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REPORT

on

COMPONENT - INDUSTRIAL CONTROL SWITCHES

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DESCRIPTION

PRODUCT COVERED:

* USR, CNR - Component - Industrial Control Switches, Types TP3251 - followed by 0, 1, 2, 3, 4, 5, or 6, followed by 0 **or 1**, followed by **-**01, **-**03, **-**04, **-**05, **-**06, or **-**07, maybe followed by /, maybe followed by 0, 1, 2, 3, 4, 5, 6, or 7, maybe followed by 0 or 1.

* General - These devices are double pole, single throw, normally open, magnetically operated switches which are latched by the use of an internal coil. Depending on the model numbers**, the TP3251 series may be provided with an external coil connection(FIG 05, FIG 07)** and are equipped with either push-button or rocker type actuation. They are intended to be front mounted in a suitable enclosure.

RATINGS:

Volts	1-phase hp
120 ac	1 (16 FLA)
240 ac	1-1/2 (10 FLA)

20 A General use, 120 V ac
16 A General use, 240 V ac

Coil rating (see nomenclature for details): 115 - 240 V ac, 50/60 Hz

Environmental Ratings (for front face only) - Type 1

ENGINEERING CONSIDERATIONS (NOT FOR UL REPRESENTATIVE USE):

*CNR - Indicates Investigated To Canadian National Standard(s) C22.2 No. 14-05.

USR – Indicates investigation To United States Standard UL 508, 17th Edition.

Note: CNR = Canadian National Standards - Recognized.
USR = United States Standards - Recognized.

Use - For use only in (or with) complete equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc.

This Component has been judged on the basis of the Standard for Industrial Control Equipment (UL 508, Table 47.1) which would cover the Component itself if submitted for unrestricted use).

NOMENCLATURE:

The Relays are designated as follows:

	I		II	III		IV		V	VI
*	TP3251	-	0	0	-	01	/	5	1

I - Series No.: TP3251

II - Switch type and mounting style
- 0: rocker switch snap-in, white rocker
- 1: rocker switch snap-in, black rocker
- 2: push button switch snap-in version, black
- 3: push button switch flange 62 mm, black upper housing
- 4: push button switch flange 42 mm, black upper housing
- 5: push button switch flange 42 mm, yellow upper housing
- 6: push button switch flange 62 mm, yellow upper housing

III - External coil connection
- 0: without external coil connection
- **...1: with external coil connection**

*

IV - Coil voltage
- 01: 230 V/50 Hz
- 03: 115 V/50 Hz
- 04: 115 V/60 Hz
- 05: 230 V/60 Hz
- 06: 240 V/50-60 Hz
- 07: 120 V/60 Hz

V - Accessories (optionally provided)
- 0: without accessories
- 1: with sealing cap above rocker or push buttons.
- 2: with protection cap for backside contact protection
- 3: with accessories as mentioned in item 1 and 2 together
- 4: with accessories as mentioned in item 1 and a gasket
- 5: with accessories as mentioned in item 2 and a gasket
- 6: with accessories as mentioned in item 3 and a gasket
- 7: with a gasket only

VI - Special Mark (optionally provided)
- 0: standard
- 1: special mark – label (package) with customer ID number

Conditions of Acceptability -

1. The devices should be mounted in an enclosure having adequate strength, thickness and in the intended manner with adequate spacings required in the end product.

2. The devices should be used within their Recognized ratings.

3. These devices are suitable for factory wiring only.

CONSTRUCTION DETAILS:

Corrosion Protection - The product shall be constructed of corrosion resistant material, or all surfaces of the parts shall be either painted or plated unless otherwise specified.

External coil connection maybe provided but internal bridged.

Tolerances - Unless specified, all dimensions are nominal.

Table of materials:

Part	Material	Manufacturer
Housing	R/C (QMFZ2) Ultramid A3X2G5	BASF
Rocker Button	R/C (QMFZ2) Ultradur B4406	BASF
Clamp Frame	R/C (QMFZ2) Ultramid A3X2G5	BASF
Sealing Cap	PVC	Any
Gasket	Moss Ruber or EPDM or Cell Rubber(min thickness 3mm)	Gummi Jaeger
Push Button	R/C (QMFZ2) Bayblend T85, Any (QMFZ2) material rated min. HB, 60°C at thickness of 1.0 mm.	Bayer Various manufacturers
Frame	Bergamid A70	PolyOne/Bergmann
*Protection Cap	**Alfater XL A75i 2GP0050** **Alternate – any material with same dimensions**	**ALBIS** **Various manufacturer**

MARKINGS:

The device shall be marked with the manufacturer’s name, trademark, or other descriptive marking, model/catalog number. Electrical ratings are optional.

Warning Markings - See Section General for details.

*

Spacings - The following spacings are provided throughout these devices -

Clearances:

Clearances between switch contacts 13 and 23, and, 14 and 24 are 4mm. Switch contact 24 and coil connection A1 is provided with a barrier (FIG 07) and/or internal bridged.

Spacing have been tested for equivalency according UL 840, table 7.1 and CSA 22.2 No 14-05, table 38.

Creepages:

Creepages between switch contact 13 and 23, and 14 and 24 are min 9.5 mm. Switch contact 24 and coil connection A1 is provided with a barrier (FIG 07) and/or internal bridged.

Spacing have been evaluated according UL 840, table 9.1 and CSA 22.2 No 14-05, table 35.

GENERAL

ROCKER

This Figure shows the complete device TP3251-00-01/10 FIG.1
(REPRESENTS ALL TP3251-0X-XX/XX AND TP3251-1X-XX/XX DEVICES) FIG.5
Protection Cap FIG.6

For materials see TABLE OF MATERIALS at page 4.

