



Certificate of Compliance

Certificate: 2447377 **Master Contract:** 165544 (047837_0_000)
Project: 70152011 **Date Issued:** 2017-09-08
Issued to: **Clark-Reliance Corporation**
16633 Foltz Industrial Pky
Strongsville, Ohio 44149
USA
Attention: Ryan Howell

The products listed below are eligible to bear the CSA Mark shown



Issued by: *Alejandra Gonzalez*
Alejandra Gonzalez

PRODUCTS

CLASS - C323802 - SWITCHES-Automatic - Magnetic Type - For Hazardous Locations

Class I Groups C and D; see table below for T code

Magnetic Level Switches, model *MLS-abcd*, rated 120 Vac, 11 A max, 1500 PSI max, ambient temperature range -50°C to 50°C, process temperature range -50°C to 375°C; Enclosure Type 4X, Single Seal.

- a = 1 – 303 SS bushing
2 – 316 SS bushing
b = 1 – (1) 11SM1-T switch
2 – (2) 11SM1-T switches
3 – (1) 41SM1-T switch
4 – (2) 41SM1-T switches
5 – (1) 11SM244-T switch
6 – (2) 11SM244-T switches
7 – (1) 1HM1 switch
8 – (2) 1HM1 switches
c = 0 to 7 – various process connection adapters not critical to this certification
d = 0 to 3 – various process connection adapter materials not critical to this certification



Certificate:
Project: 70152011

Master Contract: 165544
Date Issued: 2017-09-08

Temperature Code	Process Temperature
T6	-50°C to 90°C
T5	91°C to 140°C
T4A	141°C to 200°C
T4	201°C to 250°C
T3A	251°C to 375°C

Note: The device may carry lower amperage rating based on the internal switch used

APPLICABLE REQUIREMENTS

CAN/CSA C22.2 No. 0-M91	General Requirements – Canadian Electrical Code, Part II
CAN/CSA C22.2 No. 14-95	Industrial Control Equipment
CAN/CSA C22.2 No. 30-M1986	Explosion-Proof Enclosures for use in Class I Hazardous Locations
CAN/CSA C22.2 No. 94-M91	Special Purpose Enclosures
ISA 12.27.01-2011	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids



Supplement to Certificate of Compliance

Certificate: 2447377

Master Contract: 165544 (047837_0_000)

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
70152011	2017-09-08	Update to report 2447377 to replace adhered plastic label with a solid label attached to the enclosure lid with drive screws.
70142848	2017-07-13	Update to report 2447377 to include minor revisions to decorative documents not affecting the certification of the model MLS Magnetic level switches
70047803	2015-10-23	Update to Report 2447377 to include increase in Max ambient to 50°C increase in max process temperature to 375°C, Addition of table for selection of Tcode, addition of label drawing L-111 and replacement of instruction manual document JS500.02
70027892	2015-06-26	Update to report 2447377 to include Single Seal Marking.
2626874	2013-05-23	Update to report 2447377 to include revised drawings
2569985	2012-10-22	Update to Report 2447377 to include alternate enclosure Model GRLB100A, manufactured by EGS under trade names of Appleton and OZ / Gedney.
2447377	2012-01-20	Re-instatement and issue of LR 104957-2 under master contract 165544 to cover MLS- <i>abcd</i> magnetic level switches.



Descriptive Report and Test Results

MASTER CONTRACT: 165544
REPORT: 2447377
PROJECT: 70152011

- Edition 1:** April 24, 1996; Application No LR 104957-1 - Etobicoke
Issued by D. Somma, C.E.T
- Edition 2:** June 21, 1999; Application No - LR 104957-2
Issued by; K. Atkins
- Edition 3:** January 20, 2012; Project 2447377 – Cleveland
Issued by Marius Manastireanu; Reviewed by Scott Wallace
- Edition 4:** October 22, 2012; Project 2569985 – Cleveland
Issued by Richard Dibler Jr
- Edition 5:** May 24, 2013; Project 2626874 – Cleveland
Issued by Dennis Jeffrey; Reviewed by Richard Dibler Jr
- Edition 6:** June 26, 2015; Project 70027892 – Cleveland
Issued by Dennis Jeffrey
- Edition 7:** October 23, 2015; Project 70047803 – Cleveland
Issued by Joshua Burdeshaw
- Edition 8:** July 17, 2017; Project 70142848 - Cleveland
Issued by Joshua Burdeshaw
- Edition 9:** September 8, 2017; Project 70152011 - Plano
Issued by Alejandra Gonzalez

