1.0 Reference and Address			
Report Number	200041785UDI-ETL	Original Issued: 28-Nov-2024	Revised: 5-Dec-2024
Standard(s)	Industrial Control Panels [UL 508A:2018 Ed.3+R:28Jul2022] Industrial Control Panels and Assemblies [CSA C22.2#286:2023 Ed. 3]		
Entirely Replaces Report Number	200034303UDI-ETL		

Applicant	MATEC INDUSTRIES SRL	Manufacturer 1	**MATEC INDUSTRIES SRL**
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2.0 Product Description	
Product	Industrial Control Panels For General Use Industrial Control Panels For Industrial Machinery
Brand name	NA
Description	The products covered by this report include custom control panels that are of the "enclosed" type or "open" type. The equipment is intended for installation in ordinary locations, in accordance with the National Electrical Code, ANSI/NFPA 70 and the Canadian Electrical Code, CSA C22.1 (Canadian Electrical Code Part I). This equipment consists of assemblies of: a) two or more power circuit components (such as motor controllers, overload relays, fused disconnect switches and circuit breakers) b) two or more control circuit components (such as pushbuttons, pilot lights, selector switches, timers and control relays) or; c) a combination of power and control circuit components, with associated wiring, and terminals. These components are mounted on, or contained within, an enclosure, or are mounted on a sub-panel. Note: An industrial control panel does not include an evaluation of the controlled equipment such as motors, heaters, lighting, and other loads connected to power circuits. Unless specifically noted on the wiring diagram of the industrial control panel, an industrial control panel does not include equipment mounted remotely from the panel and connected via a wiring systems or equipment field installed on or within the industrial control panel.
Models	Custom Industrial Control Panels
Model Similarity	NA
Ratings	U.S.: 1000 Volts or less Canada: 1500 Volts or less
Other Ratings	Ambient temperature shall marked as 5°C - 40°C (104°F) maximum for U.S. Ambient temperature shall marked as 0°C - 40°C (104°F) maximum for CAN.

3.0 Product Photographs

Photo 1 - Representative view of a control panel (control panel may vary in size and components)



4.0 Critical Components

Photo #	Item no.[1]	Name	Manufacturer/ trademark[2]	Type / model[2]	Technical data and securement means	Mark(s) of conformity [3]
1	1	Control Panel	MATEC INDUSTRIES SPA	Various	All components within the control panel are Listed or Recognized as permitted by Section 6, Item 3, including the enclosure, except for Type 1 metal enclosures constructed in accordance with Sections 62 through 64 of UL 508A and components within a Class 2 circuit, Low Voltage Limited Energy circuit, or components protected by a GFCI pursuant to the requirements of Appendix B of UL 508A; and where the Class 2 circuit meets the limiting requirements outlined in Section 16-200 of the Canadian Electric Code, Part 1.	cETL cETLus ETLus

NOTES:

1) Not all item numbers are indicated (called out) in the photos, as their location is obvious.

2) “Various“ means any type, from any manufacturer that complies with the "Technical data and securement means" and meets the "Mark(s) of conformity" can be used.

3) Indicates specific marks to be verified, which assures the agreed level of surveillance for the component. "NR" - indicates Unlisted and only visual examination is necessary. "See 5.0" indicates Unlisted components or assemblies to be evaluated periodically refer to section 5.0 for details.

5.0 Critical Unlisted CEC Components

No Unlisted CEC components are used in this report.

6.0 Critical Features

Recognized Component - A component part, which has been previously evaluated by an accredited certification body with restrictions and must be evaluated as part of the basic product considering the restrictions as specified by the Conditions of Acceptability.

Listed Component - A component part, which has been previously Listed or Certified by an accredited Certification Organization with no restrictions and is used in the intended application within its ratings.

Unlisted Component - A part that has not been previously evaluated to the appropriate designated component standard.

Critical Features/Components - An essential part, material, subassembly, system, software, or accessory of a product that has a direct bearing on the product's conformance to applicable requirements of the product standard.