1. Housing (upper part) – Overall dimensions 48 mm by 25 mm by 22 mm, min. thickness 0.81 mm.

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V-0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V-0, 130°C) (E86615).

Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTI. 100°C, Flame Class V-0.

2. Housing (lower part) - Overall dimensions 45 mm by 39 mm by 21.5 mm, minimum 0.81 mm thick

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V-0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V-0, 130°C) (E86615).

   Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTIel. 100°C, Flame Class V-0.

3. Rocker button - Overall dimensions 29.8 mm by 15 mm by 12.3 mm, min. thickness 1.2 mm.

4. Clamp Frame (optional) - Any R/C (QMFZ2), polyamide 66 material, rated minimum HB, minimum 90°C. Overall dimensions 50.3 mm by 27.3 mm by 14 mm. Min. thickness 0.95 mm.

5. Sealing Cap (optional) - Overall dimensions 44 mm by 24.5 mm by 11.8 mm, min. thickness 0.8 mm.

6. Gasket (optional) - Overall dimensions 53 mm by 30 mm, min. thickness 2 mm. (FIG.6)

7. Protection cap (optional) Overall dimensions 57 mm by 25 mm by 54 mm, min. thickness 1 mm. (FIG.6)

   Alternate – Short Protection cap (optional) overall dimensions 57 mm by 25 mm by 41 mm, min. thickness 1 mm.

GENERAL -
PUSH BUTTON
This Figure shows the complete device TP3251-51-04/10 (REPRESENTS ALL TP3251-4X-XX/XX AND TP3251-5X-XX/XX DEVICES) FIG.2 (M01-21487)

For materials see TABLE OF MATERIALS at page 4.

1. Housing (upper part) - Overall dimensions 57 mm by 54 mm by 34.3 mm, min. thickness 1.2 mm.

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V-0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V-0, 130°C) (E86615).

   Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTI. 100°C, Flame Class V-0.

2. Housing (lower part) - Overall dimensions 45 mm by 39 mm by 21.5 mm, minimum 1.2 mm thick.

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V-0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V-0, 130°C) (E86615).

   Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTIel. 100, Flame Class V-0.

3. Push button - Any R/C (QMFZ2), rated minimum HB. Overall dimensions 26 mm by 18 mm by 23 mm. Min. thickness 1 mm.

4. Sealing Cap (optional) - Overall dimensions 52 mm by 34.5 mm by 20.6 mm, min. thickness 0.6 mm.

5. Frame (optional flange mounting) - Any R/C (QMFZ2), polyamide 66 material, rated minimum HB, minimum 90°C. Overall dimensions 61.4 mm by 58 mm by 7 mm. Min. thickness 2 mm.

6. Gasket (optional) - Overall dimensions 53 mm by 30 mm, min. thickness 2 mm. (FIG.6)

7. Protection cap (optional) Overall dimensions 57 mm by 25 mm by 54 mm, min. thickness 1 mm. (FIG.6)

   Alternate – Short Protection cap (optional) overall dimensions 57 mm by 25 mm by 41 mm, min. thickness 1 mm.

GENERAL –
PUSH BUTTON
This Figure shows the complete device TP3251-30-01/10
(REPRESENTS ALL TP3251-3X-XX/XX AND TP3251-6X-XX/XX DEVICES) FIG. 3, (M01 21488)

For materials see TABLE OF MATERIALS at page 4.

1. Housing (upper part) - Overall dimensions 74 mm by 35 mm by 34.3 mm, min. thickness 1.2 mm.

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V-0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V-0, 130°C) (E86615).

   Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTI. 100°C, Flame Class V-0.

2. Housing (lower part) – Overall dimensions 45 mm by 39 mm by 21.5 mm, minimum 1.2 mm thick.

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V-0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V-0, 130°C) (E86615).

   Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTIel. 100, Flame Class V-0.

3. Push button – Any R/C (QMFZ2), rated minimum HB. Overall dimensions 26 mm by 18 mm by 23 mm. Min. thickness 1 mm.

4. Sealing Cap (optional) – Overall dimensions 52 mm by 34.5 mm by 20.6 mm, min. thickness 0.6 mm.

5. Frame (optional flange mounting) - Any R/C (QMFZ2), polyamide 66 material, rated minimum HB, minimum 90°C. Overall dimensions 61.5 mm by 39.7 mm by 7.5 mm. min. thickness 1.5 mm.

6. Gasket (optional) - Overall dimensions 53 mm by 30 mm, min. thickness 2 mm. (FIG.6)

7. Protection cap (optional) Overall dimensions 57 mm by 25 mm by 54 mm, min. thickness 1 mm. (FIG.6)

Alternate – Short Protection cap (optional) overall dimensions 57 mm by 25 mm by 41 mm, min. thickness 1 mm.

GENERAL –
PUSH BUTTON
This Figure shows the complete device TP3251-30-01/10
(REPRESENTS ALL TP3251-2X-XX/XX) – FIG. 9

For materials see TABLE OF MATERIALS at page 4.

1. Housing (upper part) - Overall dimensions 57 mm by 36 mm by 34.3 mm, min. thickness 1.2 mm.

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V-0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V-0, 130°C) (E86615).

   Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTI. 100°C, Flame Class V-0.

2. Housing (lower part) – Overall dimensions 45 mm by 39 mm by 21.5 mm, minimum 1.2 mm thick.

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V-0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V-0, 130°C) (E86615).

   Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTIel. 100, Flame Class V-0.

