

SUPPLEMENT SA SPECIFIC COMPONENT REQUIREMENTS FOR INDUSTRIAL CONTROL PANELS

~~November 15, 2022~~ August 26, 2024

This document is intended to be used to determine the requirements for components when used in industrial control panels. This document replaces what was Supplement SA in the Second Edition of UL 508A, and subsequently Appendix C in the Third Edition of UL 508A. It supersedes the previous version of this document dated March 30th, 2022.

References in this document to sections or paragraphs in UL 508A are understood to be to the third edition of the standard with revisions dated September 1st 2023.

This document will be updated on an as-needed basis as changes occur in the use of components in panels. The current version will be stored on UL's Industrial Control Panel website. However, previous versions of the document may be used until UL provides notification that they are no longer in use.

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Interpretations of the document can be obtained by sending an email with your question to UL.508aPanels@ul.com.

Proposals to amend the document should be sent to Peter Hoogerdijk, UL Principal Engineer at peter.hoogerdijk@ul.com.

The following table summarizes the changes in this document from the previous version dated November 15, 2022. Revisions to this document are shown in track changes for convenience.

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Summary of Revisions

Paragraph Reference	Component Description	Summary of Revision
12.2(a), 14.2(a), 28.2.1, 28.7.1, 29.2.3, 37.8.1, 40.1.3, 42.2.1.1, 44.1.1, 45.1.1, 46.1.1, 66.4.6		References to the Product iQ have been made instead of the Recognition Information Page
14.2(a)	Recognized grounding bar kits	A reference to the FUII (Follow-Up Inspection Instructions) has been made for installation criteria instead of the need for Procedure description
30.1.6	Recognized Circuit Breaker Accessories, Disconnect handles	A reference to the FUII (Follow-Up Inspection Instructions) has been made
26.3.1	Enclosure Air Conditioners	UL 60335-2-40 has been added
27.2.2	Listed Light-emitting-diode Surface-mounted Luminaires	Addition Enclosure Maintenance Lighting has been added
27.3.2 Exception No.2	Listed Light-emitting-diode Luminaire Retrofit Kits	Addition Enclosure Maintenance Lighting has been added
29.3.6	Wiring Ferrules	Installation requirements have been added
30.1.6	Recognized Magnetic Motor controllers, Motor disconnect handles	UL60947-4-1 has been added
33.1.1		The requirement for Procedure description for parts intended for non-industrial use has been removed-
33.1.1	Listed Solid-state motor controller Recognized Solid-state motor controller	UL60947-4-2 has been added

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33.7.1	Listed Autotransformer or Resistor Type Reduced Voltage Starter	UL60947-4-1 has been added
38.1.2	Listed Optical Fiber Cable	Additional Overcurrent protection of control circuit has been added
42.1.1.1 / 42.2.1.1		Editorial corrections of Section Nos.
42.3.1	Listed Industrial control equipment with isolated secondary outputs Recognized Industrial control equipment with isolated secondary outputs	UL60947-4-1 has been added
44.1.4	Class 2 sources	AZOT and NWGQ have been removed since no Class 2 Power Supplies are investigated under these categories
47.3	Recognized Uninterruptible Power supplies	A verification according requirements in Section 47.3.1 has been added
66.5.3 Exception, 66.7.1	Listed Class L Fuse	Class L fuse added

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SUPPLEMENT SA FOR COMPONENTS USED IN INDUSTRIAL CONTROL PANELS

(Formerly Supplement SA of UL 508A)

1 Listed Components

1.1 Where a Listed device is provided in an industrial control panel and specific component requirements are not described in Part 1 (General Use Industrial Control Panels) of the UL 508A Standard, any Listed component is able to be used.

Exception No. 1: Equipment intended to be connected to a source of supply greater than 1000 volts shall not be used.

Exception No. 2: The following hazardous locations equipment and associated apparatus shall not be used as part of an ordinary locations industrial control panel:

- a) *An explosion-proof enclosure marked for Class I hazardous locations (or Type 7).*
- b) *A dust-ignition-proof enclosure marked for Class II hazardous locations (or Type 9),*
- c) *A barrier or other equipment that provides intrinsically safe input/output connections for use in Class I, II, and III hazardous locations.*

Exception No. 3: Equipment intended for a non-industrial use such as consumer appliances and equipment for residential use shall not be used.

1.2 All Listed devices shall:

- a) Be used as intended by the manufacturer of the Listed device;
- b) Be installed according to instructions provided by the manufacturer including mounting means, electrical wiring connections and routing, ventilation, required spacing between components, and required protective devices; and
- c) Not exceed their marked electrical and environmental ratings.

1.3 Enclosed type Listed components intended to be installed within an enclosed industrial control panel are able to be installed with the enclosure completely or partially removed when the device complies with the spacing requirements of this standard.

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1.4 Enclosed type Listed components that are modified by the inclusion of additional components within the existing enclosure of the component shall comply with the requirements of this standard.

2 Recognized Components

2.1 Recognized components that comply with specific requirements in the UL 508A standard are specified in Table 1. Recognized components described in Table 1 as requiring procedure description shall be described in the manufacturer's Procedure in order to be used.

2.2 Recognized components other than those described in Table 1 shall be investigated and described in the manufacturer's Procedure.

2.3 Recognized components shall:

- a) Be used within their electrical ratings;
- b) Be used as intended by the manufacturer of the Recognized component such that all applicable conditions of acceptability are satisfied;
- c) Be installed according to instructions provided by the manufacturer including, but not limited to, mounting means, electrical wiring connections and routing, ventilation, required spacing between components, and required protective devices; and
- d) Not exceed their Recognized electrical and environmental ratings.

2.4 A Recognized component installed through the wall of an industrial control panel enclosure is assumed to be for use on Type 1 enclosures only, regardless of markings and literature, unless the component and its environmental rating are specifically included in the manufacturer's Procedure.

Exception: A Recognized Industrial Control Equipment Component (NIMX2) that is marked with an enclosure type designation is able to be used in accordance with its rating without inclusion in the manufacturer's Procedure.

2.5 Unless otherwise specified in the UL 508A Standard or in the manufacturer's Procedure, terminals of Recognized components shall be used for internal wiring connections only.

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2.6 Recognized Industrial Control Panel Components (NITW2) that are not specifically described in Table 1 are suitable for use without Procedure description provided the following conditions are satisfied:

- a. NITW2 components shall be used in accordance with their ratings and other application information included with their UL Certification. This information shall be made readily available by the industrial control panel manufacturer.
- b. NITW2 components shall be installed per the manufacturer specifications. This shall be verified from installation instructions provided with the product or by the NITW2 component manufacturer.
- c. The Conditions of Acceptability (CofA) included with the UL Certification for the NITW2 component shall be reviewed. The industrial control panel manufacturer shall request these CofAs from their component providers as part of pages from the Component Recognition Report.
- d. If a CofA requires additional end-product evaluation (e.g. testing), the component shall NOT be accepted without Procedure description. The following are examples of CofAs that require the component to be Procedure described:
 - 1) Use in specific ambient conditions, such as:
 - The use of the component in ambient temperatures in excess of 25°C shall be investigated,
 - The component is for use in a 25°C maximum ambient, or
 - The component must be used in an ambient temperature less than 40° C.
 - 2) Component testing (e.g. Temperature, Dielectric, etc.) shall be conducted in the end use.
 - 3) Mechanical performance testing (e.g. Ball Impact Test, Flame Test, Environmental Type Testing, etc.) shall be considered in the end use application. (Applies to all Mechanical Testing per UL 746C, and Environmental Testing per UL 50E).
 - 4) RFI/EMI shielding required for proper component operation has not been evaluated.
 - 5) Instructions and warning markings should be provided (if the contents of the required markings are not specifically described in the CofA).
 - 6) The suitability of mounting pressure compensation devices on the enclosure shall be evaluated in the end use application.
 - 7) Strain relief and push back relief evaluations have not been conducted and shall be considered in the end use application.
 - 8) The acceptability of the mating between a component mounted through an opening in an enclosure and the enclosure wall shall be determined in the end use application.
 - 9) Test circuits for GFCI receptacles have not been evaluated and no GFCI capabilities are assumed.

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10) The GFCI receptacles do not meet the requirements of UL 508A appendix B for ground fault protection of an unevaluated component.

3 Other Components

3.1 Electrical components, other than those covered by Section 1, Listed Components and Section 2, Recognized Components, shall be evaluated by the UL representative in accordance with the requirements in UL 508A, Appendix B or shall be described in the manufacturer's Procedure.

Exception: Electrical components having all electrical connections made to a low-voltage limited energy source, as described in UL 508A, Section 43, Low-Voltage Limited Energy Circuits, or a Class 2 source are able to be used within a panel without compliance with 3.1.

3.2 Mechanical parts, having no electrical connections and containing no liquids or flammable gas, are not required to be Listed or Recognized or described in the manufacturer's Procedure.

3.3 Polymeric (plastic) mechanical parts that serve to:

- a) Physically support live parts, such as a standoff for a bus bar, shall comply with UL 508A, Section 13, Insulating Materials.
- b) Provide insulation of live parts in lieu of electrical spacings, such as insulating barriers or tubings, shall comply with Section 12, Insulating Barriers, or 29.2.3.
- c) Provide a mechanical intrusion barrier are not required to be Listed, Recognized, or Procedure described.