Construction Details - For specific construction details, see UL 508A the Standard for Industrial Control Panels, CSA C22.2#286 the Standard for Industrial Control Panels and Assemblies and the photographs and descriptions. The products covered by this report shall comply with the applicable construction and marking requirements of UL 508A, the Standard for Industrial Control Panels and CSA C22.2#286, the Standard for Industrial Control Panels and Assemblies. All dimensions are approximate unless specified as exact or within a tolerance.

In addition to the specific construction details described in this Report, the Standard for Industrial Control Panels UL 508A, and the Standard for Industrial Control Panels and Assemblies CSA C22.2#286, the following general requirements also apply.

All Clause references below are to UL 508A and CSA C22.2#286 (Ed. indicated in Section 1.0), unless otherwise noted.

1. **Manufacturer Trained Personnel** - A list of manufacturer trained personnel will be maintained in Section 8 of this report.

2. **Reference Standard** - A copy of the UL 508A and CSA C22.2#286 Standard(s) indicated in Section 1.0 are required to be controlled, maintained and available at every manufacturing location for inspection.

3. **Components** - All components used in the control panel meet the requirements outlined in the document titled: "Specific Requirements For Components Used In Industrial Control Panels (Formerly Supplement SA of UL508A)" and "Component Supplement for CSA C22.2#286 Guidance Document On How To Use Components Within Control Panels", which can be found at the following links:

   UL508A-SupplementSA

   Component Supplement for CSA C22#286.pdf

   and are:
   a) used as intended by the manufacturer of the component;
   b) 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) do not exceed their marked electrical and environmental ratings.

3a. **Type 1 Enclosures** - All Unlisted Type 1 enclosures are constructed in accordance with Sections 62, 63 and 64 of UL 508A.

6.0 Critical Features

3b. **Wiring Ferrules** - Ferrules are limited to factory installation. Any manufacturer's insulated or non-Insulated wiring ferrules are suitable for use in panels provided the following conditions are met:

a. Used for factory wiring only, power or control circuits,
b. Crimped with a tool recommended by the ferrule manufacturer before terminating in terminal blocks, wire connectors, or terminals of components such as contactors, disconnect switches, fuseholders, circuit breakers and the like,
c. Sized appropriately for the number of wires and wire size as recommended by the ferrule manufacturer,
d. Identified for use with fine stranded conductors when used with conductors more finely stranded than Class B and Class C stranding, and
e. Crimped to the wires such that the length of the uninsulated portion of the wires does not result in the reduction of electrical spacings below the distances required when the ferrule is installed.

As ferrules are an extension of a conductor, no short circuit current rating is required or assigned, provided that the requirements of 29.3.5A are met.

Ferrules are primarily for use with stranded conductors. However, they may be used with solid conductors if identified for such use.

4. **Supplementary Protectors** - A Recognized Supplementary Protector may be utilized for over-current protection in a control circuit without further evaluation provided the following conditions are met:

A. When the Supplementary Protector is on the secondary side of an isolated supply:
1. The device is designated over-current (OC);
2. The device's Use Group (UG) is designated as "A" (General Industrial);
3. The device's terminals are wired in accordance with it's designated coding (FW) 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 rating;
5. The amperage does not exceed the device's maximum amperage rating; and
6. When relied upon to provide over-current protection, the maximum Trip Curve (TC) percentage shall be multiplied by the device's ampere rating and the result is considered the rated over-current protection for use in determining compliance with UL 508A. Trip Curve ratings and the corresponding percentages are as follows:
0 - Trip current is less than 125% of amp rating or as described in Section 4 of this report
1 - Trip current is in the range of 125% to 135% of amp rating or as described in Section 4 of this report
2 - Trip current is more than 135% of amp rating. Manufacturer, Cat. No. and percentage shall be as described in Section 4 of this report"
3 - Tripping current and time is standardized at 135% and at 200% of amp rating. Cat. No. and percentage shall be as described in Section 4 of this report"
7. The supplementary protector has an Overload rating suitable for the application and voltage. The overload code designation and application are as follows:
"OL0" - Tested at 1.5 times amp rating for general use.
Application: Intended for general use, non-motor loads.
"OL1" - Tested at 6 times ac rating or 10 times dc rating
Application: Motor starting.