3. Push button – Overall dimensions 26 mm by 18 mm by 23 mm. Min. thickness 1 mm.

4. Sealing Cap (optional) – Overall dimensions 52 mm by 34.5 mm by 20.6 mm, min. thickness **0.6** mm.

5. Frame (optional flange mounting) - Overall dimensions 61.5 mm by 39.7 mm by 7.5 mm. min. thickness 1.5 mm. Any R/C (QMFZ2), polyamide 66 material, rated minimum HB, minimum 90°C.

6. Gasket (optional) - Overall dimensions 53 mm by 30 mm, min. thickness 2 mm. (FIG.6).

7. Protection Cap (optional) - Overall dimensions 57 mm by 25 mm by 54 mm, min. thickness 1 mm. (FIG.6).

   Alternate – Short Protection cap (optional) - Overall dimensions 57 mm by 25 mm by 41 mm, min. thickness 1 mm.

GENERAL –
INTERNAL OF ROCKER AND PUSH BUTTON

This Figure shows the internal components of device TP3251-00-01/00 (REPRESENTS ALL TP3251-XX-XX/XX DEVICES) FIG. 4 (M01-21490)

1. Coil Body Assembly, part. no. 300P894.01, arranged for split inspection, consist of the following main parts from 1.1 to 1.6:

1.1 Bobbin - R/C (QMFZ2) type Crastin SK641FR, overall dimensions 25 mm by 19.2 mm, min. thickness 1 mm, manufactured by DuPont.

Alternate - R/C (QMFZ2), Type Crastin SK645FR, manufactured by DuPont (E41938), same dimensions and thickness as above.

Alternate – Same as above except, R/C (QMFZ2/8.E45329) – Cat. No. Valox DR48V, manufactured by Sabic Innovative Plastics BV, rated HWI 3, HAI 0, CTI 3, RTIel. 120, Flame Class V-0.

1.2 Coil Winding - R/C (OBMW2) magnetic wire, type Poloysol P155, manufactured by Elektrisola.
Alternate - R/C (OBMW2) type CUL-WV or CUL-V, manufactured by A. Wehde.
Alternate - R/C (OBMW2) type Salflex 155, manufactured by Irce.

Alternate – Any R/C (OBMW2), magnet wire, ANSI Grade MW75 or MW79, rated minimum 130°C.

Table of the coil ratings:

Voltage / Frequency	230 V / 50 Hz	115 V / 50 Hz	115 V / 60 Hz	230 V / 60 Hz	240 V / 50–60 Hz	120 V / 60 Hz
Diameter of wire [mm]	0.06	0.08	0.09	0.063	0.06	0.085
Number of windings	18500	9000	7800	16500	18500	8600
Number of layer	62	39	37	58	62	39

1.3 Fixing tape - R/C (OANZ2) type Polyester/Crepe 18100, manufactured by CMC. Alternate – any (OANZ2) Polyester tape.

1.4 Coil connection wire - CuSn 6, Sn plated, 35 mm long, 0.5 mm by 0.5 mm diameter.

1.5 Coil core - Iron; 9 S Mn Pb 36 K Bi, surface: Fe/Cu 1-2 Ni 3+/-1 p, 25.6 mm long, 8 mm dia.

1.6 Yoke - Iron; St 3 K 32 RP **(1.0347 DC03, LC, MA GK)**, surface; Fe/Cu 18-24, “L” shaped, overall dimensions 29.5 mm by 21 mm by 15 mm wide, min. thickness 2 mm.

2. Switching bridge - Nickel plated iron, measures 32.7 mm by 14 mm by 1.5 mm thick. Slightly bent at center. See Fig. 8 for an alternate shape.

3. Coil contact ring - Copper, “D” shaped, overall dimensions 13.5 mm by 8.3 mm. Min. thickness 1.2 mm.

4. Connector/Stationary Contact - Connector Cu/Zn, with Ag/Ni 90/10 contact. “L” shaped connector, overall dimensions 21 mm by 6 mm by 6.3 mm wide. Min. thickness 0.8 mm. Contact: mm diameter, approx. 0.7 mm min. thick. See Ill. 2 for details.

5. Moveable contact carrier - R/C (QMFZ2) type A3X2G5, overall dimensions 18.8 mm by 20 mm by 5.8 mm. Min. thickness 1.5 mm. Manufactured by BASF (Ill. 1).

   Alternate – Same as above except, Type A3X2G7, BASF SE (rated V0, 115°C).

   Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V0, 130°C) (E86615).

   Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, RTIel. 100, Flame Class V-0.

6. Moveable contact rail and contact - Rail Cu/Zn, with 2 Ag/Ni 90/10 contacts. Overall rail dimensions 13.1 mm by 5 mm wide. Min. thickness 0.5 mm. Contacts; 3 mm diameter, approx. 0.7 mm min. thick. See Ill. 3 for details.

*

7. Compression spring - Spring steel, measures 6 mm long by 3.8 mm dia. Wire dia. 0.28 mm.

8. External coil connector (optional) - Cu/Zn, overall dimensions 25.2 mm by 2.8 mm. Min. thickness 0.8 mm.

9. Return set springs for rocker button - Spring steel measures 15 mm long by 3.8 mm dia. Wire dia. 0.28 mm.

10. Return set spring for push button - Spring steel measures 15 mm long by 14 mm dia. Wire dia. 0.85 mm.

11. O-Ring Seal – Rubber, overall dimensions 5 mm by 9.9 mm, thickest point 2 mm, thinnest point 1 mm, dia, or overall dimensions 10 mm high by 2 mm thickness.