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Table 1

Components that comply with specific requirements

UL508A Paragraph reference	Component description	UL Standard		Category control number(s)	Notes
UL 508A Section/Paragraph Reference					
Section 12 - Insulating Barriers meeting component selection requirements of 12.2					
12.2(a)(1)	Generic materials	-		-	Type and minimum thickness as specified in Table 12.1, dimensions of barrier shall also comply with 12.1
12.2(a)(2)	Recognized Sleeving	UL 1441		UZFT2	90°C (194°F) minimum and for voltage involved, as noted on Recognition Information Page in the UL Product iQ , dimensions of sleeving applied shall also comply with 12.1
12.2(a)(2)	Recognized Tubing	UL 224		YDPU2	90°C (194°F) minimum and for voltage involved, as noted on Recognition

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					Information Page in the UL Product iQ , dimensions of sleeving applied shall also comply with 12.1
12.2 Exception	Other insulating barriers	UL 508		-	Construction described in Procedure
Section 13 - Insulating materials meeting component selection requirements of 13.2					
13.2	Generic materials	-		-	Material type and minimum thickness as specified in Table 13.1, shall also comply with 13.2(b)
13.2	Recognized Standoffs	UL 67, UL 891		QEUY2	Any insulating standoff that complies with the required spacings of Section 10
13.2 Exception	Other insulating materials	UL 508		-	Construction described in Procedure
Section 14 - Grounding Terminals meeting component selection requirements of 14.2					
14.1	Listed Grounding/Bonding Braid	UL 467		KDER	Grounding (bonding) braids shall be sized according to 15.1
14.2(a)	Recognized Terminal Blocks	UL 1059		XCFR2	Terminal block shall be

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					suitable for field connection for the conductor size required by 15.1 as determined from the Recognized Component Information Page UL Product iQ .
14.2(a)	Listed Pressure Wire Connectors	UL 486A, UL 486B		ZMVV	Pressure wire connector shall be suitable for the conductor size required by 15.1.
14.2(a)	Recognized grounding bar kits	UL 67, UL 891	QEUY2		Procedure described only See FUII (Follow-Up Inspection Instructions) for further installation criteria
14.2(b)	Listed Grounding and Bonding Equipment	UL 467	KDER		Grounding terminal shall be suitable for the conductor size required by 15.1.
14.2(b)	Recognized Grounding and Bonding equipment	UL 467	KDER2		Grounding terminal shall be suitable for the conductor size required by 15.1.
Section 16 – Ground Fault Sensing and Relaying Equipment meeting component selection requirements of 16.4					
16.4	Listed Ground-fault Sensing and Relaying Equipment	UL 1053	KDAX		

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16.4	Recognized Ground-fault Sensing and Relaying Equipment	UL 1053	KDAX2		
Section 18 - Enclosures meeting component selection requirements of 18.3					
18.3(a)	Listed Junction and pull boxes	UL 50	BGUZ		These enclosures are not required to have doors and would not be able to house power circuit fuses and similar components - see 18.4
18.3(a)	Listed Cabinets and cutout boxes	UL 50	CYIV		Cabinets shall be provided with mating cabinet front
18.3(b)	Listed Industrial control panel enclosure	UL 508A	NITW		
18.3(b)	Recognized Industrial Control Panel Enclosure	UL 508A	NITW2		
18.3(b)	Enclosures not previously Listed or Recognized	-	-		1) Construction shall comply with Sections 62 - 64 as Type 1 enclosure; or
					2) Described in Procedure
Section 19 - Components for closing openings in enclosures					
19.1	Listed Conduit fittings	UL 514B	DWTT		For other than Type 1 enclosures, fittings and conduit openings shall comply with Table 19.1

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19.1 exception	Conduit fittings evaluated for use on industrial control panels with type rating	UL 50	-		Construction details and ratings described in Procedure, also shall comply with Table 19.1
19.2	Listed Wireway	UL 870	ZOYX		1) For use with Type 1 enclosures or when wireway with a rated attachment plate of the same Type rating as the enclosure; or
					2) Described in Procedure
19.3	Enclosure Mounted Components	-	Includes multiple CCNs (NKCR, NRNT etc.) that have appropriate Type rating.		1) Components have provisions for panel mounting; and
					2) For other than Type 1 enclosures, components shall comply with Table 19.2
		UL 50 / UL 50E	FTTA		Component installed in accordance with manufacturer's installation instructions and used within its marked ratings.
		UL 50E	FTTA2		For other than Type 1 enclosures,

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					components shall be described in Procedure.
19.3 exception	Components evaluated for use on industrial control panels with type rating	UL 50	-		Construction details and ratings described in Procedure, also shall comply with Table 19.2
19.4	Enclosures other than Type 1 with modifications that do not comply with Table 19.1 or Table 19.2	-	-		Panel nameplate marked as in 53.1 with: 1) Environmental rating that complies with Table 19.3; or 2) Type 1 Enclosure
Section 21 - Ventilation Openings meeting component selection requirements of 21.1					
21.1.1	Listed Industrial Control Panel Enclosure with Ventilation Opening	UL 508A	NITW		Location of ventilation opening with respect to components installed within enclosure shall comply with 21.2
21.1.1	Recognized Industrial Control Panel Enclosure with integral Ventilation Opening	UL 508A	NITW2		Location of ventilation opening with respect to components installed within enclosure shall comply with 21.2
21.1.1	Recognized Ventilation Opening kit	UL 508A	NITW2		Location of ventilation opening with respect to components installed within

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					enclosure shall comply with 21.2
21.1.1	Ventilation Opening not previously Listed or Recognized	UL 508A	-		Location of ventilation opening with respect to components installed within enclosure shall comply with 21.2, construction complies with 21.3, and considered Type 1 component
21.1.1 exception	Ventilation Opening evaluated for use on enclosures with Type rating	UL 508A, UL 50	-		Construction and Type ratings described in Procedure, also shall comply with Table 19.2
Section 23 - Observation Windows meeting component selection requirements in 23.1					
23.1	Listed Industrial Control Panel Enclosure with integral Observation Window	UL 508A	NITW		
23.1	Recognized Industrial Control Panel Enclosure with integral Observation Window	UL 508A	NITW2		
23.1	Recognized Observation Window kit	UL 508A	NITW2		Installed according to manufacturer's instructions
23.1	Listed Cabinet or Cutout Box with integral	UL 50	CYIV		

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	observation window				
23.1	Observation Window not previously Listed or Recognized	-	-		1) Must comply with 23.5 and 23.2 or 23.3, suitable for use on Type 1 enclosure; or
					2) Construction described in Procedure - see 23.4 and 23.6
23.1 exception	Observation Window evaluated for use on enclosures rated other than Type 1	UL 50	-		Construction and Type ratings described in Procedure
23.2	Glass used for observation window	-	-		For Type 1 enclosure, glass complies with construction requirements in 23.5 and: a) 4 inch (102 mm) max. in any dimension (includes diagonal), 0.55 inch (1.40 mm) thick; or b) 12 inch (305 mm) max. in any dimension (includes diagonal), 0.115 inch (2.92 mm) thick
23.3	Recognized Polycarbonate used for	UL 94	QMFZ2		For Type 1 enclosure, polycarbonate complies with 23.5

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	observation window				and construction requirements: a) 1/8 in. (3.2 mm) thick minimum; b) 5VA flame rating at minimum thickness in Plastics Recognized Component Directory not more than window thickness; and c) Area does not exceed 380 square inches (2452 cm ²)
23.4	Glass or polymeric observation window other than those in 23.2 or 23.3	UL 50	-		Construction and Type ratings described in Procedure
23.6	Observation windows secured by adhesive only	UL 508, UL 746C	-		Construction and Type ratings described in Procedure
Section 26 - Environmental control devices					
Section 26.2 - Enclosure Fans meeting component selection requirements in 26.2					
26.2.1	Recognized Electric fans	UL 507	GPWV2		Any that is marked "Thermally Protected" or "T.P.", or marked "Impedance Protected" or "Z.P.", or marked

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					“Electronically-Protected” or “EP” or “E.P.”
26.2.2	Recognized Motors	UL 1004-1	PRGY2		Construction and overload protection evaluated and described in Procedure
26.2.3	Recognized Fan kit	UL 508	NITW2		Installed according to manufacturer instructions, for kits that include ventilation openings for panel mounting - see 21.2
26.2.4(a)	Recognized Thermally-protected motors	UL 2111 UL 1004-3	XEWR2		Motor marked "Thermally Protected" or "T.P."
26.2.4(b)	Recognized Impedance-protected motors	UL 1004-2	XEIT2		Motor marked "Impedance Protected" or "Z.P."
26.2.4(b)	Recognized Electronically-protected motors	UL 1007-7	XDNW2		Motor marked “Electronically-Protected” or “EP” or “E.P.”
26.2.4(c)	Separate motor overload	UL 508, UL 60947-4-1	NKCR, NLRV		See Section 34, Overload Protection of Motor Loads
Section 26.3 - Enclosure Air Conditioners meeting component selection requirement					
26.3.1	Listed Special-purpose air conditioner, Self-Contained Units	UL 484, <u>UL 60335-2-40</u>	ACVS		