Report pages reissued

Contents: Certificate of Compliance – Pages 1 to 2
Supplement to Certificate of Compliance – Page 1
Description and Tests - Pages 1 to 12
Descriptive Documents – *Engineering Files only*

This report shall not be reproduced, except in full, without the approval of CSA Group.

8501 East Pleasant Valley Road, Cleveland, OH, U.S.A. 44131-5575
Telephone: 216-524-4990 1.800.463.6727 Fax: 216-642-3463 www.csagroup.org

PRODUCTS

CLASS 3238 02 – SWITCHES – Automatic – Magnetic Type – For Hazardous Locations

Class I Groups C and D; see table below for T code

Magnetic Level Switches, model *MLS-abcd*, rated 120 Vac, 11 A max, 1500 PSI max, ambient temperature range -50°C to 50°C, process temperature range -50°C to 375°C; Enclosure Type 4X, Single Seal.

- a = 1 – 303 SS bushing
2 – 316 SS bushing
b = 1 – (1) 11SM1-T switch
2 – (2) 11SM1-T switches
3 – (1) 41SM1-T switch
4 – (2) 41SM1-T switches
5 – (1) 11SM244-T switch
6 – (2) 11SM244-T switches
7 – (1) 1HM1 switch
8 – (2) 1HM1 switches
c = 0 to 7 – various process connection adapters not critical to this certification
d = 0 to 3 – various process connection adapter materials not critical to this certification

Temperature Code	Process Temperature
T6	-50°C to 90°C
T5	91°C to 140°C
T4A	141°C to 200°C
T4	201°C to 250°C
T3A	251°C to 375°C

Note: The device may carry lower amperage rating based on the internal switch used

APPLICABLE REQUIREMENTS

CAN/CSA C22.2 No. 0-M91	General Requirements – Canadian Electrical Code, Part II
CAN/CSA C22.2 No. 14-95	Industrial Control Equipment
CAN/CSA C22.2 No. 30-M1986	Explosion-Proof Enclosures for use in Class I Hazardous Locations
CAN/CSA C22.2 No. 94-M91	Special Purpose Enclosures
ISA 12.27.01-2011	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids

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.

The products listed are eligible to bear the CSA Mark shown without an indicator for Canada only (indicating that products have been manufactured to the requirements of Canadian Standards).

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

The products listed are eligible to bear the CSA Mark for Canada only applicable, in accordance with the requirements of those authorities.

Markings are silkscreen on metal nameplate with the following information:

- Manufacturer Name: “Clark Reliance” or CSA Master Contract ”165544” adjacent to the CSA Mark;
- Model number: As specified in the PRODUCTS section above.
- Electrical Ratings: As specified in the PRODUCTS section above.
- Ambient temperature rating: As specified in the PRODUCTS section, above.
- Manufacturer date in MMY format, or serial number, traceable to month of manufacture.
- The CSA Mark as shown on the Certificate of Conformity.
- Hazardous Locations designations: As specified in the PRODUCTS section above.
- Enclosure ratings: As specified in the PRODUCTS section above.
- Temperature code: As specified in the PRODUCTS section, above.
- Rated maximum working pressure: As specified in the PRODUCTS section above.
- Process Temperature range: As specified in the PRODUCTS section above.
- The following words:
 - o “CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER” and “ATTENTION: OUVRIRE LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE”, or
 - o “CAUTION: KEEP COVER TIGHT WHILE CIRCUITS ARE ALIVE” and “ATTENTION: GARDER LE COUVERCLE BIEN FERME TANT QUE LES CIRCUITS SONT SOUS TENSION” or the equivalent
 - o “Single Seal”
- The designation “GND” or equivalent adjacent to the equipment ground terminal
- Installation Instructions are provided with each units being shipped, refer to Descriptive Documents List