12. Clamp/Lug – made of Hostaform C13031, m/b TICONA, overall dimensions 20 mm long by 12.8 mm. Min 1 mm thick.

13. Barrier between Pin A1 and Pin 24 – R/C plastic (QMFZ2) Ultramid A3X2G5, manufactured by BASF, min thickness 1 mm.(FIG 7)

    Alternate – Same as above except, Type A3X2G7, BASF SE (rated V0, 115°C). Complies with direct support (barrier) requirements at 1.0 mm.

    Alternate – Same as above except, Type 66 GF 25 FR 5 A(f2), A SCHULMAN GMBH (rated V0, 130°C) (E86615). Complies with direct support (barrier) requirements at 1.0 mm.

    Alternate – Same as above except, R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, RTIel. 100, Flame Class V-0.

TEST RECORD NO. 1

SAMPLES:

Representative production samples of Types 3251- followed by 0,1, or 2, followed by -0 or 1, followed by -01, 03, 04, 05, 06, or 07, followed by /10, 16, 51, 52, 53, 54, 55, 56, 91, 92, 93, 94, 95, 96 described in the preceding section of this report, were submitted by the manufacturer and subjected to a test program as outlined below.

Test results relate only to the items tested.

TEMPERATURE TEST:

METHOD

A sample of the device as noted was subjected to the following test. The device was connected to a rated supply and load using 4 ft per terminal of wire size as noted. The device was operated continuously until constant temperatures were reached. Temperatures were measured by thermocouples. The tips of the thermocouples were secured to the heated parts by solder, tape, or sodium silicate.

Model 3251-21-04/92 Voltage 120 V ac
Current, 20 A Wire Size No. 12 AWG

Enclosure Material: CARDBOARD Size: 3.75″ by 3″ by 3.25″

RESULTS

	Thermocouple Location	Max. Temperature - °C
1.	Switch Body (Side near terminals)	59
2.	Switch Body (Bottom of coil)	30
3.	Coil Insulation (Drill hole)	79
4.	Terminal 14	58
5.	Terminal 23	59
6.	Actuator (Outside)	27
7.	Coil	49
8.	Ambient	20

TEMPERATURE TEST:

METHOD

A sample of the device as noted was subjected to the following test. The device was connected to a rated supply and load using 4 ft per terminal of wire size as noted. The device was operated continuously until constant temperatures were reached. Temperatures were measured by thermocouples. The tips of the thermocouples were secured to the heated parts by solder, tape, or sodium silicate.

Model 3251-21-01/91 Voltage 240 V ac
Current, 16 A Wire Size No. 12 AWG

Enclosure Material: CARDBOARD Size: 3.75″ by 3″ by 3.25″

RESULTS

	Thermocouple Location	Max. Temperature - °C
1.	Switch body (Side near terminals)	37
2.	Switch body (Bottom of coil)	51
3.	Coil insulation (Drill hole)	60
4.	Terminal 14	33
5.	Terminal 23	33
6.	Actuator (Outside)	27
7.	Coil	67
8.	Ambient	24

The following coil is to be measured by the change-in-resistance method.

1 2

Model 3251-21-04/92 and 3251-21-01/91

		1	2
Coil resistance cold	(r)	.8578	4.78 kohms
Coil resistance hot	(R)	1.07	5.85 ohms
Ambient air, coil cold	(t1)	17.4	17.4°C
Ambient air, coil hot	(t2)	19.4	23.3°C
Coil temperature, rise		60.3°C	50.5°C

Time in seconds after coil shut down	Measured Resistance in Ohms 3251-21-04/92	3251-21-01/91
10	1.068 kohms	5.84 kohms
20	1.066 kohms	5.829 kohms
30	1.064 kohms	5.8166 kohms
40	1.061 kohms	5.805 kohms
50	1.059 kohms	5.790 kohms
60	1.057 kohms	5.780 kohms
70	1.055 kohms	5.769 kohms
80	1.053 kohms	5.758 kohms
90	1.051 kohms	5.744 kohms

Temp rise - (R / r) * [k + t1] - [k + t2]

R is the resistance of the coil at the end of the test in ohms
r is the resistance of the coil at the beginning of the test in ohms
t1 is the room temperature in degrees C at the beginning of the test
t2 is the room temperature in degrees C at the end of the test
k is 234.5 for copper conductor, 225.0 for electrical conductor grade (EC) aluminum; values of the constant for other conductors are to be determined.

DIELECTRIC WITHSTAND TEST: MODEL 3251-21-04/92

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

DIELECTRIC WITHSTAND TEST: MODEL 3251-21-01/91

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

OVER/UNDERVOLTAGE TEST:

METHOD

A sample of each device whose model numbers are tabulated below was energized at the rated voltage until constant temperatures were observed. The (coil) voltage was then reduced to the indicated undervoltage and the device was opened and closed several times. The (coil) voltage was then increased to the overvoltage indicated until the temperatures stabilized. The voltage was then rapidly reduced to the rated voltage and the device was opened and closed several times.

Model No.	Rated Voltage	Undervoltage	Overvoltage
3251-21-04/92	115 V ac	102 V ac	132 V ac
3251-21-01/91	230 V ac	204 V ac	264 V ac

RESULTS

The device operated continuously without apparent damage (to the operating coil) at the overvoltage and operated acceptably at the undervotlage.

OVERLOAD AND ENDURANCE TEST:

Conducted in accordance with Sections 42 and 43 of the Industrial Control Standard (UL 508), Sixteenth Edition.