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26.3.1	Recognized Special-purpose air conditioner, Self-Contained Units	UL 484 ₁ <u>UL</u> <u>60335-</u> <u>2-40</u>	ACVS2		Construction described in Procedure or Installed according to manufacturer's instructions
26.3.1	Listed or Recognized Special-purpose remote or water-cooled air conditioners (requires provision for external refrigeration and/or plumbing connections).	UL 484 ₁ <u>UL</u> <u>60335-</u> <u>2-40</u>	ACVS, ACVS2		Construction described in Procedure or Installed according to manufacturer's instructions
26.3.1	Listed Special-purpose air conditioner, Self-Contained Units	UL 1995 ₁ <u>UL</u> <u>60335-</u> <u>2-40</u>	LZFE		
26.3.1	Recognized Special-purpose air conditioner, Self-Contained Units	UL 1995 ₁ <u>UL</u> <u>60335-</u> <u>2-40</u>	LZFE2		Construction described in Procedure or Installed according to manufacturer's instructions
26.3.1	Listed or Recognized Special-purpose remote or water-cooled air conditioners (requires provision for external refrigeration and/or plumbing connections).	UL 1995 ₁ <u>UL</u> <u>60335-</u> <u>2-40</u>	LZFE, LZFE2		Construction described in Procedure or Installed according to manufacturer's instructions

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Section 26.4 - Enclosure Heaters meeting component selection requirements in 26.4					
26.4.1	Recognized Miscellaneous Heater	UL 499	KSOT2		Construction described in Procedure
26.4.2	Recognized cabinet heater kit	UL 508	NITW2		Installed according to manufacturer instructions
Section 26.6 - Adhesive for enclosure insulation					
26.6.1	Recognized Insulation adhesive	-	MAGW2		Construction described in procedure
Section 27 - Enclosure Maintenance Lighting meeting the requirements in 27.2					
27.2.1	Listed Incandescent lampholder, Intermediate Base	UL 496	OMTT		
27.2.1	Listed Incandescent lampholder, Medium Base	UL 496	ONHR		
27.2.2	Listed Fluorescent fixture	UL 1598	IEUZ		
<u>27.2.2</u>	<u>Listed Light-emitting-diode Surface-mounted Luminaires</u>	<u>UL 1598</u>	<u>IFAM</u>		
27.2.3	Recognized Lighting Kit	UL 508, UL 508A	NITW2		Installed according to manufacturer's instructions
<u>27.3.2 Exception No. 2</u>	<u>Listed Light-emitting-diode Luminaire Retrofit Kits</u>	<u>UL 1598C</u>	<u>IFAR</u>		<u>When suitable for a 40°C Ambient Temperature</u>

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Section 28 - Power circuit field wiring devices meeting component selection requirements					
28.2.1	Recognized Terminal blocks	UL 1059	XCFR2		Terminal blocks shall be suitable for field connection, retaining the conductor size complying with Section 28, use group (other than use group B) complying with applicable spacing requirements from Section 10, electrical ratings and conditions of use clauses as determined from Recognized Component Information Page the UL Product iQ
28.2.2	Listed Pressure Wire connector	UL 486 series	ZMVV		Pressure wire connectors shall be suitable for retaining the conductor size complying with Section 28, applicable spacing requirements from Section 10, and secured in place as in Section 9.
28.2.2	Listed component provided with integral pressure wire connectors	UL 486 Series	-		Suitable for wire type, wire range, and terminal torque marked on component.

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28.2.3	Wire Binding Screw	UL 508A	-		When constructed as in 28.2.3, Suitable for 14 AWG or 14 - 10 AWG max.
28.2.4	Listed Power Distribution Blocks	UL 1953	QPQS		
28.2.5	Connectors for Use in Data, Signal, Control and Power Applications	UL 1977	ECBT2		Procedure described only and complies with Table 3
28.5.2	Listed Strain Relief	UL 514B	QCRV		Cord fittings suitable for diameter of flexible cord
28.5.2 exception	Strain Relief not previously Listed or Recognized	UL 514B	-		Procedure described only
28.6.1	Listed Receptacles	UL 498	RTRT		
28.6.1	Recognized Receptacles / outlets	UL 498 or UL 60320-1	RTRT2 AXUT2		For use internal to enclosure only or procedure described
28.6.1	Listed Pin and Sleeve Plug	UL 1682	QLIW		Marking required to identify mating plug
28.6.6	Listed Ground-fault circuit-interrupter	UL 943	KCXS		Class A receptacle type only
28.6.6	Listed Circuit breaker/GFCI	UL 489 and UL 943	DKUY		Class A type only.

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28.7.1	Listed Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery	UL 2237	PVVA		Any Listed assembly or fitting may be used within their marked ratings
28.7.1	Recognized Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery	UL 2237	PVVA2	1.	<ol style="list-style-type: none"> 2. Any Recognized assembly or fitting may be used within their ratings as noted on the Recognition Information Page-UL Product iQ 3. Recognized assemblies and fittings are not suitable for field wiring 4. Recognized assemblies and fittings suitable for making or breaking current under load must marked or identified for this application 5. All other applications of assemblies and fittings not covered

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					in 1-3 above shall be Procedure described
28.7.1	Listed Cable Assemblies and Fittings for Industrial Control and Signal Distribution	UL 2238	CYJV		Any Listed assembly or fitting may be used within their marked ratings
28.7.1	Recognized Cable Assemblies and Fittings for Industrial Control and Signal Distribution	UL 2238	CYJV2	1.	<ol style="list-style-type: none"> 2. Any Recognized assembly or fitting may be used within their ratings as noted on the Recognition Information Page<u>UL Product iQ</u>. 3. Recognized assemblies and fittings are not suitable for field wiring 4. Recognized assemblies and fittings suitable for making or breaking current under load must marked or identified for this application 5. All other applications

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					of assemblies and fittings not covered in 1-3 above shall be Procedure described
28.7.1	Listed Single-pole, Locking-type Separable Attachment Plugs, Panel Inlets, Panel Outlets, Adapters and Accessories	UL 1691	RUUS		Any Listed assembly or fitting may be used within their marked ratings. A caution marking shall be provided on panels employing single-pole separable connectors, adjacent to connectors used to supply a source of power, and indicating that connections are to be performed in the following sequence and that disconnection is to be performed in the reverse sequence: (a) Equipment grounding conductor connectors (b) Grounded circuit-conductor connectors, if provided (c) Ungrounded conductor connectors

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Section 29 - Internal wiring meeting the component selection requirements in 29.2					
29.2.1(a)	Listed Machine tool wire	UL 1063	ZKHZ		For wire types other than Class B and C conductors, the connecting terminals must be evaluated to UL 486A-486B for the Class of conductor to be terminated, or must have the terminals procedure described
29.2.1(b)	Listed Thermoset-insulated wire	UL 44	ZKST		For wire types other than Class B and C conductors, the connecting terminals must be evaluated to UL 486A-486B for the Class of conductor to be terminated, or must have the terminals procedure described
29.2.1(c)	Listed Thermoplastic-insulated wire	UL 83	ZLGR		For wire types other than Class B and C conductors, the connecting terminals must be evaluated to UL 486A-486B for the Class of conductor to be terminated, or must have the terminals

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					procedure described
29.2.1(d)	Recognized Appliance wiring material	UL 758	AVLV2		Rated 90°C minimum For wire types other than Class B and C conductors, the connecting terminals must be evaluated to UL 486A-486B for the Class of conductor to be terminated, or must have the terminals procedure described
29.2.1(e)	Listed Welding cable	UL 62	ZMAY		Rated 90°C minimum, the connecting terminals must be evaluated to UL 486A-486B for the Class of conductor to be terminated, or must have the terminals procedure described
29.2.2	Bus Bars not previously Listed or Recognized	UL 508A	-		Any Construction that complies with the requirements of 29.2.2.
29.2.2	Recognized Bus Bars	UL 508	NMTR2		Procedure described only
Section 29.2 - Additional insulation meeting the component selection requirements					
29.2.3(a)	Recognized Coated Electrical Sleeving	UL 1441	UZFT2		Rated 90°C (194°F) minimum and for voltage

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					involved, as noted in Recognition Information Page the UL Product iQ , dimensions of sleeving applied shall also comply with 12.1. Not acceptable for use in contact with sharp edges, corners, burrs or projections, or where subject to tension, compression or repeated flexing.
29.2.3(b)	Recognized Extruded Insulating Tubing	UL 224	YDPU2		Rated 90°C (194°F) minimum and for voltage involved, as noted on in Recognition Information Page the UL Product iQ , dimensions of sleeving applied shall also comply with 12.1. Not acceptable for use in contact with sharp edges, corners, burrs or projections, or where subject to tension, compression or repeated flexing.
29.2.3(c)	Listed Insulating tape	UL 510	OANZ		For use with control circuits only