6.0 Critical Features

B. When the Supplementary Protector is not on the secondary side of an isolated supply:
1. All provisions as indicated when on the secondary side of an isolated supply are met; and
2. The Short-Circuit (SC) rating of the device indicated is designated as U2, which indicates short-circuit protection and recalibration was performed. A short-circuit rating of C2 is acceptable when the line side branch circuit protection is sized at no more than 400% of the amperage rating of the device, OR;
3. The Short Circuit (SC) rating of the supplementary protector is designated as U3 and has a minimum short circuit rating of 5kA (Canada)

C. When the supplementary protector is used as the primary protection of a control transformer all the provisions noted in Items 1 through 8 must be met, and meet the following:
1. The Short-Circuit (SC) rating designation of the protector is U3, which indicates that the short-circuit test was conducted without series overcurrent protection and the protector has proven to be suitable for further use after the short-circuit test; recalibration, dielectric strength and voltage withstand tests were performed after the short-circuit testing.
2. The Trip Current designation of the protector is TC3.
3. The Overload designation of the protector is OL1.
4. The protector has a short circuit current rating equal to or greater than the short circuit rating of the control panel or assembly.

D. When the supplementary protector is required to isolate a load from a source for personal protection during maintenance, then the all the provisions noted in Items 1 through 8 above must be met, and meet the following:
1. The Short-Circuit (SC) rating designation of the protector is U3, which indicates that the short-circuit test was conducted without series overcurrent protection and the protector has proven to be suitable for further use after the short-circuit test; recalibration, dielectric strength and voltage withstand tests were performed after the short-circuit testing; or
2. The Short-Circuit (SC) rating designation of the protector is U1a, which indicates that the short-circuit test was conducted without series overcurrent protection and the protector was permanently open after the short-circuit test; and dielectric strength and voltage withstand tests were performed after the short-circuit testing.

5. **Grounding and Bonding** - Grounding and bonding of control panels and assemblies shall comply with the requirements outlined in:

   Clause 14 of UL 508A
   Section 4.3 of C22.2 No. 286

6. **Electrical Spacings** - Electrical spacings shall comply with the requirements outlined in Clause 10 (UL 508A) and Section 4.14 (C22.2 No. 286) of the Standards.

7. **Factory Markings** - If the report includes more than one Manufacturer Location, each product is to be additionally provided with markings that indicate the specific Manufacturing location. This marking can be in a coded format available for inspection.

6.0 Critical Features

8. **Nameplate Marking** - The control panel shall be permanently marked with the following on a single nameplate:

a) The Applicant name, trademark, or other descriptive marking;
b) The following electrical ratings:
i) rated nominal voltage, Vrms or Vdc;
ii) frequency in Hz;
iii) full load ampacity in Amps;
iv) short circuit current rating in kA and Vrms, see required marking below;
c) Enclosure type rating
d) The wording "Industrial control panel" or Industrial control panel assembly", as applicable. (Canada)
e) Month and year of manufacture (Canada)
f) 2-wire, 3-wire, or 4-Wire (Canada)

The industrial control panel shall be permanently marked in a readily visible location with the following text or equivalent:

"SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN ____ RMS SYMMETRICAL AMPERES, ____ V MAXIMUM"

For products bearing the cETL or cETLus mark, the following French text is required or equivalent:

"CONVIENT À L'UTILISATION DANS UN CIRCUIT CAPABLE DE LIVRER UN COURANT RMS SYMÉTRIQUE D'AU PLUS ____ A, À UNE TENSION MAXIMALE DE ____ V"

Open type control panels are provided with the following label: "Open Industrial Control Panel." Enclosed type control panels are provided with the following label: "Enclosed Industrial Control Panel."