ALTERATIONS

N/A

FACTORY TESTS

The equipment at the conclusion of manufacture, before shipment, shall withstand for one min, without breakdown, the application of 1000V ac plus twice the max rated voltage between live parts and exposed non-current-carrying metal parts. The factory test may be made at existing room temperature. As an alternative, a potential 20 percent higher may be applied for one sec.

Warning: The factory test(s) 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 another certification organization accredited by the appropriate accreditation body or scheme requirements to the correct standard, 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 another certification organization accredited by the appropriate accreditation body or scheme requirements to the correct standard, 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: The subject switches are magnetic activated, to indicate and control the level of liquids or gas and provide an alarm-signaling device for use in hazardous location. Detail operation and complete nomenclature is given in A-31103 drawing.

Nomenclature for MLS abcd

- a = 1 – 303 SS bushing
2 – 316 SS bushing
b = 1 – (1) 11SM1-T switch

- 2 – (2) 11SM1-T switches
- 3 – (1) 41SM1-T switch
- 4 – (2) 41SM1-T switches
- 5 – (1) 11SM244-T switch
- 6 – (2) 11SM244-T switches
- 7 – (1) 1HM1 switch
- 8 – (2) 1HM1 switches

c = 0 to 7 – various process connection adapters not critical to this certification

d = 0 to 3 – various process connection adapter materials not critical to this certification

Construction

Typical magnetic levels switch series:

"MLS" assembly and parts list is shown in A-31103

The magnetic level switch consists of the following items critical for the safe operation of the equipment:

1. Enclosure: CSA Certified. Model GALB-3, manufactured by Thomas & Betts for use in Class I, Groups C & D, Class II, Groups E, F & G, Class III, Type 4. The enclosure is painted with polyurethane enamel for corrosion protection

Alternate: CSA Certified / UL Listed (E10444). Model GRLB100A, manufactured by EGS under trade names of Appleton and OZ / Gedney. CSA Class I, Groups C and D; Class II, Groups E, F and G; Class III Type 3, UL Class I, Groups B, C and D; Class II, Groups E, F and G Type 4. The enclosure is epoxy powder coated aluminium resistant to corrosion.

2. MLS Process Bushing: Made of T-303 SST or 316 SST. Detail dimensions and construction is shown in drawings M-1058 and M1057. A 1-1/2 in by 2-7/8 in float made of T-316 SST is secured to the process bushing with a T-316 SST pivot pin. The process bushing threads into the enclosure hub with a minimum of five full NPT threads.

3. Switch Assembly: Refer to drawing B-7001 for general assembly and parts list. Switches used are CSA Certified LR 41372, manufactures by Micro Switch listed below; up to two switches can be used.

- a) 11SM1-T rated 5A at 250Vac
- b) 41SM1-T rated 11A at 120Vac
- c) 11SM244-T rated 5A at 120Vac
- d) 1HM1 rated 2A at 120V

4. Insulating barrier: Material Nomex paper or equivalent approximately 2in by 0.5”in, 15mils thick; separates micro switch terminals from non-current carrying metals.

5. Wire leads: Certified, manufactured by Alphawire P/N 3053, CSA Style TR-64/TEW, 90°C FT1 20AWG min or equivalent.

6. Terminal block: Certified, manufactured by Weco P/N 323-FU16.6-HDS-12 rated 300V 25A, or equivalent; suitable for factory wiring.