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29.2.3(c)	Recognized Insulating tape	UL 510	OANZ2		Rated 90°C (194°F) minimum and for voltage involved, as noted <u>on-in Recognition Information Page the UL Product iQ</u> , dimensions of sleeving applied shall also comply with 12.1.
29.3.6	Wiring Ferrules	UL486F, UL486L			<u>Ferrules shall be installed using the tool and die specified by the manufacturer</u>
29.3.9	Listed Splicing Connectors	UL 486C	ZMVV		Includes twist-on connectors
29.3.9	Recognized Splicing Connectors	UL 486C	ZMVV2		Procedure described only
29.4	Wire ties and tie supports				Wire ties and tie supports are not required to be Listed or Recognized

Section 30 - Disconnect means meeting the component selection requirements

30.1.1	Listed Molded case circuit breaker	UL 489	DIVQ		
30.1.1	Listed Solid-state Molded case circuit breaker	UL 489, UL 489I	DIXS		
30.1.1	Listed Circuit Breaker with Equipment	UL489, UL 1053	DIYA		

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	Ground-fault Protection				
30.1.1	Recognized Instantaneous-trip circuit breaker	UL 489	DKPU2		Procedure described only or used in accordance with the rules provided in the ratings spreadsheet located in the website for Short Circuit Current Ratings for Combination Motor Controller Components
30.1.2	Listed Molded case switch	UL 489	WJAZ		
30.1.3	Listed Enclosed switch	UL 98	WIAX		
30.1.3	Listed Open Type Switch	UL 98	WHTY		
30.1.3	Recognized Switch unit	UL 98	WHTY2		
30.1.4	Listed Manual motor controller	UL 508, UL 60947-4-1	NLRV		Products marked "Suitable as motor disconnect" and used as a motor disconnect must be installed on the load side of the branch circuit protective device for the circuit in which the motor controller is located.
30.1.4	Recognized Manual motor controller	UL 508, UL	NLRV2		Procedure described only. Products marked

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		60947-4-1			“Suitable as motor disconnect” and used as a motor disconnect must be installed on the load side of the branch circuit protective device for the circuit in which the motor controller is located.
30.1.5	Listed Combination motor controller (including self-protected combination motor controllers)	UL 508, UL 60947-4-1	NKJH		Self-protected combination motor controllers must be supplied with all required accessory parts specified with Listing Mark. Accessories which provide feeder circuit spacings in accordance with Table 10.2, may be omitted when line terminals are factory-wired.
30.1.6	Listed Circuit Breaker Accessories, Disconnect handles	UL 489	DIHS		Any disconnect handle marked for use with circuit breaker
30.1.6	Recognized Circuit Breaker Accessories, Disconnect handles	UL 489	DIHS2		For use on enclosures, any disconnect handle marked for use with circuit breaker is able to be used in accordance with its enclosure Type Rating. See FUII

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					(Follow-up Inspection Instructions) for further information.
30.1.6	Recognized Circuit Breaker Accessories, manual and electrical operators, shunt trip devices, undervoltage trip devices, alarm switches, and auxiliary switches.	UL 489	DIHS2		For use with circuit breaker marked on accessory or identified in the installation instructions
30.1.6	Recognized Switch unit handles	UL 98	WHTY2		For use on enclosures, any disconnect handle marked for use with switch unit is able to be used in accordance with its enclosure Type Rating.
30.1.6	Recognized Magnetic Motor controllers, Motor disconnect handles	UL508, UL60947-4-1	NLDX2		For use on enclosures, any disconnect handle marked for use with the disconnecting means is able to be used in accordance with its enclosure Type Rating.
30.1.6	Recognized Panelboard accessories, disconnect handles	UL 67, UL 891	QEUY2		For use on enclosures, any disconnect handle marked for use with circuit breaker is able to be used in accordance with its

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					enclosure Type Rating.
30.1.7	Listed Pullout Switch	UL 1429	WGEU		
30.1.8	Listed Fused Power Switch	UL 977	IYSR		
30.1.9	Listed Low Voltage AC Power Circuit Breakers	UL 1066	PAQX		
Section 31 - Overcurrent protective devices meeting the component selection requirements for branch circuit protection					
31.1.1	Listed Molded case circuit breaker	UL 489	DIVQ		
31.1.1	Listed Solid-state Molded case circuit breaker	UL 489, UL 489I	DIXS		
31.1.1	Listed Circuit Breaker with Equipment Ground-fault Protection	UL 489, UL 1053	DIYA		
31.1.1	Recognized Instantaneous-trip circuit breaker	UL 489	DKPU2		Procedure described only
31.1.1	Listed Low Voltage AC Power Circuit Breakers	UL 1066	PAQX		
31.1.2	Listed Class CC fuses	UL 248-1, UL 248-4	JDDZ		
31.1.2	Listed Class CF fuses	UL 248-1, UL 248-15	JDDZ		
31.1.2	Listed Class G fuses	UL 248-1, UL 248-5	JDDZ		

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31.1.2	Listed Class H fuses	UL 248-1, UL 248-6	JDDZ		
31.1.2	Listed Class J fuses	UL 248-1, UL 248-8	JDDZ		
31.1.2	Listed Class K fuses	UL 248-1, UL 248-9	JDDZ		
31.1.2	Listed Class L fuses	UL 248-1, UL 248-10	JDDZ		
31.1.2	Listed Class R fuses	UL 248-1, UL 248-12	JDDZ		
31.1.2	Listed Class T fuses	UL 248-1, UL 248-15	JDDZ		
31.1.2	Listed Special Purpose fuse	UL 248 series	JFHR		Only when marked for replacement of Class rated fuse or marked as meeting the performance requirements of a Class rated fuse
31.1.3	Recognized Special-purpose fuses	UL 248-1, UL 248-13	JFHR2		Semiconductor fuse only when specified by drive instructions
31.1.4	Listed Self-protected combination motor controller	UL 508, UL 60947-4-1	NKJH		Must be supplied with all required accessory parts specified with Listing Mark. Accessories which provide feeder circuit spacings in accordance with Table 10.2, may be

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					omitted when line terminals are factory-wired.
31.1.4	Listed Manual Self-protected combination motor controller	UL 508, UL 60947-4-1	NKJH		Must be supplied with all required accessory parts specified with Listing Mark. Accessories which provide feeder circuit spacings in accordance with Table 10.2, may be omitted when line terminals are factory-wired. Separate Motor controllers must be marked for use with manual self-protected combination motor controller.
31.1.5	Listed Cartridge Fuse Fuseholders	UL 4248-1 series	IZLT		Any that comply with appropriate spacing requirements in 10.8
31.1.5	Listed Special Purpose Fuseholder	UL 4248-1 series	IZND		Any that comply with appropriate spacing requirements in 10.8
31.1.5	Recognized Cartridge Fuse Fuseholders	UL 4248-1 series	IZLT2		Procedure described only
31.1.5	Listed accessories for use with Power	UL 61800-5-1	NMMS		Fuseholders installed in accordance with

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	Conversion Equipment				the manufacturer's installation instructions
31.1.6	Fuseholder rated more than 600A not previously Listed or Recognized	UL 977	-		Procedure described only
Section 31.4 - Components for Group Installation meeting component selection requirements of 31.4					
31.4.1(c)	Listed Magnetic Motor Controller	UL 508, UL 60947-4-1	NLDX		Marked "Suitable for Group Installation" or referenced from marking on motor controller
31.4.1(c)	Listed Manual Motor Controller	UL 508, UL 60947-4-1	NLRV		Marked "Suitable for Group Installation"
31.4.3	Listed Manual Motor Controller for use as tap conductor protection	UL 508, UL 60947-4-1	NLRV		Marked "Suitable for Tap Conductor Protection in Group Installations"
Section 33 - Load controllers meeting the component selection criteria in 33.1					
33.1.1	Listed Float-pressure operated	UL 508	NKPZ		
33.1.1	Recognized Float-pressure operated	UL 508	NKPZ2		Any part Recognized for industrial use. Parts intended for non-industrial use requires procedure description.
33.1.1	Listed Magnetic motor controller	UL 508, UL	NLDX		

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		60947-4-1			
33.1.1	Recognized Magnetic motor controller	UL 508, UL 60947-4-1	NLDX2		Any part Recognized for industrial use. Parts intended for non-industrial use requires procedure description.
33.1.1	Recognized Magnetic Definite Purpose Controller	UL 508, UL 60947-4-1	NLDX2		Any part Recognized for industrial use and used within its Recognized ratings. Parts intended for non-industrial use requires procedure description.
33.1.1	Listed Manual motor controller	UL 508, UL 60947-4-1	NLRV		
33.1.1	Recognized Manual motor controller	UL 508, UL 60947-4-1	NLRV2		Any part Recognized for industrial use. Parts intended for non-industrial use requires procedure description.
33.1.1	Listed Combination motor controller (including self-protected combination motor controllers)	UL 508, UL 60947-4-1	NKJH		Accessories which provide feeder circuit spacings in accordance with Table 10.2, may be omitted when line terminals are factory-wired.
33.1.1	Listed Solid-state motor controller	UL 508, <u>UL</u>	NMFT		

