Descriptive Report and Test Results

MASTER CONTRACT: 150323
REPORT: 1124259
PROJECT: 70007937

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Contents:
Certificate of Compliance - Page 1 to 2
Supplement to Certificate of Compliance – Page 1
Description and Tests – Pages 1 to 8
Figures - Figs. 1 to 3
Attachments - 1 to 2 (CSA Eng. Report only)

PRODUCTS

CLASS 2258 04 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations
CLASS 2258 84 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations - Certified to U.S. Standards

Class I, Groups A, B, C and D:

- Series Q45 Namur Photoelectric Sensors. Entity Parameters: Vmax = 15V dc, Imax = 60mA dc, Ci = 0.3uF, Li = 0; Amb 70°C. Intrinsically Safe when connected per Installation Drawing No 38343.

Class I, Div. 2, Groups A, B, C and D:

- Series Q45 Namur Photoelectric Sensors rated 15V dc max, 60mA max; Amb 70°C.

Note: The sensors are suitable for installation in (or through the wall of) a suitable enclosure with provision for connection of rigid metal conduit, as acceptable to the local inspection authority having jurisdiction.

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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

APPLICABLE REQUIREMENTS

CSA Std C22.2 No. 142-M1987 - Process Control Equipment
CSA Std C22.2 No. 157-92 - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
CSA Std C22.2 No. 213-M1987 - Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations
UL Std No. 508 – 17th Ed. - Industrial Control Equipment
UL Std No. 913- 5th Ed. - Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations
ANSI/ISA-12.12.01-2012 – Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

- CSA Monogram with NRTL/C or C/US indicator;
- Submittor Identification;
- Model number;
- Serial number, date code or month and year of manufacture;
- Electrical rating (may appear on installation diagram);
- Hazardous location designation (may appear on installation diagram);
- Entity parameters (may appear on installation diagram);
- The words INTRINSICALLY SAFE/SECURITE INTRINSEQUE;
- The Symbol Exia;
- Reference to Installation Instructions;
- Bilingual Caution for Class I, Div. 2. (may appear on installation diagram);
- Ambient Temperature (may appear on installation diagram).

Refer to Figure 1 for partial sensor label details. Refer to Fig 2 for cable assembly Div. 2 warning label details. (Note: For complete sensor markings requirements please see Certificate of Compliance).

Serial number or date code is stamped on the sensor label with indelible ink.
Refer to Figure 3 for Installation Drawing No 38343, referred to in markings.

Method of Marking

For Sensor
Markings as referenced in Fig. 1 are stamped with indelible ink on side of sensor.

For Cable
CSA accepted self-adhesive label is affixed on cable assembly. Label is CSA Accepted in File LR 98462, pressure-sensitive, Type L-23, manufactured by Commerce Label Inc.

ALTERATIONS

1. Markings as above

FACTORY TESTS

The equipment at the conclusion of manufacture and before shipment, shall withstand for one min, without breakdown, the application of the following ac potential:

500V between extra low potential live parts and exposed non-current-carrying metal parts or ground terminal, if such circuits leave or enter the enclosure.
Notes:

1. As an alternative, potentials 20 percent higher may be applied for one second.

2. Where it is more convenient to do so, the dielectric strength test may be made by applying a direct current voltage instead of an ac voltage, provided that the voltage used is 1.414 times the values specified above.
3. The test specified above shall be waived on grounded or Class 2 circuits.

Warning: The factory test specified may present a hazard of injury to personnel and/or property and should only be performed by persons knowledgeable of such hazards and under conditions designed to minimize the possibility of injury.

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

1. Component descriptions marked with either the "(INT)" or "(INT*)" identifiers may be substituted with other components providing the requirements specified under the notes in the "Description" are complied with.

2. This report contains reference to certain construction and engineering documents that have been deemed critical to ensuring continued compliance with applicable construction and performance requirements. A list of these documents, with drawing numbers and the appropriate revision levels is summarized in this report. Documents detailed herein are subject to inspection by CSA International personnel and shall be made available in the manufacturing location upon request. Failure to produce these documents in a timely manner constitutes noncompliance and is subject to the actions outlined in the CSA Product Service Agreement.

COMPONENT SPECIAL PICKUP

1. Component descriptions marked with the identifier "(CT)" are subject to annual pickup and Conformity Testing.

DESCRIPTION

Notes:

1. Component Substitution
   a) Critical components (those identified by mfr name, cat no), which are NOT identified with either "INT" or "INT*" are not eligible for substitution without evaluation and report updating.
   b) The term "INT" means a "Certified" and/or "Listed" (or a "Recognized" and/or "Accepted") component may be replaced by one "Certified" and/or "Listed" by an organization (accredited by OSHA/SCC), for the same application; providing the applicable country identifiers are included and requirements in item "d" below are complied with.
   c) The term "INT*" means a "Recognized" and/or "Accepted" component may be replaced by one "Recognized" and/or "Accepted" by an organization (accredited by OSHA/SCC), for the same application, providing the applicable country identifiers are included, the component is **also** CSA Certified, the requirements in item "d" below are complied with and any "conditions of suitability" for the component (as recorded in this descriptive report) are complied with.
   d) Components which have been substituted, must be of an equivalent rating, configuration (size, orientation, mounting) and the applicable minimum creepage and clearance distances are to be maintained from live parts to bonded metal parts and secondary parts.
   e) Substitution of a "Certified" and/or "Listed" component with a component that is "Recognized" or "Accepted" is not permitted without evaluation and report updating.