DESCRIPTIVE DOCUMENTS LIST

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

Drawing number	Revision	Drawing Title
A-31103	2	JMLS Horiz. Switch Assembly
B-7001	0	MLS Switch Carriage Sub-Assembly
M-1057	2	Bushing, Horizontal MLS Switch for Flanged Connections
M-1058	4	Bushing, Horizontal MLS Switch
L-1011	4	LABEL, MLS, EXPLOSION PROOF
JS500.02	Dated 7/15/15	MLS Series Switches Installation, Operation and Maintenance

TEST HISTORY RESULTS

Representative sample of series MLS switch was subjected to the following tests:

1. Enclosure Fluid Seals: CSA Std C22.2 No 30-M1986, Cl 4.10.6.

- (a) Overpressure Leakage Test: (Cl 4.10.6.3)
2X max working pressure for a period of one minute
2X 1500 psi
3000 psi/1 min

Results: There was no evidence of any visible leakage following the overpressure test.

- (b) Overpressure Rupture Test (Cl 4.10.6.4)
3X 1500 psi (MWP)
4500 psi/1 min

Results: there was no rupture of the seal following overpressure rupture test.

Detail test data performed by the submittor is attached under Appendix 1 (kept in Eng. File).

2. Adhesive Nameplate: CSA Std C22.2 No 30-M1986, Cl 6.12.

Seven separate adhesive label each secured to the epoxy painted terminal box were exposed for 10 days to a 50 percent saturated atmospheres of the following vapours:

Ethanol;
Ethyl acetate;
Ethyl ether;
Gasoline;
M.E.K.;
Toulene;
Vinyl acetate.

Results: Following the solvent exposure, the adhesive labels were examined for lack of firmness of attachment, and other deleterious effects. Results indicate that there was no deleterious effects, and the attachment of the labels were firm (satisfactory). Detailed test data is attached under Appendix 2 (kept in eng. file).

Hosedown (Type 4X): Waived. The enclosure is Certified as Type 4. The epoxy ratings per manufacturer's spec sheet. Indicate suitability for corrosion resistance.

No further tests were deemed necessary.

Edition 3 (Project 2447377): Re-instatement and issue of LR 104957-2 under master contract 165544 to cover *MLS-abcd* magnetic level switches. These magnetic devices can incorporate up to two switches. Evaluation of clearances and creepages has been conducted on MLS 2200 model provided by the submitter, representative of MLS Series.

Dielectric Strength Test – CSA Standard 14 Clause 6.8

One representative sample (MLS2200) was dielectrically tested by applying 2.13KVac between enclosure (ground) and all terminal block connections for 1 minute. The sample has sustained the high voltage withstand test.

Evaluation of clearances and creepages – CSA Standard 14 Clause 4.15 – Table 6

The representative sample used during the high voltage withstand test has been used to determined spacings and clearances. There is no through air spacing between bare live parts (switch terminals) and grounded metal parts. Switch actuating arm (metal) is separated from switch terminals through the use of insulating paper (Nomex). Terminal blocks are suitable for factory wiring and provide an over surface spacing of at least 6mm, above minimum requirement for voltages ranging between 0 and 150Vac (3mm).

No further tests were deemed necessary

Edition 4 (Project 2569985): This project updates the report to include alternate CSA Certified / UL Listed enclosure Model GRLB100A, manufactured by EGS under trade names of Appleton and OZ / Gedney. Based on similarities between the current enclosure and the new enclosure, no additional testing has been deemed necessary.

Edition 5 (Project 2626874):

Update to report 2447377 to include revised drawings. The follow table lists the drawings revised and their corresponding changes.

Drawing number	Old Revision	New Revision	Changes
A-31103	0	1	Bill of material was corrected to fix quantities listed and list all parts. Code BW (Back welding) was added. Notes 8 – 13 were added.
M-1057	-	1	New drawing for flanged connections. Flamepath side identical to M-1058 bushing.
M-1058	2	3	Thread gage note changed from “Gage shall be flush to (2) threads shallow” to “3 threads oversize +1/2 thread/-0 thread”.