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		<u>60947-4-2</u>			
33.1.1	Recognized Solid-state motor controller	UL 508, <u>UL</u> <u>60947-4-2</u>	NMFT2		Recognized controller is usable only when procedure described
33.1.1	Listed Relays, Electromechanical Elementary	UL 61810-1	NRLC		
33.1.1	Recognized Relays, Electromechanical Elementary	UL 61810-1	NRLC2		Any part Recognized for industrial use. Parts intended for non-industrial use requires procedure description.
33.1.1	Listed Switches, Industrial Control	UL 508, UL 60947-1, UL 60947-4-1, UL 61810-1	NRNT		
33.1.1	Recognized Switches, Industrial Control	UL 508, UL 60947-1, UL 60947-4-1, UL 61810-1	NRNT2		Any part Recognized for industrial use. Parts intended for non-industrial use requires procedure description.
33.1.1	Listed Energy Management Equipment	UL 916	PAZX		
33.1.1	Recognized Energy Management Equipment	UL 916	PAZX2		

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33.1.2	Listed Power conversion equipment	UL508C, UL 61800-5- 1	NMMS		
33.1.2	Recognized Power conversion equipment	UL508C, UL 61800-5- 1	NMMS2		Recognized controller is usable only when procedure described
33.1.3	Listed Magnetic Reversing Motor Controller	UL 508, UL 60947-4- 1	NLDX		a) Any Listed reversing controller assembled by component manufacturer; or b) Listed motor controllers with Listed reversing kit may be assembled by panelbuilder in accordance with the manufacturer's instructions; or c) Other constructions must be procedure described.
33.1.3	Recognized Magnetic Reversing Motor Controller	UL 508, UL 60947-4- 1	NLDX2		Procedure described only
33.7.1	Listed Autotransformer or Resistor Type Reduced Voltage Starter	UL 508, <u>UL</u> <u>60947-4-</u> <u>1</u>	NLDX		Listed assemblies may be used within their marked ratings; all other constructions must be procedure described.

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Section 34 - Motor overload devices meeting the component selection requirements					
34.1.1	Listed Auxiliary devices (overload relay only)	UL 508, UL 60947-4-1	NKCR		Overload relay only
34.1.1	Recognized Auxiliary devices (overload relay only)	UL 508, UL 60947-4-1	NKCR2		Overload relay only
34.1.1	Listed Magnetic motor controller	UL 508, UL 60947-4-1	NLDX		Any starter
34.1.1	Recognized Magnetic motor controller	UL 508, UL 60947-4-1	NLDX2		Any Recognized starter for industrial use. Parts intended for non-industrial use requires procedure description.
34.1.1	Listed Manual motor controller	UL 508, UL 60947-4-1	NLRV		Any manual starter
34.1.1	Recognized Manual motor controller	UL 508, UL 60947-4-1	NLRV2		Any Recognized manual starter for industrial use. Parts intended for non-industrial use requires procedure description.
34.1.1	Listed Combination motor controller (including self-protected combination motor controllers)	UL 508, UL 60947-4-1	NKJH		Accessories which provide feeder circuit spacings in accordance with Table 10.2, may be omitted when line

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					terminals are factory-wired.
34.1.1	Listed Solid-state motor controller	UL 508	NMFT		When motor overload function described in instructions.
34.1.2	Listed Power conversion equipment	UL508, UL 61800-5-1	NMMS		When motor overload function described in instructions.
34.1.2	Recognized Power conversion equipment	UL 508, UL 61800-5-1	NMMS2		Procedure described only
34.1.3	Listed Molded case circuit breaker	UL 489	DIVQ		When motor overload function described in instructions or marked as MPCB
Section 35 - Transformers meeting the component selection requirements					
35.1.1	Listed General-purpose transformer	UL 5085-1 and UL 5085-2	XPTQ		Industrial control transformer
35.1.1	Recognized General-purpose transformer	UL 5085-1 and UL 5085-2	XPTQ2		Industrial control transformer
35.1.2	Listed Power or general-purpose transformer	UL 1561	XQNX		
35.1.2	Recognized Power or general-purpose transformer	UL 1561	XQNX2		
35.1.1, 35.1.2	Transformer not previously Listed or Recognized with Recognized Insulation System	UL 1446	OBJY2		Procedure described only. Tests are required.

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35.1.1, 35.1.2	Recognized Transformer Construction		XORU2		Procedure described only. Tests are required.
Section 36 - Miscellaneous power devices meeting component selection requirements					
36.1.1	Recognized Oil- filled capacitors	UL 810	CYWT2		Any that complies with the requirements in 36.1.2 – 36.1.5
36.1.6	Recognized Across-the-line capacitors	UL 60384-14	FOWX2		Any that complies with the requirements in 36.1.5 and with spacings provided as in Section 10 or insulated as in Section 12
36.1.6	Across-the-line capacitors not previously Listed or Recognized	UL 508	-		Procedure Described Only
36.2	Listed or Recognized Resistors	UL 508	NMTR, NMTR2		Any that complies with the requirements in 36.2.2 - 36.2.5
36.3	Listed or Recognized Reactors	UL 508	NMTR, NMTR2		Any that complies with the requirements in 36.3.1 and 36.3.2
36.3	Listed or Recognized Reactors	UL 5085- 1 and UL 5085-2	XPTQ, XPTQ2		Any that complies with the requirements in 36.3.1 and 36.3.2
36.3	Listed or Recognized Reactors	UL 1561	XQNX, XQNX2		Any that complies with the requirements in 36.3.1 and 36.3.2

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36.4.1	Recognized Surge Protective Devices	UL 1449	VZCA2		SPDs that are outside the guidelines of Table 2 must be procedure described.
36.4.1	Listed Surge Protective Devices	UL 1449	VZCA		Type 1, 2 or 3. SPDs that are outside the guidelines of Table 2 must be procedure described
36.5.1	Listed Electromagnetic interference filters	UL 1283	FOKY		
36.5.1	Recognized Electromagnetic interference filters	UL 1283	FOKY2		
36.5.1	Recognized Passive Filter Units for Electromagnetic Interference Suppression	UL 60939-3	FOKR2		Any Recognized filter used within its ratings
36.5.2	Listed Power Conversion Equipment with filters	UL508C UL 61800-5-1	NMMS		
36.5.2	Recognized filters	UL 508C, UL 61800-5-1	NMMS2		Any Recognized filter used within its ratings
36	Listed Power Circuit and Motor-mounted Apparatus, current transformers	UL 508	NMTR		Restricted to factory wiring only

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36	Recognized Power Circuit and Motor-mounted Apparatus, current transformers	UL 508	NMTR2		Restricted to factory wiring only
Section 37 - Control circuit field wiring devices meeting component selection requirements					
37.8.1	Listed Cable Assemblies and Fittings for Industrial Control and Signal Distribution	UL 2238	CYJV		Any Listed assembly or fitting may be used within their marked ratings
37.8.1	Recognized Cable Assemblies and Fittings for Industrial Control and Signal Distribution	UL 2238	CYJV2	1.	<p>2. Any Recognized assembly or fitting may be used within their ratings as noted on the Recognition Information Page <u>in the UL Product iQ</u></p> <p>3. Recognized assemblies and fittings are not suitable for field wiring</p> <p>4. Recognized assemblies and fittings suitable for making or breaking</p>

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					<p>current under load must marked or identified for this application</p> <p>5. All other applications of assemblies and fittings not covered in 1-3 above shall be Procedure described</p>
37.8.1	Listed Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery	UL 2237	PVVA		Any Listed assembly or fitting may be used within their marked ratings
37.8.1	Recognized Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery	UL 2237	PVVA2	1.	<p>2. Any Recognized assembly or fitting may be used within their ratings as noted on the Recognition Information Page in the UL Product iQ.</p> <p>3. Recognized assemblies and fittings are not suitable for field wiring</p>

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					<p>4. Recognized assemblies and fittings suitable for making or breaking current under load must marked or identified for this application</p> <p>5. All other applications of assemblies and fittings not covered in 1-3 above shall be Procedure described</p>
37.8.1	Connectors for Use in Data, Signal, Control and Power Applications	UL 1977	ECBT2		Procedure described only and complies with Table 3
Section 38 - Control circuit internal wiring meeting component selection requirements					
38.1.1(b)	Listed Power-limited cable	UL 13	QPTZ		Class 2 or low-voltage limited-energy circuit use only
38.1.1(c)	Listed Communication cable	UL 444	DUZX		Class 2 or low-voltage limited-energy circuit use only
<u>38.1.2</u>	<u>Listed Optical Fiber Cable</u>	<u>UL1651</u>	<u>QAYK</u>		

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Section 40 - Overcurrent protection of control circuit meeting the component selection requirements					
40.1.2	Listed Miscellaneous or miniature fuse	UL 248-1 UL 248-14	JDYX		
40.1.2	Recognized Miscellaneous or miniature fuse	UL 248-1 UL 248-14	JDYX2		
40.1.3	Recognized Supplementary protector	UL 1077	QVNU2		Refer to Requirements for Supplementary Protectors at the end of this document. 1) Any Recognized protector used within its ratings found in the UL Product iQ Database may be used 2) All other protectors including those with trip curve TC-2 shall be Procedure described.
40.1.3	Recognized Special-purpose Solid State Overcurrent Protectors	UL 2367	QVRQ2		Printed circuit board type must be Procedure described. All others such as DIN rail mounted types are acceptable without Procedure description. If used for compliance with LVLE or Class 2 limitations, the Recognition

