RP 8.0: DOGHOUSE ELECTRICAL CLASSIFICATION

A Recommended Practice (RP) for the Canadian Land-Based Drilling Industry

EDITION: 3
SANCTION DATE: November 2015

CANADIAN ASSOCIATION OF OILWELL DRILLING CONTRACTORS
RECOMMENDED PRACTICE 8.0
DOGHOUSE ELECTRICAL CLASSIFICATION (DR)

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INTRODUCTION

The Canadian Association of Oilwell Drilling Contractors (CAODC) Engineering & Technical (E&T) Committee has developed a Recommended Practice (RP) for Doghouse Electrical Classification. This document dated November 2015 supersedes all prior editions of this Recommended Practice.

The information contained herein is a recommendation only for electrical equipment classification within the doghouse (drill floor crew shelter), currently utilized in the Canadian drilling industry. An attempt has been made to establish some practical recommended operating practices for electrical equipment classification equipment in the Canadian drilling industry.

The recommendations contained in this document should be considered in conjunction with the requirements of the original equipment manufacturers (OEM). Companies should operate and maintain the equipment within the operating limitations, such as load ratings, as designed by the OEM.

If the OEM stipulates increased levels of inspection or accelerated inspection/certification cycles, the contractors must follow the OEM guidelines unless granted approval to follow this CAODC Recommended Practice by a Professional Engineer.

CAODC has produced this Recommended Practice based on industry experience. However, this document should be considered in conjunction with all relevant legislation and the requirements of provincial regulatory authorities. This document should not be construed as a legal opinion, and users are advised to seek legal counsel to address their specific facts and circumstances.

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HISTORY

Some locations where flammable gases or vapours may occur are classified as Class 1 locations by Rule 18-004 of the Canadian Electrical Code (CEC). The CEC further divides these locations into three Zones or two Divisions, depending on the frequency and duration of the occurrence of flammable quantities of these gases and vapours. Hazardous area classification is the process of determining which parts of a facility are hazardous and dividing them properly into zones or divisions to allow appropriate wiring methods and selections of electrical equipment. It is the responsibility of owners of

facilities to ensure that the facilities are properly classified according to the definitions of the CEC.

REVIEW PROCESS

CAODC Recommended Practices are reviewed and revised, reaffirmed, or withdrawn at least every three years. A one-time extension of up to two years may be added to this review cycle. Email any comments or items of concern to rpfeedback@caodc.ca.

RP REVISION SCHEDULE

Revision Date	Revision Details
October 2013	RP issued to industry.
November 2015	Section 4 (1) and (2) revised to align with API RP 500, Clause 6.2.3.5.

1. SCOPE – DOGHOUSE ELECTRICAL CLASSIFICATION

The equipment for drilling rigs covered in this Recommended Practice (RP) and henceforth referred to as doghouse, refers to any structure suspended or attached, at the level of and adjacent to the drill floor. This determination of classification refers to typical Canadian drilling rigs, where the derrick is not enclosed, the doghouse is situated beyond a radius of the 3m Zone 2 area, and the drill floor is surrounded by a windbreak.

Classification of the doghouse is based on the recommendations and descriptions presented in the American Petroleum Institute (API) Recommended Practice 500, Second Edition, November 1997 and is consistent with the Code for Electrical Installations at Oil and Gas Facilities - Third Edition 2006 established by the Electrical Technical Council Safety Codes Council.

Note: *where the drilling rig doghouse does not meet the above criterion, it is recommended that the services of a Professional Engineer be engaged to determine the classification.*

A doghouse attached to the typical Canadian drilling rig operating in Canada is not considered a classified area based on the definitions and interpretation of API RP500 or Code for Electrical Installations at Oil and Gas Facilities - Third Edition 2006. However, in cases of known flammable vapour leakage, or during production testing operations, additional steps may be prudent to enhance safety in the area. These steps may include, but not be limited to: improved floor ventilation (open "V" door), closure of doghouse openings and gas monitoring.

2. REFERENCED RULES FROM CODE FOR ELECTRICAL INSTALLATIONS AT OIL AND GAS FACILITIES (3RD EDITION, 2006)

2.1 RULE J19-000

Persons using this Code should be aware of other regulatory requirements such as in the areas of energy, occupational health & safety and environment.

See also Appendix J and notes on rules 18-000, 18-002, and 18-006 in Appendix B of the CEC.

Where installations are not covered by this Code [J19-000(2) (a) to (d)], sound engineering principles should be applied to determine if an installation should be classified in accordance with Rules 18-004 and 18-006 of the CEC.

This rule recognizes the expertise of an engineer in classifying Oil and Gas facilities. The engineer must be experienced in determining area classifications

for hazardous locations as outlined in Rule 18-006 of the CEC and knowledgeable in using industry-recognized standards and recommended practices. (See notes on rule 18-006 in Appendix B of the CEC.)