No further tests were deemed necessary.

Edition 6:(Project 70027892)

Update to report 2447377 to include Single Seal marking.

Assessment per ANSI/ISA-12.27.01-2011:

Temperature Cycling – Clause 5.2.2

The stainless steel bushing provides the seal between the enclosure and process fluid. The seal consists of solid material directly machined into the bushing with a minimum thickness of 0.125” as shown on drawings M-1057 and M-1058. No non-metallic parts are used for sealing purposes and the seal is directly incorporated into the equipment. Therefore the temperature profile will be uniform and no fluctuations will occur. The temperature cycling test has been waived.

Fatigue Cycling – Clause 5.2.3

This test was waived based on calculations/explanation/documentation/etc. provided by the manufacturer. CSA does not take any responsibility for the validity or accuracy of the information provided.

Leakage Test – Clause 5.2.4

This test has been accepted based upon the original explosive fluid seals leakage test conducted under edition 1. This test has been waived.

Burst Pressure Test – Clause 5.2.5

This test has been accepted based upon the original explosive fluid seals burst pressure test conducted under edition 1. This test has been waived.

The process temperature range, ambient temperature ratings, temperature code, and words “Single Seal” have been included in the Markings section of this report.

No further testing has been deemed necessary.

Edition 7: (Project 70047803)

Update to report 2447377 to include increase in max ambient to 50°C, increase in max process temperature to 375°C, Addition of table for selection of T code, addition of label drawing L-1011 and replacement of instruction manual document JS500.02.

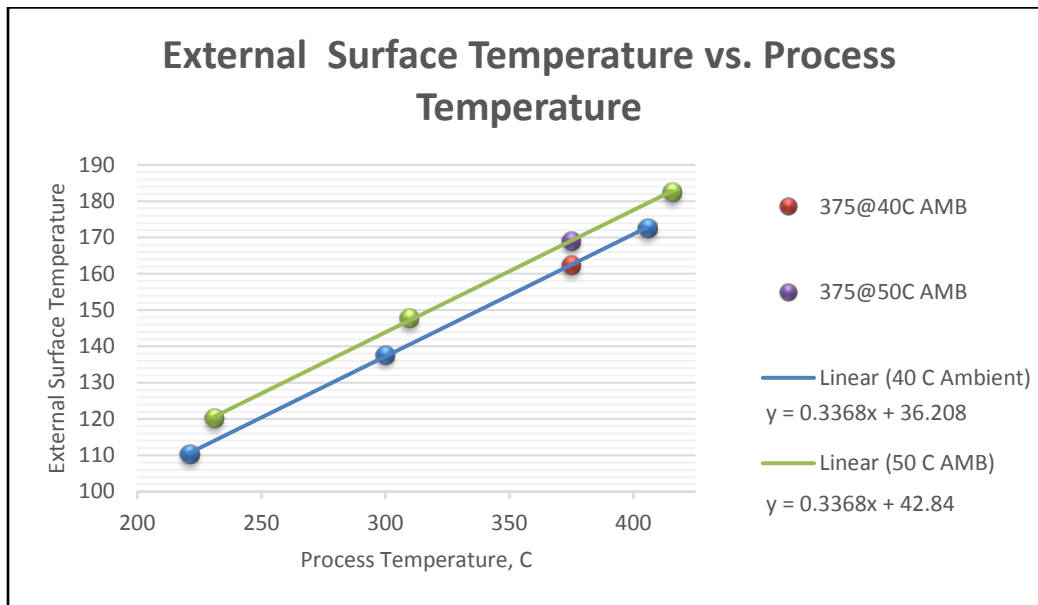
The following assessment was based on data extracted from custom test report 70038379 dated September 9, 2015 and results from test data sheet 70038379TDS performed under project 70038379 for the submittor.

Assessment

Increasing the max ambient temperature to 50°C and increasing the max process temperature to 375°C.