Test	O'LOAD-ST.ROTOR-ENDURANCE	OVERLOAD	ENDURANCE	ENDURANCE
	CAT. NO.	3251-21-04/92	3251-21-04/92	3251-21-04/92
	POLES USED	2	2	2
	BOX CONNECTION TO WHICH POLE	L2	L2	L2
FOR	AMPERES	-	-	20
RATINGS	VOLTS	120	120	120
OF	HORSEPOWER/WATTS	1hp	1hp	-
	PHASE/DC	1	1	1
TEST	VOLTS-OPEN CCT	120	120	120
DATA	VOLTS-CLOSED CCT	120V	120V	120V
	PHASE/DC	1	1	1
	AMPERES	96A	32A	20
	POWER FACTOR	.5	.49	.78
	SHUNT OHMS/PHASE	190Ω	590Ω	305Ω
	OPERATIONS/MIN	6	60	6
	TOTAL OPERATIONS	50	1000	5000
	RESULTS	ACC	ACC	ACC

DIELECTRIC WITHSTAND TEST:

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

OVERLOAD AND ENDURANCE TEST:

Conducted in accordance with Sections 42 and 43 of the Industrial Control Standard (UL 508), Sixteenth Edition.

Test	O'LOAD-ST.ROTOR-ENDURANCE	OVERLOAD	ENDURANCE	ENDURANCE
	CAT. NO.	3251-21-01/91	3251-21-01/91	3251-21-01/91
	POLES USED	2	2	2
	BOX CONNECTION TO WHICH POLE	L2	L2	L2
FOR	AMPERES	-	-	16
RATINGS	VOLTS	240	240	240
OF	HORSEPOWER/WATTS	1 1/2 HP	1 1/2 HP	-
	PHASE/DC	1	1	1
TEST	VOLTS-OPEN CCT	242	242	248
DATA	VOLTS-CLOSED CCT	240	241	241
	PHASE/DC	1	1	1
	AMPERES	60A	120	16
	POWER FACTOR	.41PF	.46	.75
	SHUNT OHMS/PHASE	815Ω	2075Ω	875Ω
	OPERATIONS/MIN	6	60	6
	TOTAL OPERATIONS	50	1000	5000
	RESULTS	ACC	ACC	ACC

DIELECTRIC WITHSTAND TEST:

METHOD

To be tested in accordance with Section 49 of UL 508 (Industrial Control Equipment Standard) Seventeenth Edition.

	VOLTS AC	RESULTS
SWITCH OPEN - LIVE PARTS TO ENCLOSURE	1480	NB
UNINSULATED LIVE PARTS OF DIFFERENT CIRCUITS	1480	NB

REMARKS: NB - No Breakdown

ENCLOSURE FLAMMABILITY 5 INCH TEST:

Enclosure section: Models E3251-00-01/10
Material: Recognized Component type (QMFZ2), A3X2G5 manufactured by BASF
Thickness .95 mm
Conditioning; None

METHOD

One section on each of three enclosures of the equipment most liable to be ignited was tested. The enclosure was supported in its normal operating position in a draft-free location. Nonpolymeric portions of the enclosure in contact with or fastened to the polymeric portions were not removed and insofar as possible the internal mechanism of the equipment was left in place. The flame of a burner with a 3/8 inch inside diameter, was adjusted to have an overall height of five inches with an inner blue cone of 1-1/2 inches. The tip of the 1-1/2 inch blue cone was applied at an angle of twenty degrees from the vertical on the enclosure section selected for five seconds and removed for five seconds. The operation was repeated until the test section was subjected to five applications of the flame.

RESULTS

Test No.	Test Section Selected	Time of Combustion After Fifth Flame Application	Did Specimen Drip Flaming Particles?	Integrity of Enclosure
1	Middle top (inner)	65	No	N/A
2	Middle	2	No	N/A
3	Middle bottom (inner)	0	No	N/A

Comments:

The integrity of the enclosure was maintained. The results are in accordance with the Enclosure 5 Inch Flame criteria as specified in UL Standard 746 C. The results were considered acceptable.

ENCLOSURE FLAMMABILITY 5 INCH TEST:

Enclosure section: MODEL E3251-21-01/91
Material: Recognized Component type (QMFZ2) A3X2G5
manufactured by BASF
Thickness 1.2 mm
Conditioning: None

METHOD

One section on each of three enclosures of the equipment most liable to be ignited was tested. The enclosure was supported in its normal operating position in a draft-free location. Nonpolymeric portions of the enclosure in contact with or fastened to the polymeric portions were not removed and insofar as possible the internal mechanism of the equipment was left in place. The flame of a burner with a 3/8 inch inside diameter, was adjusted to have an overall height of five inches with an inner blue cone of 1-1/2 inches. The tip of the 1-1/2 inch blue cone was applied at an angle of twenty degrees from the vertical on the enclosure section selected for five seconds and removed for five seconds. The operation was repeated until the test section was subjected to five applications of the flame.

RESULTS

Test No.	Test Section Selected	Time of Combustion After Fifth Flame Application	Did Specimen Drip Flaming Particles?	Integrity of Enclosure
1	inner top	0	No	N/A
2	inner middle	2	No	N/A
3	inner bottom	2	No	N/A

Comments:

The integrity of the enclosure was maintained. The results are in accordance with the Enclosure 5 Inch Flame criteria as specified in UL Standard 746 C. The results were considered acceptable.

BALL IMPACT TEST (AS RECEIVED): 3251-21-01/91

Recognized Component Plastic Type (QMFZ2) A3XG5

manufactured by BASF

Thickness 1.2 mm.

METHOD

Each of three “As-Received” samples of the equipment were subjected to an impact (each sample is to be subjected to one impact at one location only) on any surface that could be exposed to a blow during normal use. A smooth steel sphere 2 inches in diameter and weighing 1.18 lbs, was allowed to fall vertically from rest or swung as a pendulum through the distance required to cause the sphere to strike the surface under test with an impact of 5 ft lbs.