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					InformationUL Product iQ pPage shall indicate the output has been evaluated for Class 2.
40.1.4	Recognized Cartridge Fuse Fuseholders	UL 4248- 1 series	IZLT2 .		
Section 42 - Isolated secondary circuit supply meeting component selection requirements					
42.1.1.1	Listed general- purpose transformer	UL 5085- 1 and UL 5085-2	XPTQ		Industrial control transformer
42.1.1.1	Recognized general-purpose transformer	UL 5085- 1 and UL 5085-2	XPTQ2		Industrial control transformer
42.1.1.1	Listed Power or general-purpose transformer	UL 1561	XQNX		
42.1.1.1	Recognized Power or general- purpose transformer	UL 1561	XQNX2		
42.42.1.1	Listed Power supplies for use with Programmable controllers	UL 508 or UL 61010-1 and UL 61010-2- 201	NMTR, NRAQ		
42.42.1.1	Recognized Power supplies for use with Programmable controllers	UL 508 or UL 61010-1 and UL 61010-2- 201	NMTR2, NRAQ2		

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42.42.1.1	Listed Power Supplies for Hazardous Locations	UL 508 or UL 61010-1	NRAD		
42.42.1.1	Recognized Power Supplies for Hazardous Locations	UL 508 or UL 61010-1	NRAD2		
42.2.1.1	Recognized Power Supplies (including power supplies for electronic data processing equipment, general purpose, information technology equipment, information and communication technology equipment, medical and dental equipment, office appliances and business equipment, specialty, and telephone)	UL 1012 or UL 60950-1 or UL 62368-1	NWQG2 QQBK2, QQFU2, QQGQ2, QQHM2, QQHX2, QQIJ2, QQJE2, QQJQ2		<p>a) any part that complies with the requirements in 42.2.2 and 42.2.3, and when specified in column “EP”, provided with external overcurrent protection not exceeding rating specified on Recognized Component information page the UL Product iQ;</p> <p>b) other applications must be procedure described.</p> <p>c) only when marked as a limited power source (LPS) is the output supplying a limited power (limited energy) circuit</p>

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42.2.1.1	Listed General Purpose Power supplies	UL 1012	QQFU		
42.2.1.1	Listed Information Technology Equipment Power supplies and Listed Information and Communication Technology Equipment power supplies	UL 1012, UL 60950-1 or UL 62368-1	QQGQ, QQJQ		Any power supply that has been evaluated for use at 40 degree C is able to be used for loading to 100 percent of the ampere rating of the power supply. Only when marked as a limited power source (LPS) is the output supplying a limited power (limited energy) circuit
42.2.1.1	Listed Power Supplies for Hazardous Locations	UL 508 or UL 61010-1	NRAD		
42.2.1.1	Recognized Power Supplies for Hazardous Locations	UL 508 or UL 61010-1	NRAD2		
42.2.1.1	Listed Energy Management Equipment	UL 916	PAZX		
42.2.1.1	Recognized Energy Management Equipment	UL 916	PAZX2		
42.2.1.2	Recognized General Purpose Power supplies	UL 1012	QQFU2		Any bridge rectifier that complies with the requirements in 42.2.2 and 42.2.3.

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42.2.1.2	Recognized Specialty Power supplies	UL 1012	QQIJ2		Any bridge rectifier that complies with the requirements in 42.2.2 and 42.2.3.
42.2.1.2	Recognized Power Switching Semiconductors	UL 1557	QQQX2		Procedure described only.
42.3.1	Listed Industrial control equipment with isolated secondary outputs	UL 508, <u>UL60947-1</u>	NKCR, NKPZ, NLDX, NMFT, NRNT		Connections to low voltage terminals of components with integral isolating type power supply comply with 42.3.1.
		UL 508 or UL 61010-1 and UL 61010-2- 201	NMTR, NRAQ		Connections to low voltage terminals of components with integral isolating type power supply comply with 42.3.1.
42.3.1	Recognized Industrial control equipment with isolated secondary outputs	UL 508, <u>UL 60947-4-1</u>	NKCR2, NKPZ2, NLDX2, NMFT2, NRNT2		Connections to low voltage terminals of components with integral isolating type power supply comply with 42.3.1.
		UL 508 or UL 61010-1 and UL 61010-2- 201	NMTR2, NRAQ2		Connections to low voltage terminals of components with integral isolating type power supply comply with 42.3.1.
42.3.1	Listed Industrial control equipment for Hazardous Locations with isolated secondary outputs	UL 508 or UL 61010-1	NRAD		Connections to low voltage terminals of components with integral isolating type power supply comply with 42.3.1.

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42.3.1	Recognized Industrial control equipment for Hazardous Locations with isolated secondary outputs	UL 508 or UL 61010-1	NRAD		Connections to low voltage terminals of components with integral isolating type power supply comply with 42.3.1.
42.3.1	Listed Power conversion equipment with isolated secondary outputs	UL 61800-5-1	NMMS		Connections to low voltage terminals of components with integral isolating type power supply comply with 42.3.1.
42.3.1	Recognized Power conversion equipment with isolated secondary outputs	UL508C, UL 61800-5-1	NMMS2		Connections to low voltage terminals of components with integral isolating type power supply comply with 42.3.1.
42.3.1	Listed Energy Management Equipment	UL 916	PAZX		
42.3.1	Recognized Energy Management Equipment	UL 916	PAZX2		
Section 43 - Low-voltage limited-energy sources meeting component selection requirements					
43.1.1(d)	Listed Batteries	UL 1989	BAZR		
43.1.1(d)	Recognized Batteries	UL 1989	BAZR2		
43.1.1(e)	Recognized Lithium batteries	UL 1642	BBCV2		
43.1.1(f)	Recognized Current transformer	IEEE C57.13 and IEEE C57.13.2	XODW2		

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43.1.1	Recognized Potential transformer	IEEE C57.13 and IEEE C57.13.2	XODW2		Procedure described only
Section 44 - Class 2 sources meeting component selection requirements					
44.1.1	Listed Class 2 transformer	UL 5085-1 and UL 5085-3	XOKV		
44.1.1	Recognized Class 2 transformer	UL 5085-1 and UL 5085-3	XOKV2		Product identified on Recognition information page UL Product iQ as not inherently limited Class 2 transformer requires additional overcurrent protection
44.1.2	Listed Direct Plug-in Class 2 power unit	UL 1310	EPBU		
44.1.2	Recognized Direct Plug-in Class 2 power unit	UL 1310	EPBU2		
44.1.4	Listed Information technology equipment and Listed information and communication technology equipment	UL 60950-1 or UL 62368-1	AZOT, NWGQ		Only when marked for limited-energy circuit use. Output connectors/circuits of Listed ITE and Listed ICT equipment are assumed Limited Power Sources (LPS) supplying a limited power (limited energy) circuit unless marked otherwise.
44.1.4	Recognized Information	UL 60950-1	AZOT2, NWGQ2		Procedure described only

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	technology equipment and Recognized Information and communication technology equipment	or UL 62368-1			
44.1.4	Listed Information technology equipment power supplies, and Listed Information and communication technology equipment power supplies	UL 60950-1 or UL 62368-1	QQGQ, QQJQ		Only when marked as a limited power source (LPS) is the output supplying a limited power (limited energy) circuit
44.1.4	Recognized Information technology equipment power supplies and Recognized Information and communication technology equipment power supplies	UL 60950-1 or UL 62368-1	QQGQ2, QQJQ2		Procedure described only
Section 45 - Control switching devices meeting component selection requirements					
45.1.1(a)	Listed Auxiliary devices	UL 508, UL 60947-5-1	NKCR		
45.1.1(a)	Recognized Auxiliary devices	UL 508, UL 60947-5-1	NKCR2		Any part Recognized for industrial use. Recognized for non-industrial use

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					requires procedure description.
45.1.1(a)	Listed Magnetic motor controllers	UL 508, UL 60947-4-1	NLDX		
45.1.1(a)	Recognized Magnetic motor controllers	UL 508, UL 60947-4-1	NLDX2		Any part Recognized for industrial use. Recognized for non-industrial use requires procedure description.
45.1.1(a)	Listed Auxiliary Devices for Hazardous Locations	UL 508	NOIV, NWFN		Any open type switch component
45.1.1(a)	Recognized Auxiliary Devices for Hazardous Locations	UL 508	NOIV2, NWFN2		Any open type switch component
45.1.1(a)	Listed Programmable Controllers for Hazardous Locations	UL 508 or UL 61010-1 and UL 61010-2-201	NRAG		
45.1.1(a)	Recognized Programmable Controllers for Hazardous Locations	UL 508 or UL 61010-1 and UL 61010-2-201	NRAG2		
45.1.1(a)	Listed Programmable controllers	UL 508 or UL 61010-1 and UL 61010-2-201	NRAQ		