A sample Magnetic Level Switch model MLS 2100 was tested at 40°C with three separate process temperatures 200°C, 300°C and 400°C. The maximum internal component temperatures and external surface temperatures were recorded and adjusted +5 degrees for measurement uncertainty.

Process temperature (°C), Internal float	Max temperature (°C), External threaded base
221.0	110.3
299.7	137.71
405.6	172.55



The data is linear dependent. Interpolation at the process temperature of 375°C results in a max external surface temperature of 162.5°C when referenced to an ambient temperature of 40°C. When referenced to an ambient temperature of 50°C interpolation at the process temperature of 375°C results in a max external surface temperature of 169.1°C. The highest allowable temperature code given a max external surface temperature of 169.1°C is T3A per Canada (CEC). The maximum ambient temperature of 50°C and the maximum allowable process temperature of 375 °C is stated on the label (details found on drawing L-1011). The T code selection information is also provide within the JS500.02 instruction document.

All internal components were operated below their maximum rated temperatures.

The data was also used to construct the following table which was added to the **PRODUCT** section for selection of the appropriate temperature code versus process temperature.

Temperature Code	Process Temperature
T6	-50°C to 90°C
T5	91°C to 140°C
T4A	141°C to 200°C
T4	201°C to 250°C
T3A	251°C to 375°C

- At 50C the following are the resultant maximum surface temperatures at the given process temperatures.
- At the process temperature of 250C the resultant maximum surface temperature is 127.04C allowing a T code of T4.
- At the process temperature of 200C the resultant maximum surface temperature is 110.2C allowing a T code of T4A.
- At the process temperature of 140C the resultant maximum surface temperature is 89.9C allowing a T code of T5.
- At the process temperature of 90C the resultant maximum surface temperature is 73.0C allowing a T code of T6

The following documents were added:

Drawing number	Old Revision	New Revision	Changes
L-1011	-	3	Added – New document Label drawing includes the increase to the maximum ambient temperature to 50°C and the increase to the maximum process temperature to 375°C.
JS500.02	-	Dated 7/15/15	Added – New document MLS Series Switches Installation, Operation and Maintenance. Replaces previous instruction document.

No further testing determined necessary.

Edition 8: (Project 70142848)

Update to report 2447377 to include minor revisions to descriptive documents not affecting the certification of the model MLS Magnetic level switches.

The purpose of the 8th edition of this report is to introduce revisions to drawing M-1057 and M-1058. The revisions made to the two bushing designs are determined to be noncritical to the **Class I Groups C and D** protection method.

The following documents revisions are added to the descriptive documents list.

Copies can be found in the project folder:

Drawing number	Old Revision	New Revision	Changes
M-1057	1	2	Added 4 additional pivot notches at 60 deg intervals to allow better float positioning.
M-1058	3	4	Added 4 additional pivot holes at 60 deg intervals to allow better float positioning.

The addition of the notches and the holes to the bushings increase the number of positions in which the pivot pin can be oriented to secure the bushing to the process. By direct inspection of the revised drawings it is determined that no changes are made to the threaded flame path of the bushing nor compromise the integrity of the device in any way.

The profile and certificate are updated. No changes are made to the certification record.

No further testing determined necessary.

Edition 9: (Project 70152011)

Update to report 2447377 to replace adhered plastic label with a solid label attached to the enclosure lid with drive screws.

The metal plate is permanently attached to the enclosure by means of screws; drill holes for drive screws outside of thread diameter (3.32 in OD) in cover, in a manner that will prevent damage or distortion (e.g. secure in each corner) as per CSA Std. 30, Cl. 5.2 (b) - Markings requirements. The hole is outside of the thread diameter, it can never penetrate the enclosure. No further testing was deemed necessary.

The follow table lists the drawings revised and their corresponding changes.

Drawing number	Old Revision	New Revision	Changes
A-31103	1	2	Changed label to sheet metal with drive screw holes: Added screws to BOM.
L-1011	3	4	Changed label to round sheet metal.

---End of Report---