RESULTS

Sample Number	Impact Location #	Results
1	Top Right	No live parts exposed
2	Center	No live parts exposed
3	Bottom Left	No live parts exposed

Location is to be determined by Engineer.

Note - The following conditions should be considered when determining results.

A - Uninsulated live parts accessible to contact (use accessibility probe).
B - A condition that might affect the mechanical performance.
C - A condition that might increase the likelihood of an electric shock.

BALL IMPACT TEST (AFTER CONDITIONING): 3251-21-01/91

Recognized Component Plastic Type (QMFZ2) A3XG5

Manufactured by BASF

Thickness 1.2 mm.

METHOD

Each of three samples of the equipment, conditioned at 0°C (for indoor use) for three hours, were subjected to an impact (each sample is to be subjected to one impact at one location only) on any surface that could be exposed to a blow during normal use. A smooth steel sphere 2 inches in diameter and weighing 1.18 lbs, was allowed to fall vertically from rest or swung as a pendulum through the distance required to cause the sphere to strike the surface under test with an impact of 5 ft lbs.

RESULTS

Sample Number	Impact Location #	Results
1	Top Right	No live parts exposed
2	Center	No live parts exposed
3	Bottom Left	No live parts exposed

Location is to be determined by Engineer.

Note - The following conditions should be considered when determining results.

A - Uninsulated live parts accessible to contact (use accessibility probe).
B - A condition that might affect the mechanical performance.
C - A condition that might increase the likelihood of an electric shock.

MOLD STRESS RELIEF DISTORTION TEST: E3251-21-01/91

Recognized Component Plastic Type (QMFZ2) A3X2G5
Manufactured by BASF
Thickness 1.2 mm.

METHOD

Samples of the complete equipment, or enclosure thereof, were placed in a full draft circulating air-oven maintained at a uniform temperature of 89°C for seven hours. At the end of this time, the samples were carefully removed from the oven and allowed to return to room temperature. The samples were then closely examined for deterioration.

RESULTS

At the conclusion of the test there was no undue cracking, distortion or exposure of live parts. The results were considered acceptable.

CRUSHING RESISTANCE TEST: E3251-01-03/15

Recognized Component Plastic Type (QMFZ2) A3X2G5
Manufactured by BASF
Thickness .95 mm

METHOD

1 Sample of the complete equipment was backed on the mounting side by a fixed rigid supporting surface. A crushing force was applied to the side opposite the mounting surface, the compression force was applied by flat surfaces each 4 by 10 inches (102 by 254 mm). Each force applicator exerted 100 lbs (45.4 kg) on the sample. As many applicators were applied as the sample can accommodate on the surface opposite the mounting surface.

RESULTS

At the conclusion of the test there was no undue cracking or exposure of live parts. The results were considered acceptable.

TEST RECORD NO. 2

SAMPLES:

This manufacturer submitted samples of their devices for investigation to the requirements of the Canadian National Standard. Due to the similarity of the devices with models previously covered under this report, no tests were considered necessary. These devices and all recorded test results were in conformance with the requirements found in Canadian National Standard C22.2.

TEST RECORD NO. 3

No tests have been considered necessary due to administrative changes without a change in the electrical ratings.

Test Record Summary:

The results of this investigation indicate that the products evaluated comply with the applicable requirements and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Report by:

Karsten Henrici

Karsten Henrici
Project Engineer
UL International Germany GmbH

Reviewed by:

Dirk Mueller

Dirk Mueller
Engineering Manager
UL International Germany GmbH

Pursuant to the Corporate Services Agreement between Underwriters Laboratories ("UL") and UL International Germany GmbH, UL hereby accepts and issues this report.

TEST RECORD NO. 4

SAMPLES:

A representative production sample of series TP3251 as indicated below and constructed herein, was submitted by the manufacturer for examination and test.

GENERAL:

No tests have been considered necessary due to administrative changes at the product covered and the nomenclature without change of electrical ratings or construction.

The results of the above examination have been reviewed and found to comply with the requirements in the Standard for Industrial Control Equipment, UL 508 17th edition and CSA C22.2 No. 14-05.

TEST RECORD SUMMARY:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in UL 508 17th Edition, Rev. 2005-07-11 and CSA 22.2 No. 14-05, Rev. 2005-04 and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

H. Schobbe

Holger Schobbe
Project Handler
UL International Germany GmbH

M. Keil

Michael Keil
Project Engineer
UL International Germany GmbH

Reviewed by:

K. Koester

Karsten Koester
Senior Project Engineer
UL International Germany GmbH

TEST RECORD NO. 5

SAMPLES:

A sample of the switch TP3251-41-03 as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test.

The Model TP3251-41-03 was used for test purposes and considered representative of the entire series TP3251. This test was necessary due to creepage and clearances distances, which are not in accordance to the standard UL 508.

GENERAL:

Clamp Frame, Sealing Cap and Gasket were supplemented with optional. Additional type designations from the Rocker Button and from Push Button were deleted. The dimensions are unchanged. The type devices at GENERAL were changed due to changed NOMENCLATURE and were supplemented at GENERAL device TP3251-30-01/10 with new items: Housing (lower part), Push Button, Sealing Cap (optional), Gasket (optional) and Protection Cap (optional). Figures 05 and 06 are supplemented to General. A summary of all materials was inserted in a table. Product Covered and Nomenclature has been updated due to failed test between external coil connection A1 and coil connection 24.

Test results relate only to the items tested.

