component and its tag number referenced on the drawings and on the physical component.
 - Wiring diagram
 - Burner management system specification
 - Operating narrative, shutdown key / cause and effect diagram, ladder logic, installation and operation manual or other suitable description of appliance operation
 - Specification of electrical area classification (in compliance with Alberta Code for Electrical Installations at Oil and Gas Facilities 3rd Edition 2006), appliance and instrument venting to a safe location, and overpressure protection of the fuel train.
 - Commissioning / combustion report with equipment/permissive set-points and stack readings at maximum fire.
 - Maintenance instructions
 - For a portable/movable appliance, a set-up procedure to be followed by the installer or operator upon arrival at each site, including a range of elevations where the appliance can be safely operated
 - For an appliance approved for use with different fuels, a switch-over procedure to be followed by the operator upon switching to another fuel without exceeding the maximum rating of the appliance.

In addition, a Professional Engineer approving the installation shall:

- a) Not use the engineered approval process for generic, "paper" or "shop" approvals of appliances produced in quantities, or of any appliances or their subassemblies prior to their actual installation in the field.
- b) Inspect each appliance in the field in its completed and working condition (use of a person under the direction of the Professional engineer to conduct such inspection or its part is permissible as long as the Professional Engineer takes responsibility for the work of such person)
- c) Include a statement of compliance and approval of the final design, installation and operation in the report.
- d) Ensure that the gas-fired appliance displays a permanent (lasting for the life of the appliance) approval plate showing the location of the installation, reference number of the inspection and acceptance project, inspection date and the name of the inspecting and accepting engineer.

6. APPROVAL TO CURRENTLY ADOPTED VERSION OF THE CODES

Inspection and acceptance in options (b) (c) and (d) of the variance VAR-GAS-01-13, which varies section 3 of the Gas Code Regulation AR 111/2010, shall be to the currently adopted version of the safety codes except where project design has an identifiable start date prior to the adoption date of that code. In such case the owner may have a choice to comply with the previously or the currently adopted version of the Code, as long as the chosen version is used in its entirety. Projects identified within the scope of the existing variance and documented prior to June 30, 2013 may follow the VAR-GAS-05-05 version of the variance.

7. PERMITS

Effective on July 1, 2013, all certified, or accepted and inspected (in accordance with the variance) gas-fired appliance installations must have a valid gas permit as identified by the permit regulation (AR 204/2007).

The accreditation program by the Safety Codes Council in the gas discipline, for municipalities, agencies, regional authorities and corporations are limited in their scope to installation aspects of a gas-fired appliance in accordance with CSA B149.1-10 and CSA B149.2-10 installation codes. Therefore, accreditation is not a substitute for inspection and acceptance of gas-fired appliance designs and installations covered by options (b), (c), and (d) of the variance VAR-GAS-01-13. A Safety Codes Officer (SCO) working for these organizations shall not issue design or modification related variances for appliances, or approve installations of non-certified or non inspected and accepted appliances. Only installations of appliances, which already meet the conditions of the variance, can be inspected by an SCO and permitted.

Projects on a site that are identified under the gas regulation as not falling within the scope of the variance, such as certified appliances used for heating and ventilating of occupied buildings or warehouses shall be permitted, installed by certified gasfitters and inspected by an SCO in the gas discipline.

8. PENALTIES FOR NON-COMPLIANCE

A person who 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 \$100,000 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 second or subsequent offence, to a fine of not more than \$500,000 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.