9. **Industrial Control Panels with warning and/or cautionary markings:**

Clause 55.2:
A cautionary marking shall be prefixed with the word "CAUTION" and/or "ATTENTION"; as applicable, in letters not less than 1/8 inch (3.2 mm) high. The remaining letters of such marking, unless otherwise specified, shall not be less than 1/16 inch (1.6 mm) high.

For products bearing the cETL or cETLus mark, the French cautionary marking shall be prefixed with the word "PRUDENCE" or "AVERTISSEMENT," as applicable.

6.0 Critical Features

10. **Industrial Control Panels for provided with more than one supply source:**

Clause 55.4
An industrial control panel intended to be provided with more than one supply source such that more than one disconnect switch is required to disconnect all power within the control panel shall be marked with the word "CAUTION" or "WARNING" and the following or equivalent: "Risk of Electric Shock – More than one disconnect switch may be required to de-energize the equipment before servicing." A risk assessment shall be performed to justify if the word "WARNING" or "CAUTION" shall be used.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the word: "PRUDENCE" and the following or equivalent "Risque de choc électrique - Plus d'un sectionneur peut être requis afin de mettre hors tension le matériel avant l'entretien."

Clause 4.10.10, 4.10.11 and 5.24 (C22.2 No. 286):
Control panels with multiple disconnecting means shall be marked with the following or equivalent text:

WARNING: MORE THAN ONE LIVE CIRCUIT. SEE DIAGRAM

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

AVERTISSEMENT : IL Y A PLUS D'UN CIRCUIT SOUS TENSION. VOIR LE SCHÉMA

11. **Control Panel Not Provided With Disconnect Means:**

When the required disconnecting means for an incoming supply circuit is omitted, then the control panel shall be marked with the following or equivalent English and French text:

"WARNING: EXTERNAL MAIN DISCONNECT MUST BE PROVIDED"

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"AVERTISSEMENT : UN SECTIONNEUR D'ARRIVÉE EXTERNE DOIT ÊTRE FOURNI"

12. **Floor Mounted Equipment With Bottom Openings :**

Clause 4.2.2.11 and 5.4 (Canada):
Floor mounted control panels with bottom openings that do not comply with Clause 4.2.2.10 shall be marked with following English and French text:

"WARNING: WHEN MOUNTING ON OR OVER A COMBUSTIBLE SURFACE, A FLOOR PLATE OF AT LEAST 1.43 mm GALVANIZED OR 1.6 mm UNCOATED STEEL EXTENDING AT LEAST 150 mm BEYOND THE EQUIPMENT ON ALL SIDES MUST BE INSTALLED."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"AVERTISSEMENT: LORSQUE L'ÉQUIPEMENT EST INSTALLÉ SUR OU AU DESSUS D'UNE SURFACE COMBUSTIBLE, CELLE-CI DOIT ÊTRE RECOUVERTE D'UNE PLAQUE DE PLANCHER EN ACIER GALVANISÉ D'AU MOINS 1,43 mm OU D'UNE PLAQUE DE PLANCHER EN ACIER NU D'AU MOINS 1,6 mm QUI DÉPASSE L'ÉQUIPEMENT D'AU MOINS 150 mm DE TOUS LES CÔTÉS"

6.0 Critical Features

13. **Industrial Control Panels with enclosures intended for field assembly of the bonding means in accordance with 24.1(b):**

Clause 55.5:
The marking required for enclosures intended for field assembly of the bonding means in accordance with 24.1(b) shall be located where visible during installation, such as inside the cover, and consist of:

The word "CAUTION" and the following or equivalent, "Bonding between conduit connection is not automatic and must be provided as a part of the installation;"

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"ATTENTION : IL DOIT Y AVOIR CONTINUITÉ DES MASSES ENTRE CONDUITS"

OR;

"CAUTION" and the following or equivalent, "Nonmetallic enclosure does not provide grounding between conduit connections. Use grounding bushings and jumper wires."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"ATTENTION: Le boîtier non métallique ne fournit pas de mise à la terre entre les connexions des conduits. Utilisez des traversées de mise à la terre et des câbles volants"

14. **Industrial control panel provided with an instantaneous trip circuit breaker:**