Due to similarity of the devices to Model TP3251-41-03 recognized for this manufacturer, only the following tests were considered necessary.

Impulse Dielectric Voltage-Withstand Test Equivalency	Par. 7.1 Of UL 840
Dielectric Voltage-Withstand Test In Lieu Of Measuring Spacings (Can/CSA C22.2 No. 14 – 2005)	(Clause 6.20)

Test results were acceptable, for details see Datasheet package 1 attached to this test record.

All other tests were considered covered as follows:

Test	File Reference	Report Date	Test Record No.
All	E76343	2001-06-11	1-3

The results of the above examination have been reviewed and found to comply with the requirements in the Standard for Industrial Control Equipment, UL 508 17th edition, Rev. 2005-07-11 and CSA C22.2 No. 14-05, Rev. 2005-04.

TEST RECORD SUMMARY:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in UL 508 17th Edition, contains revisions through and including 2005-07-11 and CSA 22.2 No. 14-05, contains revisions through and including 2005-04 and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report. Any information and documentation involving UL Mark services are provided on invoice of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

Test Record by:

H. Schobbe

Holger Schobbe

Project Handler III

UL International Germany GmbH

F. Thon

Frank Thon

Project Engineer

UL International Germany GmbH

Reviewed by:

K. Koester

Karsten Koester

Senior Project Engineer

UL International Germany GmbH

TEST RECORD NO. 6

SAMPLES:

A sample of the switch TP3251-31-04/70 as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test.

The Model TP3251-31-04/70 was used for test purposes and considered representative of the entire series TP3251. The external coil connection A1 has been tested, due to creepage and clearance distances, to the Pin 24 which are not in accordance with the requirements of the UL 508.

GENERAL:

The switch has been supplemented for the use of the external coil connection A1. The moveable contact carrier has been modified. Due to a modification from two assembled contact carriers to now one contact carrier with the same or better dimensions, no endurance and no overload test has been performed.

Test results relate only to the items tested.

Due to similarity of the devices to Model TP3251-31-04/70 recognized for this manufacturer, only the following tests were considered necessary.

Impulse Dielectric Voltage-Withstand Test Equivalency	Par. 7.1 Of UL 840
Dielectric Voltage-Withstand Test In Lieu Of Measuring Spacings (Can/CSA C22.2 No. 14 – 2005)	(Clause 6.20)

Test results were acceptable, for details see Datasheet package 1 attached to this test record.

All other tests were considered covered as follows:

Test	File Reference	Report Date	Test Record No.
All	E76343	2001-06-11	1-3 and 5

The results of the above examination have been reviewed and found to comply with the requirements in the Standard for Industrial Control Equipment, UL 508 17th edition, Rev. 2005-07-11 and CSA C22.2 No. 14-05, Rev. 2005-04.

TEST RECORD SUMMARY:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in UL 508 17th Edition, contains revisions through and including 2005-07-11 and CSA 22.2 No. 14-05, contains revisions through and including 2005-04 and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

H. Schobbe

Holger Schobbe

Engineering Project Handler

UL International Germany GmbH

F. Thon

Frank Thon

Project Engineer

UL International Germany GmbH

Reviewed by:

K. Koester

Karsten Koester

Engineering Team Leader

UL International Germany GmbH

Any information and documentation involving UL Mark services are provided on invoice of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

TEST RECORD NO. 7

SAMPLES:

No sample of the switch TP3251-00-01/00 as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test, all required information was submitted by the client.

Industrial Control Switches, Types TP3251.

GENERAL:

Due to Variation Notice 20909031823, the bobbin, coil winding, fixing tape, coil connection wire, coil core and yoke of the switch TP3251-00-01/00 has been combined to coil assembly with part. no. 300P894.01, arranged for Split Inspection with identification marking “ULIC:TRI”. No changes of the electrical ratings or construction.

The results of the above examination have been reviewed and found to comply with the requirements in the Standard for Industrial Control Equipment, UL 508 17th edition and CSA C22.2 No. 14-05.

TEST RECORD SUMMARY:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in UL 508 17th Edition, Rev. 2008-09-19 and CSA 22.2 No. 14-05, Update No.3 April 2008 and, therefore, such products are judged eligible to bear UL’s Mark as described on the Conclusion Page of this Report.

Report by:

Harald Gottwald
Conformity Assessment Specialist
UL International Germany GmbH

Björn Aschemann
Project Engineer
UL International Germany GmbH

Reviewed by:

Guido Bitter
Staff Engineer
UL International Germany GmbH

TEST RECORD NO. 8

SAMPLES:

No representative production samples of the Industrial Control Switches, Type TP3251 constructed as described herein, was submitted by the manufacturer for examination and test.

Employs the alternate material by BASF SE, Type A3X2G7 (rated V-0, 115ºC), (E41871).

Employs the alternate material by A SCHULMAN GMBH, Type 66 GF 25 (rated V-0, 130°C) (E86615).

Employs the optional alternate Short Protection cap, overall dimensions 57 mm by 25 mm by 41 mm, min. thickness 1 mm.

GENERAL:

Test results relate only to the items tested.

Testing of the Industrial Control Switches, Relay Types TP3251 was not considered necessary based on the results of previous investigations.

