

STANDATA bulletin 18-ECB-062

Electrical

2018 Canadian Electrical Code – Section 62 – Fixed electric heating systems

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Page 1 of 3

Rule 62-118 Demand factors for service conductors and feeders

Questions have been raised regarding the use of demand factors for storage tank water heaters in residential installations. The following rules apply:

62-118(5)(a)

- As referenced, Subrule 3 applies to space heating installations;
- As referenced, Subrule 4 applies to electric thermal storage heating systems, duct heaters, or electric furnaces;
- Storage tank water heaters fall under “other equipment with demand factors as applicable in Section 8”.

8-200(1): “The calculated load for the service or feeder supplying a single dwelling shall be based on the greater of Item a) or b)”

If (a) is used, then (vii) applies:

8-202(1): “The calculated load for the service or feeder from a main service supplying loads in dwelling units shall be the greater of Item a) or b)”

If (a) is used, then (vii) applies.

Rule 62-126 Field repair, modification or assembly of series heating cable sets

Industry has requested clarification of the information required on the permanent tag. The following information is provided to assist industry with the permanent tag information and installation.

Field Repair

Rule 62-126 a); when the total length of the heating portion of the sets is not changed by more than 3%, no additional tag is required.

Unless stated otherwise, all Code references in this STANDATA are to the 2018 CE Code, Part 1.

Issuance of this STANDATA is authorized by the Provincial Electrical Administrator

[Original Signed]

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Modification or Assembly

Rule 62-126 b) i) requires a permanent tag with new design information to be installed on series heating sets that have been field modified or field assembled. Although the design information is not specified in the rule, Standard C22.2 No. 130-16 provides guidance as to the marking of field-assembled heating device sets. Minimum marking requirements on the permanent tag should include:

1. the manufacturers name
2. the word "series" and usage markings
3. the rated voltage
4. the rated output in watts per unit length or area and the specified temperature for that output for those heating devices that vary their power output with temperature
5. the maximum permissible steady-state current
6. a reference number or other similar identification which relates to a permanent record of the assembly or modification

Nameplates bearing the original markings shall **not** be removed. The new permanent tag should be installed directly beside the original nameplate.

The permanent tag shall be clearly legible and suitable for the environment (outdoors, corrosive environment, etc.). The tag should be permanently secured adjacent to the original nameplate.

Rule 62-212 Installation of heating cable sets and heating panel sets

Flexible Heating Panels

Several fires in Canada have been attributed to the improper installation of flexible heating panels. Although the actual cause for such fires has yet to be determined, investigations have revealed the need for extreme care with installation practices.

The following practices are recommended to reduce the risk of fire or product failure:

1. Flexible heating panels are to be installed by qualified persons.
2. The work of the various trades involved in the installation process must be coordinated. The installation of the electric heating panels, the construction practices involved in the area where the panels are located, the type of insulation used, etc. are critical to the safety of the final installation.
3. It is strongly recommended that the heating panel manufacturer or representative be directly involved in the installation to ensure the product, building construction and insulation type are correct for the heating product to operate safely.
4. Permits for a flexible heating panel installation should identify the type of heating panel used.
5. Resistance measurements taken in compliance with the manufacturer's instructions are to be in the form of a permanent record at either the distribution panel location or the thermostat location.



Other heating systems

Rule 62-400 Heating cable sets and heating panel sets installed within pipes, ducts, or vessels

Immersion heaters

A recent incident involving an immersion heater installed in an oilfield tank is cause to alert industry of a potential problem with the installation of immersion heaters. An investigation of the incident has revealed that the level of the liquid was lowered to a point where some of the heater elements were exposed. The flashpoint of the fluid in the tank was approximately 60°C and its auto-ignition temperature 380°C. When temperature control called for the heater to operate, the elements near the surface caused the fluid to vaporize (flash). The vaporized fluid, mixed with the air present in the tank, created a flammable atmosphere and some of the elements of the immersion heater were exposed to the flammable atmosphere. The heater elements are mineral insulated (MI) construction (typical for immersion heaters) that can operate at high temperatures, significantly above the ignition temperature of the flammable gas mixture. The oilfield tank atmosphere was ignited, resulting in an explosion and the collapse of the tank. Personnel were able to vacate the area with no injury. Failure or misapplication of an electric immersion heater was determined to be responsible for the ignition. An unofficial survey within the oil and gas sector has identified a number of similar incidents where immersion heaters were suspected to be the cause of an unwanted fire/explosion.

Since there is no Canadian standard specific for process immersion heaters, certification bodies certify them to an "other recognized document" (ORD). In the testing procedures, the heating elements are assumed to be immersed in a liquid all the time, and the testing for maximum temperature (or temperature code) is for those parts of the heater that are exposed to the atmosphere. The heating elements themselves are not temperature tested. Additionally, tests for conductor temperature rating at the heater connection point are made. Since these specific types of process heaters are semi-custom, the certifier engages in technical discussions with the manufacturer on specifics for testing such as the materials or range of materials for immersion and the environment. It was suggested that a test be made for the heater element temperature in air, however it was deemed unnecessary because: a) the heater elements are assumed to always be within the liquid and b) the current test procedure is consistent with other certification bodies.

As part of the certification, the manufacturer is required to put warning statements in the instruction manual and a caution label on the product that a **liquid level and/or high temperature limit control must be used to de-energize the heater**.

Manufacturer instruction manual contains these instructions and warnings, and therefore they become a requirement to follow for installation. The certification body verifies the manual contains the appropriate instructions and warnings.

It is the responsibility of the user to ensure the elements remain immersed while in operation by installing level controls and/or have a high temperature limit control on the elements. Therefore:

1. Electric immersion heaters need to be installed with a high integrity liquid level control to ensure the element does not become un-immersed and/or a surface temperature limit device is used to de-energize the heater if the elements become un-immersed.
2. Other installations of process immersion heaters should be investigated for potential similar misapplications.