Clause 55.6:
An industrial control panel provided with an instantaneous trip circuit breaker used as branch circuit protection for a combination motor controller shall be marked:

a) With the word "WARNING" and the following or the equivalent: "To maintain overcurrent, short-circuit, and ground-fault protection, the manufacturer’s instructions for selecting current elements and setting the instantaneous-trip circuit breaker must be followed."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

AVERTISSEMENT : LES DIRECTIVES DU FABRICANT CONCERNANT LE CHOIX DES DOIVENT ÊTRE SUIVIES; ÉLÉMENTS DE COURANT ET LE RÉGLAGE DES DISJONCTEURS

b) With the word "WARNING" and the following or the equivalent: "Tripping of the instantaneous-trip circuit breaker is an indication that a fault current has been interrupted. Current-carrying components of the magnetic motor controller should be examined and replaced if damaged to reduce the risk of fire or electric shock. If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

AVERTISSEMENT : SI LE DISJONCTEUR SE DÉCLENCHE, LES COMPOSANTES DU CONTRÔLEUR QUI SONT PORTEUSES DE COURANT DEVRAIENT ÊTRE EXAMINÉES ET REMPLACÉES SI ELLES SONT ENDOMMAGÉES.

6.0 Critical Features

15. **Specific Rating Or Type of Branch Circuit Protector (Canada):**

Control panels that contain components marked for use with a specific rating or type of branch circuit protector shall be marked in a readily visible location with the following text:

"SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN ____ RMS SYMMETRICAL AMPERES, ____ V MAXIMUM, WHEN PROTECTED BY ___ (B) ___ WITH A MAXIMUM RATING OF ___ (C) ___."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"CONVIENT À L'UTILISATION DANS UN CIRCUIT CAPABLE DE LIVRER UN COURANT RMS SYMÉTRIQUE D'AU PLUS ____ A, À UNE TENSION MAXIMALE DE ____ V, À CONDITION QUE LE CIRCUIT SOIT PROTÉGÉ PAR ___ (B) ___ DONT LA CAPACITÉ NOMINALE EST DE ___ (C) ___"

a) (B) represents the type of overcurrent protective devices, either "fuses" or "a circuit breaker";
b) (C) represents the maximum ampere rating of the overcurrent protective device specified by the manufacturer.

6.0 Critical Features

15 **Industrial control panel provided with a self-protected combination motor controller:**

a. Clause 55.7 An industrial control panel provided with a self-protected combination motor controller shall be marked:

a) With the word "WARNING" and the following or the equivalent: "To maintain overcurrent, short-circuit, and ground-fault protection, the manufacturer's instructions for selection of overload and short circuit protection must be followed to reduce the risk of fire or electric shock."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"AVERTISSEMENT: Pour maintenir la protection contre les surintensités, les courts-circuits et les défauts à la terre, les instructions du fabricant pour la sélection de la protection contre les surcharges et les courts-circuits doivent être suivies afin de réduire le risque d'incendie ou de choc électrique"

b) With the word "WARNING" and the following or the equivalent: "If an overload or a fault current interruption occurs, circuits must be checked to determine the cause of the interruption. If a fault condition exists, the current-carrying components should be examined and replaced if damaged, and the integral current sensors must be replaced to reduce the risk of fire or electric shock."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

AVERTISSEMENT: En cas de surcharge ou d'interruption de courant de défaut, les circuits doivent être vérifiés pour déterminer la cause de l'interruption. En cas de défaut, les composants porteurs de courant doivent être examinés et remplacés s'ils sont endommagés, et les capteurs de courant intégrés doivent être remplacés pour réduire le risque d'incendie ou de choc électrique

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following English and French text:
a) COMBINATION MOTOR CONTROLLER; and
b) SHORT-CIRCUIT CURRENT RATING, ___ A RMS SYMMETRICAL, ___ V MAXIMUM
AND;
a) ENSEMBLE MOTEUR CONTRÔLEUR
b) COURANT RMS SYMÉTRIQUE DE COURT-CIRCUIT NOMINAL DE ___ A, À UNE TENSION MAXIMALE DE ___ V.