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45.1.1(a)	Recognized Programmable controllers	UL 508 or UL 61010-1 and UL 61010-2-201	NRAQ2		
45.1.1(a)	Listed Industrial control switches	UL 508	NRNT		
45.1.1(a)	Recognized Industrial control switches	UL 508	NRNT2		Any part Recognized for industrial use. Recognized for non-industrial use requires procedure description.
45.1.1(a)	Recognized Relay sockets	UL 498	SWIV2		
45.1.1(a)	Listed Relays, Electromechanical Elementary	UL 61810-1	NRLC		
45.1.1(a)	Recognized Relays, Electromechanical Elementary	UL 61810-1	NRLC2		Any part Recognized for industrial use. Parts intended for non-industrial use requires procedure description.
45.1.1(b)	Recognized Snap switches	UL 61058-1	WOYR2		Same polarity only for multiple-pole switches
45.1.1(c)	Listed Clock-operated switches	UL 917	WGZR		Products intended for non-industrial use shall not be used.
45.1.1(c)	Recognized Clock-operated switches	UL 917	WGZR2		Products identified for non-industrial use on Recognition information

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					pageProduct iQ shall not be used.
45.1.1(d)	Listed Temperature controller	UL 873** or UL 60730-1	XAPX		
45.1.1(d)	Recognized Temperature controller	UL 873** or UL 60730-1	XAPX2		Products shall be used in accordance with limitations specified on Recognition information pageProduct iQ
45.1.1(e)	Listed Process controller	UL 508	QUXY		
45.1.1(e)	Recognized Process controller	UL 508	QUXY2		Products shall be used in accordance with notes included on Recognition information pageProduct iQ
45.1.1(e)	Listed Process controller	UL 61010-1	QUYX		
45.1.1(e)	Recognized Process controller	UL 61010-1	QUYX2		Products shall be used in accordance with notes included on Recognition information pageProduct iQ
45.1.1(e)	Listed Electrical Equipment for Measurement, Control, and Laboratory Use	UL 61010-1	QUYX		
45.1.1(e)	Recognized Electrical Equipment for Measurement, Control, and Laboratory Use	UL 61010-1	QUYX2		Products shall be used in accordance with notes included on Recognition information pageProduct iQ

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45.1.1(e)	Listed Process Control Equipment	UL 61010-1	QUYX		
45.1.1(e)	Recognized Process Control Equipment	UL 61010-1	QUYX2		Products shall be used in accordance with notes included on Recognition information page Product iQ
45.1.1(f)	Listed Emergency Stop Devices	UL 60947-5-5	NISD		
45.1.1(f)	Recognized Emergency Stop Devices	UL 60947-5-5	NISD2		
45.1.1	Listed Energy Management Equipment	UL 916	PAZX		
45.1.1	Recognized Energy Management Equipment	UL 916	PAZX2		
Section 46 - Control circuit loads meeting component selection requirements					
46.1.1(a)	Listed Auxiliary Devices	UL 508, UL 60947-5-1	NKCR		Any pilot light
46.1.1(a)	Recognized Auxiliary Devices	UL 508, UL 60947-5-1	NKCR2		Any pilot light
46.1.1(a)	Listed Auxiliary Devices for Hazardous Locations	UL 508	NOIV, NWFN		Any open type pilot light
46.1.1(a)	Recognized Auxiliary Devices	UL 508	NOIV2, NWFN2		Any open type pilot light

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	for Hazardous Locations				
46.1.1(a)	Recognized Miscellaneous lampholder	UL 496	OOIX2		Any product identified as a pilot light in Recognized component information page Product iQ
46.1.1(b)	Listed Electrically Operated Valves	UL 429	YIOZ		
46.1.1(b)	Recognized Electrically Operated Valves	UL 429	YIOZ2		
46.1.1(c)	Recognized Solenoids	UL 906	VAIU2		
46.1.1(d)	Recognized Hourmeter, synchronous motor	UL 863	XHNR2		Products intended for non-industrial use shall not be used.
46.1.1(e)	Recognized Counters	UL 863	ELIY2		
46.1.1(f)	Listed Audible signal appliances	UL 464	UCST		
46.1.1(f)	Recognized Audible signal appliances	UL 464	UCST2		
Section 47 - Surge control devices meeting component selection requirements					
47.1.1	Recognized Surge Protective Devices	UL 1449	VZCA2		SPDs that are outside the guidelines of Table 2 must be procedure described.
47.1.1	Listed Surge Protective Devices	UL 1449	VZCA		Type 1, 2 or 3. SPDs that are outside the guidelines of Table

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					2 must be procedure described
47.1.3	Listed Isolated Loop Circuit Protectors	UL 497B	QVGQ		
47.1.3	Recognized Isolated Loop Circuit Protectors	UL 497B	QVGQ2		Procedure described
47.1.4	Recognized Electromagnetic interference filters	UL 1283	FOKY2		
47.1.4	Recognized filters	UL 508C, UL 61800-5-1	NMMS2		Any Recognized filter used within its ratings
47.1.4	Recognized Passive Filter Units for Electromagnetic Interference Suppression	UL 60939-3	FOKR2		Any Recognized filter used within its ratings
47.1.5	Recognized Across-the-line capacitors	UL 60384-14	FOWX2		Any axial leaded capacitor or varistor when mounted with spacings
Section 47.3 - UPS (Uninterruptible Power-supply) equipment meeting component selection requirements					
47.3	Listed Uninterruptible Power supplies	UL 1778	YEDU		Any that complies with the requirements in 47.3.1
47.3	Recognized Uninterruptible Power supplies	UL 1778	YEDU2		Procedure described or compliance with the following is verified

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					<ol style="list-style-type: none"> 1. Suitable for use in a minimum 40C ambient 2. Suitable for use in a pollution degree 3 environment 3. Suitable for installation in overvoltage category III applications 3.4. <u>Complies with the requirements in 47.3.1</u>
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Section 47 – Miscellaneous devices meeting component selection requirements

47	Listed Energy Usage Monitoring Systems	UL 916, UL 61010-1, UL 61010-2-030	FTRZ		For other than Type 1 enclosures, components mounted through an opening in an enclosure shall comply with Table 19.2
47	Recognized Energy Usage Monitoring Systems	UL 916, UL 61010-1, UL 61010-2-030	FTRZ2		Components mounted through an opening in an enclosure shall be Procedure described unless compliance with Table 19.2 can be verified
47	Listed Measuring, Testing and Signal-generating Equipment	UL 61010-1, UL 61010-031	PICQ		For other than Type 1 enclosures, components mounted through an opening in an enclosure shall

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					comply with Table 19.2
47	Recognized Measuring, Testing and Signal-generating Equipment	UL 61010-1, UL 61010-031	PICQ2		Components mounted through an opening in an enclosure shall be Procedure described unless compliance with Table 19.2 can be verified
47	Listed Energy Monitoring Equipment	UL 2808	XOBA		For other than Type 1 enclosures, components mounted through an opening in an enclosure shall comply with Table 19.2
47	Listed Communications-, Audio/Video-, Data- and Other Signaling-circuit Accessories	UL 1977, UL 1863	DUXR		For use in low-voltage limited energy or Class 2 circuits only
47	Recognized Communications-, Audio/Video-, Data- and Other Signaling-circuit Accessories	UL 1977, UL 1863	DUXR2		For use in low-voltage limited energy or Class 2 circuits only
Section 63 - Enclosures					
63.2.1		UL 50 / UL 50E	FTTA2		For other than Type 1 enclosures, components shall be described in Procedure

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63.4	Enclosure Openings	UL 50 / UL 50E	FTTA		Component installed in accordance with manufacturer's installation instructions and used within its marked ratings
		UL 50 / UL 50E	FTTA2		For other than Type 1 enclosures, components shall be described in Procedure
63.5	Ventilation Openings	UL 50 / UL 50E	FTTA		Component installed in accordance with manufacturer's installation instructions and used within its marked ratings
63.6	Observation Windows	UL 50 / UL 50E	FTTA		Component installed in accordance with manufacturer's installation instructions and used within its marked ratings.
Section 66.4 - Enclosures meeting component selection requirements <u>Field wiring – power circuits</u>					
66.4.6(a)	Listed Flexible cord	UL 62	ZJCZ		Any type that complies with 28.5.3
66.4.6(a)	Listed Portable Power Cable	UL 62	QPMU		
66.4.6(b)	Listed Attachment Plugs	UL 498	AXUT		

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66.4.6(b)	Listed Pin and Sleeve Plug	UL 1682	QLHN		Marking required to identify mating receptacle
66.4.6(b)	Listed Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery	UL 2237	PVVA		Any Listed assembly or fitting may be used within their marked ratings
66.4.6(b)	Recognized Multi-Point Interconnection Power Cable Assemblies for Industrial Machinery	UL 2237	PVVA2		<ol style="list-style-type: none"> 1. Any Recognized assembly or fitting may be used within their ratings as noted on the Recognition Information Page. Product iQ. 2. Recognized assemblies and fittings are not suitable for field wiring 3. Recognized assemblies and fittings suitable for making or breaking current under load must marked or identified for this application 4. All other applications of

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					assemblies and fittings not covered in 1-3 above shall be Procedure described
66.4.6(b)	Listed Cable Assemblies and Fittings for Industrial Control and Signal Distribution	UL 2238	CYJV		Any Listed assembly or fitting may be used within their marked ratings
66.4.6(b)	Recognized Cable Assemblies and Fittings for Industrial Control and Signal Distribution	UL 2238	CYJV2	1.	<ol style="list-style-type: none"> 2. Any Recognized assembly or fitting may be used within their ratings as noted on the Recognition Information Page. 3. Recognized assemblies and fittings are not suitable for field wiring 4. Recognized assemblies and fittings suitable for making or breaking current under load must marked or identified for this application