Without engineering involvement, the requirements for classifying hazardous locations in rules 19-102 to 19-108 are the minimum requirements. When applying these minimum requirements, users are advised of their responsibility to ensure that they are adequate for the installation. Circumstances may dictate the need to exceed these rules to achieve an acceptable level of safety performance.

2.2 RULE J19-102 (3)(D)

When locating enclosures or buildings (with electrical equipment intended for non-hazardous locations) adjacent to a classified area, we should consider the boundary of the classified area as being an arbitrary line. Even though the building or enclosure does not infringe upon the classified area, care should be taken to avoid locating them in close proximity to these areas, unless they have a vapor-tight barrier. API RP500 and RP505 define vapor-tight barrier as a barrier that will not allow the passage of significant quantities of gas or vapor at atmospheric pressure.

A study developed by the CAODC titled Doghouse Classification Risk Analysis (attached) has determined the probability of an explosive gas atmosphere occurring in a doghouse located outside the hazardous area of a drill floor (with or without winter enclosures) is less than 1 hour in 100 years. The 1 hour in 100 years probability or less is the industry standard for determining non-hazardous locations. For this reason, the doghouse, located outside the hazardous area of the drill floor, is unclassified. Owners/operators may adopt policies that impose a more stringent wiring method as well as limit the type of equipment that can be used in the doghouse.

Interpretation: *where a doghouse is constructed and installed as described in the Section 1, the interior would be an "unclassified" area.*

3. REFERENCED CLAUSES FROM API RP500 (2ND EDITION, NOV.1997)

3.1 CLAUSE - 6.2.3.5

When a building (or similar enclosed area) is classified as Zone 2 (*"to the extent of the building"*) due to specific oil or gas handling equipment enclosed by the building, it is not necessary to extend that classification beyond the building due to non-vapor tight walls or other openings (e.g. doors and windows) except when specific equipment enclosed by building requires classification for distances beyond the openings. However, since these openings may provide

communication for flammable gases and vapours, for enhanced safety it is recommended that non-explosion proof arcing or high temperature electrical equipment not be installed immediately adjacent to such openings.

Interpretation: *where the windbreak is taken to describe a "building or similar enclosed area" as referred to by Clause 6.2.3.5, it is not necessary to extend the Zone 2 area beyond the enclosed area (i.e. into the doghouse building) due to non-vapor tight walls or other openings (e.g. doors and windows).*

3.2 CLAUSE - 10.4.1.1

When a derrick is not enclosed or is equipped with a windbreak (open top and open "V" door) and the substructure is adequately ventilated, the areas are classified as shown in Figure 29.

Note: d*erricks enclosed with a windbreak (open top and open "V" door) such as that depicted in Figure 29 are considered to satisfy the requirements of adequate ventilation through years of satisfactory experience with this practice.*

Interpretation: *this clause describes the usual case for Canadian drilling rigs, where the derrick is not enclosed, but the drill floor is surrounded by a windbreak. The doghouse, where situated beyond a radius of 3m of well center, is therefore not classified.*

