

May 9, 2011

VAR-CEC-2-024 ESP's [rev-0]

Page 1 of 3

### VARIANCE

#### Canadian Electrical Code

**SUBJECT: Rule 2-024 – RE: Oil and Gas Industry Electrical Submersible Pumps**

#### Preamble

Rule 2-024 requires that electrical equipment be approved. Section 2 of the *Electrical Code Regulation* mandates approval requirements:

#### Electrical systems equipment

- 2(1)** If a code, standard or body of rules declared in force under the Act with respect to electrical systems requires approved equipment, that equipment must meet the requirements of this section.
- (2)** No person shall manufacture, install, sell or offer for sale any equipment related to electrical systems for use in Alberta unless the equipment has been
- (a) certified by a certification body in accordance with the certification body's terms of accreditation with the Standards Council of Canada, or
  - (b) inspected by an inspection body in accordance with the inspection body's terms of accreditation with the Standards Council of Canada.
- (3)** Subsection (2) does not apply to electrical equipment of an electric distribution system or a transmission line as defined in the *Hydro and Electric Energy Act*.

*(Note: "certification body" is defined as 'an organization accredited by the Standards Council of Canada as a certification body;' and "inspection body" is defined as 'an organization accredited by the Standards Council of Canada as an inspection body.')*

There is seldom occasion where we cannot meet this requirement. Situations do exist however, where the requirement may be onerous or impracticable.

In the specific situation of Electrical Submersible Pumps (ESP's) and associated down hole cable assemblies, certification organizations have yet to identify a demand for developing a product certification program around these particular electrical products. Consequently, certified ESP's and cables are generally not available.

---

**Government  
of Alberta** ■

Issue of this STANDATA is authorized by  
the Administrator

*[Original Signed]*

Pierre McDonald



SAFETY CODES COUNCIL

## Variance

This Variance applies to ESP's and associated down hole cables used in wells within the Oil and Gas industry. ESP's are multistage centrifugal pumps driven by 3-phase motors constructed to fit within the inside diameter of the well casing. Motors range in size from 10 Hp to 1200 Hp and in lengths from 1.2 m to 12 m. Power cables are normally 3-phase with tape-in or plug in pot head connection at the motor. Instrument cables may also be associated with the ESP installation.

ESP's and associated down hole cables mentioned in this variance have a history of successful and safe operation. This installation poses no fire or shock risks. The motor is underground in an oxygen deficient atmosphere and could not create an explosion. Personnel are physically isolated from the motor and consequently, there is no shock hazard.

**Therefore manufacturers, distributors, owners and installers of ESP's and associated down hole cables shall be permitted to deviate from Rule 2-024 of the Canadian Electrical Code provided they meet the following conditions:**

### Conditions

1. a) Manufactured to North American Standards

ESP's and/or associated down hole cables are acceptable when the manufacturer declares that he has manufactured, inspected and tested the ESP's and/or associated down hole cables to the requirements of the appropriate and current standards. These standards include but are not limited to:

- CAN/CSA-C22.2, No.0      General Requirements Canadian Electrical Code Part 2.
- IEEE 112                      Standard Test Procedure for Polyphase Induction Motors and Generators.
- IEEE 252                      Standard Test Procedure for Polyphase Induction Motors having Liquid in the Magnetic Gap.
- IEEE 1017                     Recommended Practice for Field Testing Electric Submersible Pump Cable.
- IEEE 1018                     Recommended Practice for specifying Electric Submersible Pump Cable Ethylene-Propylene Rubber Insulation.
- IEEE 1019                     Recommended Practice for specifying Electric Submersible Pump Cable Polypropylene Rubber Insulation.

b) Manufactured to Other than North American Standards

Where ESP's and/or associated down hole cables are manufactured to other than North American standards, the manufacturer must declare that the product has equivalent safety performance as one manufactured to North American standards. Alternatively, a professional engineer with relevant experience registered to practice in Alberta may evaluate and accept the product standard to which the ESP's and/or associated down hole

cables were manufactured to, if it compares favourably with the appropriate North American standards concerning safety performance.

## 2. Product Identification

In addition to meeting the requirements of Rule 2-100 of the Canadian Electrical Code, the ESP's and/or associated down hole cables must identify the standard to which it was manufactured.

The following documentation or appropriate marking must also accompany the product:

- a manufacturer's declaration stating that they have manufactured the product to one or more appropriate North American standards, or
- when manufactured to other than North American standards:
  - i. a manufacturer's declaration that the product has equivalent safety performance as one manufactured to the appropriate North American standards, or
  - ii. a professional engineer's evaluation report indicating the product as having equivalent safety performance as one manufactured to appropriate North American standards.

## 3. Additional Requirements

- The installation is bonded to ground. Proper overcurrent and overload protection must be provided in accordance with the CE Code, Part 1
- All above ground components associated with the installations meets the requirements of the CE Code and the Electrical Code Regulation.
- The installation is subject to a Safety Codes inspection to verify compliance with the CE Code Part 1.

## 4. Expiry

To ensure that this variance is reviewed for ongoing relevancy and necessity, with the opinion that it may be reissued in its present or an amended form following a review, this variance expires on March 31, 2014.