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					5. All other applications of assemblies and fittings not covered in 1-3 above shall be Procedure described
66.5 Internal wiring – power circuits					
66.5.3 Exception	Listed Circuit Breaker for 16 AWG and 18 AWG conductors	UL 489	DIVQ		Product marked for use with 16 AWG or 18 AWG conductors
66.5.3 Exception, 66.7.1	Listed Class CC Fuse	UL 248-1, UL 248-4	JDDZ		
66.5.3 Exception, 66.7.1	Listed Class CF Fuse	UL 248-1, UL 248-15	JDDZ		
66.5.3 Exception, 66.7.1	Listed Class J Fuse	UL 248-1, UL 248-8	JDDZ		
66.5.3 Exception, 66.7.1	Listed Class L Fuse	UL 248-1, UL 248-12	JDDZ		
66.5.3 Exception, 66.7.1	Listed Class RK1 or RK5 Fuse	UL 248-1, UL 248-12	JDDZ		
66.5.3 Exception, 66.7.1	Listed Class T Fuse	UL 248-1, UL 248-15	JDDZ		
66.8.3	Listed Robot Controller	UL 1740	TETZ		
66.8.3	Recognized Robot Controller	UL 1740	TETZ2		Procedure described only

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66.11.2	Listed Emergency Stop Devices	UL 60947-5-5	NISD		
66.11.2	Recognized Emergency Stop Devices	UL 60947-5-5	NISD2		
Service Equipment Use - components meeting specific selection requirements					
75.6.1	Listed Ground Fault Sensing and Relaying Equipment	UL 1053	KDAX		
75.6.1	Listed Circuit Breaker with Equipment Ground-fault Protection	UL 489, UL 1053	DIYA		
75.8.2	Listed Meter Socket	UL 414	PJYZ		
75.8.4	Surge Protective Devices	UL 1449	VZCA		Type 1 SPD Only.
Flame control panels - components meeting specific selection requirements					
82.1.1	Listed Primary safety controls	UL 372	MCCZ		
82.1.1	Recognized Primary safety controls	UL 372	MCCZ2		
82.1.2	Listed Ignition transformer	UL 506	XPZZ		
82.1.3	Listed Ignition cable	UL 814	ZJQX		
Air Conditioning and Refrigeration Panels - components meeting specific selection requirements					
90.4.1	Recognized Magnetic Definite Purpose Controller	UL 508	NLDX2		When marked with FLA / LRA rating for use with compressor loads

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90.4.1	Recognized Relays, Electromechanical Elementary	UL 61810-1	NRLC2		When identified as having FLA / LRA rating for use with compressor loads
90.4.2	Listed Power Conversion Equipment	UL508C, UL 61800-5-1	NMMS		
90.4.2	Recognized Power Conversion Equipment	UL508C, UL 61800-5-1	NMMS2		Recognized controller is usable only when procedure described
90.4.2	Listed Solid-state motor controller	UL 508	NMFT		
90.4.2	Recognized Solid-state motor controller	UL 508	NMFT2		Recognized controller is usable only when procedure described
Appendix B - components meeting specific selection requirements					
B.2.2.3	Listed Ground-fault circuit-interrupter	UL 943	KCXS		Class A type only.
B.2.2.3	Listed Circuit breaker/GFCI	UL 489 and UL 943	DKUY		Class A type only.
		** Compliance with the UL 60730-1, and/or the applicable Part 2 standard from the UL 60730 series fulfills these requirements.			

Table 2

Use of Surge Protective Devices

	Type of Surge Protective Device (SPD) - One port only^a:
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		Listed Type 1	Listed Type 2	Listed Type 3	R/C Type 4 Component Assembly	R/C Type 5
		R/C Type 1 Component Assembly	R/C Type 2 Component Assembly	R/C Type 3 Component Assembly	-	-
Location of SPD:						
Service Equipment Supply Side of Overcurrent Protection		W	Z	Z	Z	Z
Service Equipment Load Side of Overcurrent Protection		W	W	Z	Z	Z
Non-Service Equipment Feeder or Branch Circuits		W	W	W	Z	Z
Isolated Control Circuits		W	W	W	W	W
Ratings:						
Service Equipment Supply Side of Overcurrent Protection	V_b	X	Z	Z	Z	Z
	I_n^c	Y	Z	Z	Z	Z
Service Equipment Load Side of Overcurrent Protection	V_b	X	X	Z	Z	Z
	I_n^c	Y	10 kA	Z	Z	Z
	V_b	X	X	X	Z	Z

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Non-Service Equipment Feeder or Branch Circuits	I_n^c	y	y	y	z	z
Control Circuits	V_b	x	x	x	x	x
	I_n^c	y	y	y	3 kA	3 kA
NOTES:						
	1. A “w” indicates an allowable location for the SPD.					
	2. An “x” indicates a Normal Operating Voltage Rating is required as specified in footnote “b” below.					
	3. A “y” indicates a Nominal Discharge Current Rating as specified in footnote “c” below is not required.					
	4. A “z” indicates the SPD needs further evaluation to determine suitability and Procedure description is required.					
^a Two-Port SPD shall be Listed and comply with the ratings specified above for the intended application. In addition, it shall have an appropriate short circuit current rating (SCCR) rating.						
^b V - Normal Operating Voltage Rating - Operating Voltage and MCOV ratings shall be equal to or greater than the applied circuit Line-to-Line (full phase) voltage.						
^c I_n (NDC) - Nominal Discharge Current - Amount of peak current "forced" through the device during Surge Testing.						

Table 3

Use of Single and Multipole Connectors in Data, Signal, Control and Power Applications (ECBT2)

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Type of circuit	Direct Support Requirements (DSR)	Feeder circuit spacings	Branch circuit spacings	Control circuit spacings	Short Circuit Current Rating ² (SCCR)	Voltage and Current Ratings ³ suitable for the application	Environmental Enclosure Rating ⁴ (e.g. Type 12)
	Section 13	Table 10.2 ¹	Table 10.1 ¹	Table 10.1 ¹			
Feeder Circuit	X		-	-	X	Need to be verified	Need to be verified
Branch Circuit	X	-	X	-	X	Need to be verified	Need to be verified
Control Circuit	X	-	-	X	-	Need to be verified	Need to be verified
Low Voltage Limited Energy Circuit	-	-	-	-	-	-	Need to be verified

NOTE: An "x" indicates the requirement applies or the condition exists. A "-" indicates the requirement does not apply, or the condition does not exist.

¹ The spacings requirements are only applied if the connector has no voltage rating in which case the connector spacings shall support the voltage in the end-use application. For feeder circuits spacings shall comply with Table 10.2.

² Assumed maximum short circuit current rating of 10kA. Higher ratings are obtained by test.

³ If the connector does not have suitable voltage and/or current ratings, appropriate tests such as temperature and dielectric strength would be required to establish voltage and current ratings suitable for the end-use application.

⁴ If the connector is used outside of the panel (normally it is) it shall have a Type rating at least equivalent to the panel enclosure, otherwise, the panel enclosure will be derated based on the connector rating.

Requirements for Supplementary Protectors

Any Recognized Component (QVNU2) supplementary protector may be utilized for overcurrent protection in a control circuit without further evaluation provided the following conditions are met when determined from the tabulated values found in the

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supplementary protector's Recognition Information Page in UL Product iQ.

A. When on the secondary side of an isolated supply (transformer or power supply);

1. The device Type is designated (OC) overcurrent; and
2. The device's Use Group (UG) is designated "A", General Industrial; and
3. The device's terminals are wired (FW) in accordance with its designated coding as follows:
 - 0 - Suitable for factory wiring only
 - 1 - Line Terminals evaluated for field wiring
 - 2 - Load Terminals evaluated for field wiring
 - 3 - Line and load terminals evaluated for field wiring
4. The voltage does not exceed the device's maximum Voltage (V) rating; and
5. The amperage does not exceed the device's maximum Amperage (A) rating; and
6. When relied upon to provide overcurrent protection, the maximum Trip Curve (TC) percentage shall be multiplied by the device's ampere rating and the result is considered the rated overcurrent protection for use in determining compliance with UL 508A. Trip Curve ratings and the corresponding percentages are as follows:
 - 0 - Tripping current is less than 125% of amp rating
 - 1 - Tripping current is in the range of 125% to 135% of amp rating
 - 3 - Tripping current and time is standardized at 135% and at 200% of amp rating

B. When not in an isolated secondary circuit;

1. All provisions as indicated when on the secondary side of an isolated supply are met; and
2. The short-circuit-current rating of the device is code U2 (short-circuit tests were conducted without series overcurrent protection and recalibration was performed), or
3. The short-circuit-current rating of the device is code C2 (short-circuit tests were conducted with series overcurrent protection and recalibration was performed) and the line side branch circuit overcurrent protection is sized at no more than 400 percent of the amp rating of the protector.

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