16. **Industrial control panel provided with ground fault protection:**

Clause 77.5.3:
In equipment with ground-fault protection, the part of the neutral bus for load termination shall be marked "WARNING – Do not connect grounding conductors to these or any other neutral terminals; to do so will defeat ground-fault protection." The marking shall be located on or adjacent to the portion of the grounded service conductor for load terminals.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"AVERTISSEMENT - Ne connectez pas de conducteurs de mise à la terre à ces bornes ou à toute autre borne neutre; cela annule la protection contre les défauts à la terre"

6.0 Critical Features

17. **An industrial control panel with a short circuit current rating based on the high fault short circuit current ratings of one or more components as specified in SB4.2.3 shall be provided with the following additional markings, as applicable:**

Clause SB5.2.1:
An industrial control panel with a short circuit current rating based on the high fault short circuit current ratings of one or more components as specified in SB4.2.3 shall be marked with the word "WARNING" and the following statement: "Risk of Fire or Electric Shock – The opening of the branch-circuit protective device may be an indication that a fault current has been interrupted. All current-carrying parts and other components protected by this device should be examined and replaced if damaged. If burnout of a current element of an overload relay occurs, the complete overload relay must be replaced."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"AVERTISSEMENT: Risque d'incendie ou d'électrocution - L'ouverture du dispositif de protection du circuit de dérivation peut indiquer qu'un courant de défaut a été interrompu. Toutes les pièces sous tension et autres composants protégés par cet appareil doivent être examinés et remplacés s'ils sont endommagés. En cas de rupture d'un élément de courant d'un relais de surcharge, le relais de surcharge complet doit être remplacé."

18. **Enclosures Constructed pursuant to clauses 62 through 64 shall be provided with the following additional markings, as applicable:**

Clause 64.1:
An enclosure that complies with the requirements in Section 62, General, and Section 63, Construction, shall be marked with the manufacturer’s name and "Type 1 Enclosure."

Clause 64.2:
An enclosure that is not provided with a door shall be marked "Not suitable for housing renewable overload protective devices."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Ne convient pas pour le logement de dispositifs de protection contre les surcharges renouvelables."

19. **If manufacturer is authorized to build Industrial Control Panels for Industrial Machinery per Section 2 of this report, then the Industrial Control Panel for Industrial Machinery shall include the following additional markings, as applicable:**

Clause 66.2.2:
All terminals for power circuits, control circuits and control circuits supplied from external voltage, shall be arranged such that the terminals of each circuit are grouped together and are readily identified from one another by means such as physical separation, barriers or color coding.

Clause 66.5.1.1:
All current carrying conductors shall be identified at each termination by letter(s), or number(s), or color (s) or a combination thereof corresponding with the wiring diagrams provided with the industrial control panel. Where colors are used, a table identifying the color with the appropriate circuit or location shall be marked inside the door of the control panel or on the wiring diagram

Clause 67.1.1:
In addition to the information in 52.1, the nameplate shall include "industrial control panel for industrial machinery", and the ampere rating of the largest heater load.

6.0 Critical Features

Clause 67.1.2:
When provided with main overcurrent protection, the nameplate shall include "short circuit current rating of the protective device" in amperes.

Clause 67.1.3:
When the main overcurrent protection in the panel is intended to provide protection for the supply conductors and the machine, the panel shall be marked “Supply conductor and machine overcurrent protection provided at main supply terminals.”

Clause 67.2.1:
Each control device shall be identified as to its function by a legend plate placed next to the device.

Clause 67.3.1:
All components shall be identified with a designation that corresponds to its designation on the schematic wiring diagram.

Clause 67.3.2:
The output connections for a robot manipulator arm shall be marked to identify the manufacturer name and model number of the manipulator arm that complies with 66.8.3.

Clause 67.4.1:
An enclosure that does not clearly contain electrical parts shall be marked, “CAUTION – High Voltage – ___V”, or with a black lightning flash on a yellow background within a black triangle as in Figure 67.1, or an equivalent marking.