General – A complete description of products can be found with the descriptive documents referenced within this report.

No further description deemed necessary.

Descriptive Documents:

Note: Documents detailed herein are subject to inspection by CSA International personnel and shall be made available in the manufacturing location upon request.

Subject	Drawing	Rev. or ate
Schematic Diagram Q45 Namur Circuit	37664	C
Pcb Assembly; Q45 Namur CV/LP	37663	G
Q45 Namur FP	37662	G
Q45 Namur LV	37660	G
Q45 Namur D/DL/F	37657	F1
Schematic Diagram, Q45 E Namur Circuit	37668	C
Pcb Assembly; Q45 Namur E	37667	H1
Pcb Raw; Q45 Namur	01961	B
Dimension Dwg; Pcb Raw Shield, Q45	35741	-
Filter Pair; Omni 2	35168	B
O-ring, Top Cover, Omni 2	34821	-
Potting Procedure; Q45	80143	-
Modified Clear Lens, Omni-beam, OSBD	14894	A
LED Red Ind SBR3431 or SBR3931; (05105) C-prep, use fixture 487	35990	A
LED IR, Domed	05013	-
LED Specification, Banner P/N 30694,Type: Visible Red LED	30694	A
Scanner Head Lens	15485	A
Housing, Connector, Micro QD, Value-beam	13685	E
Lens, Clear	12504	C
Lens Installation, Q45	00534	B
Black Valox, 310-SEO	13752	C
Aperture Cone, Alpha Head	14630	A
Black Valox 865	14845	E
Fibre Block Valu/maxi beam	15857	B
Bezel, Omni 2	34975	B
Bezel, Convergent Series, Omni 2	35035	B
SPE-SPI No 3	35037	B
Fibre Base, Omni 2	35038	C
Insert, Filter Holder, Q45	35158	D
First Assembly; Q45	00532	H
Assembly Prep; Q45	00531	D
Final Assembly; Q45	00533	E
Pcb Assembly Q45 Namur FV	58272	A
Q45AD9FV Namur 5-15VDC	58266	-
Q45AD9FVQ Namur 5-15VDC 4-Pin	59014	-
PCB Assembly Q45 Namur FV (B!961)	58272	-

TEST HISTORY

1. Dielectric Strength: Std CSA C22.2 No 142-M1987, Cl 6.8.1 (c)
UL 508, Paragraph 46.1.2 (a)

The sensor Q45AD9DQ was subject to a 500V rms potential applied between the terminals of quick-connector and thread sensor attachment connector, for a period of 1 minute.

Results: Model Q45AD9DQ (representative for Series Q45 Namur).

No breakdown.

2. Li Determination: Li was determined to be O based on there being no inductances in the device.

3. Ci Determination: Ci was determined based on only Cl, C2 and C4 being accessible under a two fault condition. Cl, C2 and C4 in parallel give a total capacitance of 3.67 uF which is also in series with 94 ohms (R31 & R32). Using the ignition curves for capacitance circuits in hydrogen the equivalent capacitance is 0.22 uF. Therefore Ci = 0.22 uF or higher.

4. Temperature Code: Std CAN/CSA C22.2 No 213-M1987, Cl 6.2
UL Std 1604, Para 10

The device was operated continuously with an input voltage of 15V dc. The following readings were recorded:

Component	Method	Temp
R1	Thermocouple	27C
R31	Thermocouple	26C
D4	Thermocouple	29C
Ambient	Thermometer	23C

5. Temperature Code: Std CAN/CSA No 157-92, Cl 6.3
UL Std 913, Para 7.5

The following tests are worst case conditions considering possible faults and supply levels. The barriers wee simulated by a suitable dc supply and current limiting resistance. Temperatures were measured by thermocouples placed directly on component surfaces; ambient by thermometer.

Supply Barrier: 15V dc (max)/60mA
- Barrier connected in intended manner where current is 60mA.

- Q1 collector is shorted to emitter; component fault
- C2 is shorted out; component fault

Max Temp on R31 (47r) 38°C; Amb 23°C

6. Spark Ignition: Std CAN/CSA C22.2 No 157-92, Cl 6.2
UL Std 913, Para 8

The following tests are worst case conditions considering possible faults and supply levels. The barriers were simulated by a suitable dc supply and current limiting resistance.

Hydrogen/air test mixture

Supply Barrier: 15V dc/60mA (max)
- Connected in intended manner

- Q1 collector is sorted to emitter; component fault
- Pot 3 terminal 3 shorted to terminal 2, simulating zero ohm setting
- Fet 1 terminal 2 shorted to terminal 3, component fault

Tester contacts shorting board trace (that runs from Q1 collector terminal to Pot 3 terminal 3) to ground; less than 1/3 of required spacing.

OCV 11.7 SCC 38.4mA

No ignition.

Evaluated the discharge of C1, C2 and C3.

LR 41887-76: Since sensor Models Q45AD9FV and Q45AD9FVQ are identical to presently certified Q45AD9F sensors, except sensors Q45AD9FV(Q) has a visible Led instead of an infrared Led, no tests were deemed necessary.

Project 1124259: Since this project covered changing R19 from 10K to 1K and changing FET1 from 2N7002 to ZN4106 where none of these changes would effect the I.S. and/or Div. 2 evaluation, no testing was deemed necessary.

Project 70007937

This project only covered updating drawing list with latest drawings revision levels, none of the changes made to the drawings affect the construction of the sensors and/or the CSA I.S. and Div. 2 evaluation, hence no tests were deemed necessary.