CLASSIFICATION OF LOCATIONS FOR ELECTRICAL INSTALLATIONS AT PETROLEUM FACILITIES CLASSIFIED AS CLASS I, DIV.1 AND DIV.2

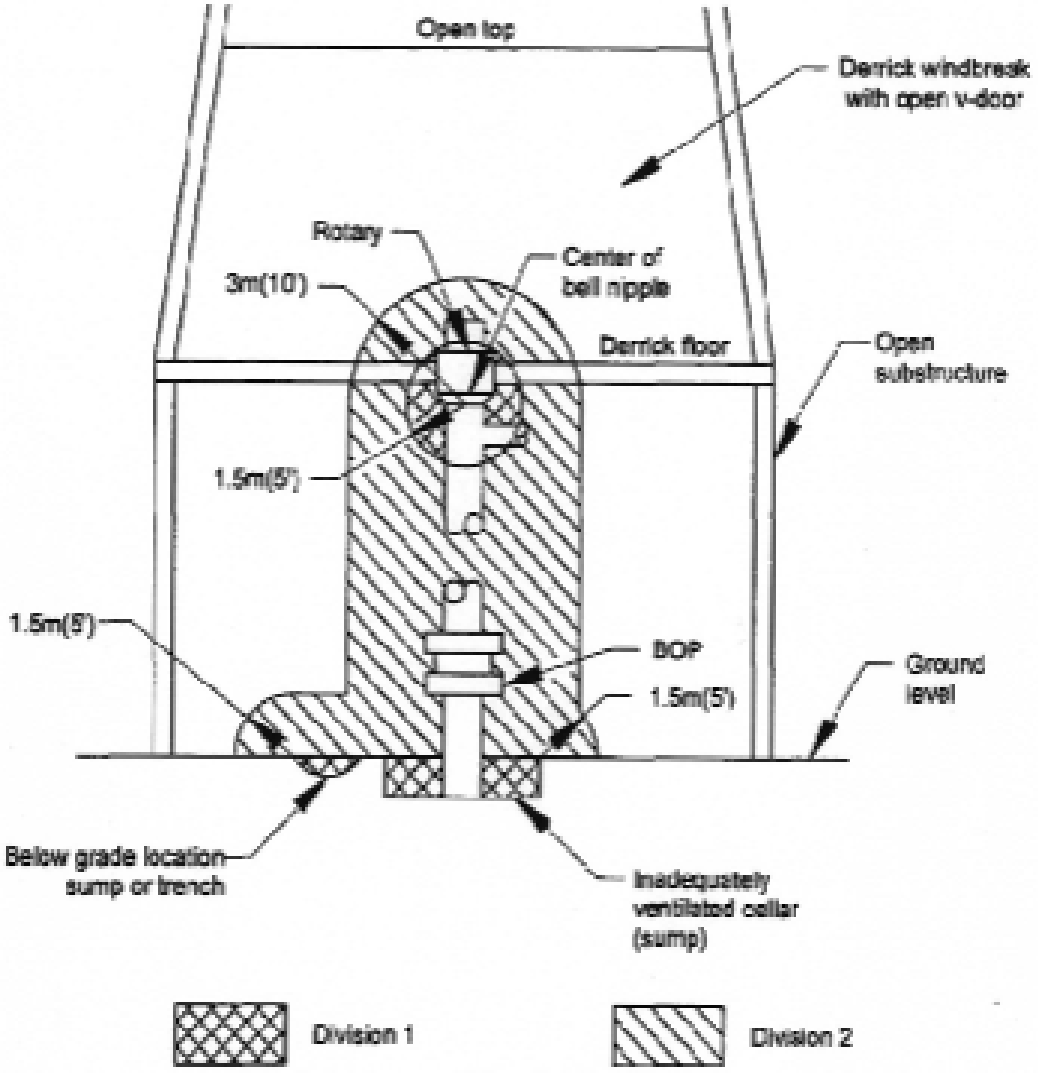

Figure 29 - Drilling Rig, Adequate Ventilation in Substructure, and Derrick is Not Enclosed, But is Equipped With a Windbreak, Open Top, and Open V-Door

(See Section 10.4.1.1)

3.3 CLAUSE - 10.4.1.2

This clause generally describes the usual case for Canadian drilling rigs equipped for winter operation, except that the derrick is not enclosed. As the rigs referred to here do not incorporate enclosed derricks, the decision to extend Zone 2 area beyond the radius of 3m, to the edges of the windbreak is arbitrary, and conservative. It is therefore reasonable to categorize the area as Zone 2 "to the extent of the windbreak.

Interpretation: *when the derrick is enclosed (open top) with adequate ventilation and the substructure is inadequately ventilated, the areas are classified as shown in Figure 30.*