Tests were considered covered as follows:

Model	Test	File	Report Date	Test Record No.
TP3251	ALL	E76343	2001-06-11	1, 5

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the Standard for Industrial Control Equipment, UL508 17th edition, revised April 15, 2010 and Industrial Control Equipment, CSA C22.2 No. 14-10, revised February 2010 and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by: Reviewed by:

Katherine Matthew Ronald Breschini
Project Handler II Senior Staff Engineer

TEST RECORD NO. 9

SAMPLES:

No representative production samples of the Industrial Control Switches, Type TP3251 followed by 0, 1, 2, 3, 4, 5, or 6, followed by 0 or 1, followed by -01, -03, -04, -05, -06, or -07, maybe followed by /, maybe followed by 0, 1, 2, 3, 4, 5, 6, or 7, maybe followed by 0 or 1 constructed as described herein, were submitted by the manufacturer for examination and test. Revisions were made based on technical information provided by the manufacturer.

GENERAL:

Test results relate only to the items tested.

Bobbin employed in Types mentioned above is being molded from alternate R/C (QMFZ2) material, Crastin SK645FR, manufactured by DuPont (E41938). The material has the same or better parameters as already used materials, therefore no additional electrical or mechanical tests were considered necessary.

Addtionally editorial revisions were made to the report.

Tests were considered covered as follows:

Test	File	Report Date	Test Record No.
ALL	E76343	2001-06-11	1, 5

TEST RECORD SUMMARY

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in Standard for Industrial Control Equipment, UL 508, 17th Edition, revision 2013-10-16 and C22.2 No. 14-13, 12th Edition, issued 2013-03-01, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Adrian Równicki
Project Engineer
UL International Polska Sp. z o.o.

Supervised by:

Pawel Stankiewicz
Engineering Leader
UL International Polska Sp. z o.o.

TEST RECORD NO. 10

SAMPLES:

Representative production samples of the _Industrial Control Switch Type TP3251, was submitted by the manufacturer for examination and test.

GENERAL:

Test results relate only to the items tested.

Employs alternative polymeric material Radiflam A RV250 AF for housing (lower part), moveable contact carrier and barrier between Pin A1 and Pin 24.

Employs alternative polymeric material Valox DR48V for bobbin.

The materials have same or better parameters as already used materials, therefore no additional electrical or mechanical tests were considered necessary.

Employs new material for Protection Cap. Protection Cap is optional and not safety relevant.

Material for coil core and yoke was corrected.

Employs new construction design of connector/stationary contact and moveable contact rail. See new Ill. 2 and 3 for details.

Only limited tests were performed on the TP3251 due to similarity in construction to previously tested Models of TP3251.

Tests were considered covered as follows:

Model	Test	File	Report Date	Test Record No.
All	All	E76343	2001-06-11	1-9

The following tests were conducted in accordance with UL508 and are considered representative of the same tests required by Canadian National Standard, CAN/CSA C22.2 No. 14-13.

Overload And Endurance Test	Secs. 45, 46, 73b (Clause 6.5, 6.6)
Dielectric Voltage Withstand Test Dielectric Strength (CAN/CSA C22.2 No. 14-13)	Par. 49.1, 73c, 77b UL 508 17th Ed. (Clause 6.8)

The test methods and results of the above tests have been reviewed and found to comply with the requirements in the Standard for Industrial Control Equipment, UL 508 and CAN/CSA C22.2 No. 14-13.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the Standard for Industrial Control Equipment, UL 508 17th edition, revised 2013-10-16 and Industrial Control Equipment, CSA C22.2 No. 14-13 12th edition, revised March 2013 and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:

Dirk Wohlfahrt
Project Engineer
UL Internatinal Germany GmbH

Reviewed by:

Guido Bitter
Senior Staff Engineer
UL International Germany GmbH

TEST RECORD NO. 11

A sample of the TP3251-00-01/10 and TP3251-20-01/10 as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test.

Add alternate Housing material for Upper Part - R/C (QMFZ2/8.E116324) – Cat. No. Radiflam A RV250 AF, manufactured by Radicinovacips, rated HWI 1, HAI 0, CTI 1, RTI. 100°C, Flame Class V-0.

Model TP3251-00-01/10 was used for test purposes and considered representative of TP3251-0X-XX/XX AND TP3251-1X-XX/XX devices.

Model TP3251-20-01/10 was used for test purposes and considered representative of TP3251-3X-XX/XX AND TP3251-6X-XX/XX devices.

GENERAL:

Test results relate only to the items tested.

Due to similarity of this device to previous evaluation of tested models for this manufacturer, only the following tests were considered necessary.

Tests were considered covered as follows:

Test	File Reference	Report Date	Test Record No.
Temperature Test (1)	E76343	2001-06-11	1
(1) Due to equivalent temperature rating, previous testing deemed acceptable.			

The following tests were conducted.

Crushing Resistance Test	UL 746C, Clause 21
Ball Impact Test	UL 746C, Clause 22
Mold Stress-Relief Distortion Test	UL 746C, Clause 29
Flammability – 12 Mm Flame Test	UL 746C, Clause 15

The test methods and results of the above tests have been reviewed and found to comply with the requirements in the Standard for Industrial Control Equipment, UL 508 and CAN/CSA C22.2 No. 14-18.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the Standard for Industrial Control Equipment, UL508, 18th Ed. Issued 2018-03-30 and Industrial Control Equipment, CSA C22.2 No. 14-18, 13th, Issued March 1, 2018 and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Test Record by:	Reviewed by:
Anil Patel	Karl Moeller
Staff Engineer	Senior Project Engineer

CONCLUSION

Samples of the products covered by this Report have been found to comply with the requirements covering the class and the products are judged to be eligible for Component Recognition and Follow-Up Service. Under the Service the manufacturer is authorized to use the Recognized Marking described in the Follow-Up Service Procedure on such products which comply with said Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Recognized Marking are considered as Recognized Components by Underwriters Laboratories Inc.

Report by:

P. HAPP
Engineering Assistant

Reviewed by:

R. MANALAC
Associate Project Engineer