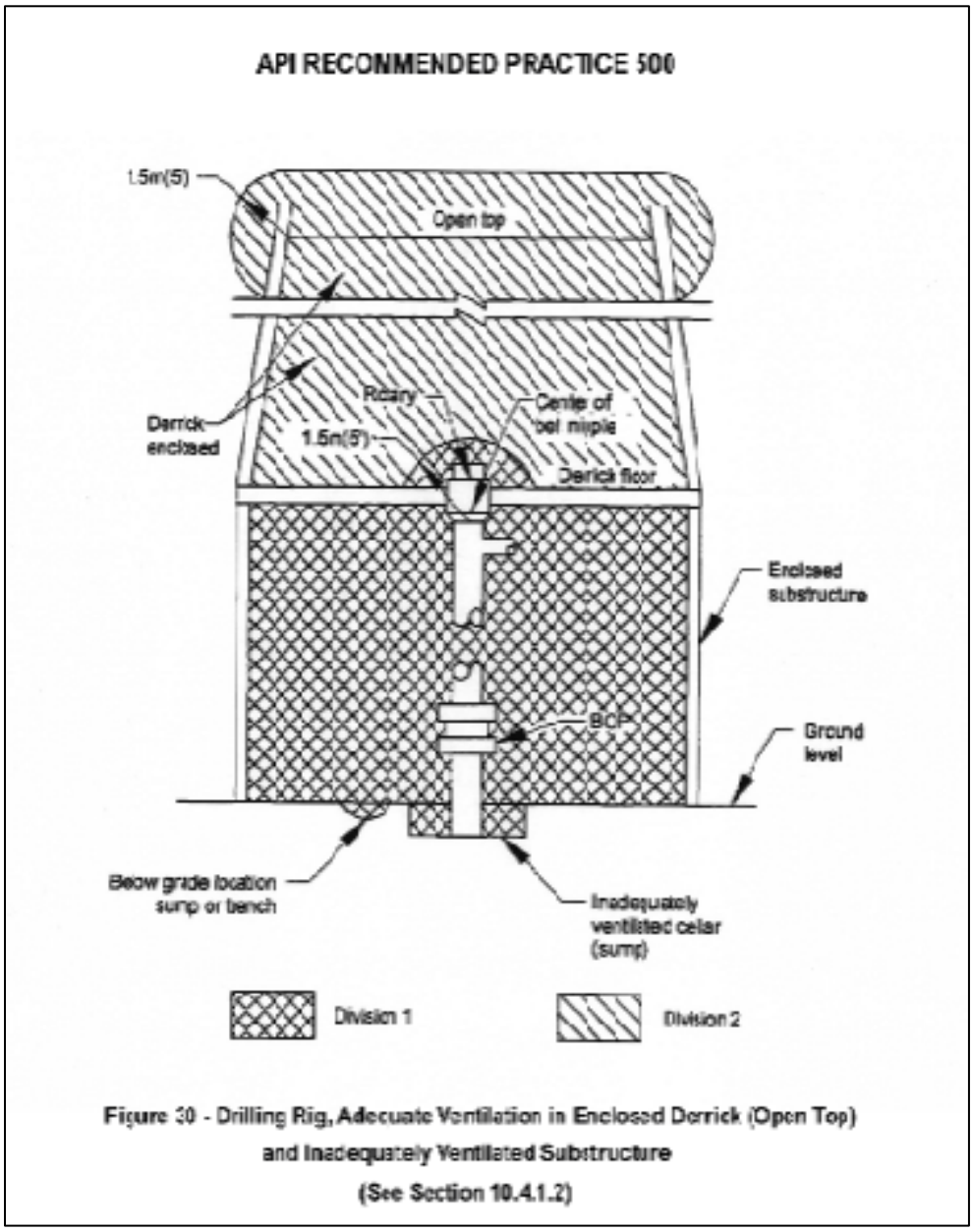

Figure 30 - Drilling Rig, Adequate Ventilation in Enclosed Derrick (Open Top) and Inadequately Ventilated Substructure
(See Section 10.4.1.2)

4. RECOMMENDED WIRING PRACTICE

In recognition of the harsh environment and for enhanced safety (as referenced in API RP500 Clause 6.2.3.5), the following code of practice is recommended to reduce the potential for failure:

1. Non-explosion proof arcing or high temperature electrical equipment such as coffee pots, electric drills or microwave ovens should not be installed immediately adjacent to openings in the doghouse;

2. Low voltage devices are acceptable in all areas of the doghouse provided they are protected from environmental damage (i.e. computers, control devices and low voltage components);

3. Windows on walls and doors adjacent to the drill floor side of the doghouse should be gasketed and be able to easily close if required;

4. Openings into the doghouse for such things as cable or hose entry should not be located on the wall adjacent to the drill floor. If an opening is required on the wall adjacent to the drill floor or substructure, it is recommended that it be gasketed or have the ability to close easily;

5. When it is not possible to install the doghouse electrical panel within the doghouse, it should be on an outside wall not facing the drill floor;

6. No electrical devices are to be mounted on the outside, drill floor side of the doghouse unless they are approved for Zone 2 classification or sealed and gasketed;

7. High voltage wiring devices such as switches, control panels and power distribution panels are to be enclosed and gasketed (meet or exceed requirements of CSA C22-1-0222-100 (4));

8. Light fixtures are to be a minimum of NEMA 4 or Zone 2 rated (meet or exceed requirements of CSA C22-1-01 22-106);

9. All receptacles and plugs/cord caps located in the doghouse are to be constructed to prevent accidental disconnection. All receptacles should be clearly labeled with reciprocating circuit numbers. Signage should be posted in the doghouse indicating circuits should be turned off before unplugging (meet or exceed requirements of CSA C22-1-01 22-108);

10. Plugs should be correctly matched to receptacles. The use of "crossover plugs" is prohibited unless they meet or exceed the above criteria;

11. All electrical heating devices should be approved for use in Zone 2 areas;

12. Air conditioners should be approved for use in Zone 2 areas;

13. It is recommended that a Professional Engineer of the member company approve deviations from this RP;

14. Where the doghouse, or extensions to the doghouse, extends within a radius of 3m of the well center, classification must be reviewed by a Professional Engineer.

5. IMPLEMENTATION

This RP applies to all member company drilling rigs constructed after the original issue date of this RP.