For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"ATTENTION - Haute Tension - ____V"

Exception: Equipment provided with external electrical devices such as disconnect handles and operator controls are not required to comply with this requirement.

Clause 67.4.2
An industrial control panel that is disconnected by an attachment plug and constructed as in 66.1.3.2 shall be marked on the outside of the door or cover with “CAUTION – Disconnect power before opening enclosure”, or the equivalent.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"ATTENTION - Débranchez l'alimentation avant d'ouvrir le boîtier"

6.0 Critical Features

Clause 67.4.3
An industrial control panel that is disconnected by a remote disconnecting means and constructed as in 66.1.3.2 shall be marked on the outside of the door or cover with “CAUTION – Disconnect power before opening enclosure. Close the enclosure before restoring power”, or the equivalent.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"ATTENTION - Débranchez l'alimentation avant d'ouvrir le boîtier. Fermez le boîtier avant de rétablir l'alimentation"

20. **If manufacturer is authorized to build Industrial Control Panels For Crane And Hoist Control per Section 2 of this report, then the Industrial Control Panel For Crane And Hoist Control shall include the following additional markings, as applicable:**

Clause 71.1:
The nameplate rating of an industrial control panel for crane control shall include the longest short time duty rating of all short time duty motors controlled.

Clause 71.2:
The load ratings of a short time duty motor shall include the short time duty rating.

Clause 72.1:
The nameplate shall include Crane Control Panel or Hoist Control Panel.

Clause 72.2:
The field wiring terminals of a power circuit including a short time duty motor shall be marked to use 75°C (167°F) conductors only.

21. **If manufacturer is authorized to build Industrial Control Panels For Service Equipment Use per Section 2 of this report, then the Industrial Control Panel For Service Equipment Use shall include the following additional markings, as applicable:**

Clause 76.1:
An industrial control panel intended for use on a supply circuit involving two different potentials, such as 120/240 volts, 3-wire, or 208Y/120 volts, 3-phase, 4-wire, shall have a suitable combination voltage rating as indicated in 76.2.

Clause 76.2:
The requirement in 76.1 is in regard to the combination rating of an industrial control panel that is intended for use only on circuits such as:
a) 120/240 volt, single phase, 3-wire, ac, with grounded neutral;
b) 125/250 volts, 3-wire, dc, with grounded neutral;
c) 208Y/120 volt, 3-wire, ac (from 3-phase, 4-wire network);
d) 480Y/277 volt, 3-wire, ac (from 3-phase, 4-wire network);
e) 208Y/120 volt, 3-phase, 4-wire;
f) 240/120 volt, 3-phase, 4-wire, delta; or
g) 480Y/277 volt, 3-phase, 4-wire.

Clause 76.3:
An industrial control panel for service equipment use shall be provided with a short circuit current rating for each input that complies with the requirements in Supplement SB.

6.0 Critical Features

Clause 77.1.1:
Equipment having a neutral that is factory bonded to the enclosure and that is capable of accommodating not more than six main disconnecting means shall be marked "Suitable only for use as service equipment."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Convient uniquement pour une utilisation comme équipement de service"

Clause 77.1.2:
Equipment that has the neutral bonded at the factory by a removable bonding means shall be marked "Bonded neutral, remove bonding means for test purposes only."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Neutre lié, retirer les moyens de liaison à des fins de test uniquement"

Clause 77.2.1:
Equipment having a neutral insulated from the enclosure, intended for use as service equipment, and that accommodates not more than six main disconnecting means shall be marked "Suitable for use as service equipment."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Convient pour une utilisation comme équipement de service"

Clause 77.3.1:
The markings specified in 77.1 and 77.2 shall be an integral part of the manufacturer’s nameplate marking containing the manufacturer’s name or trademark as specified in 52.1.

Clause 77.4.1:
Each service disconnecting means for ungrounded conductors shall be marked "Service disconnect" as specified in 77.4.2 and 77.4.3.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Déconnexion du service"

Exception No. 1: Several adjacent service disconnects are able to be identified by the single marking "Service disconnects" together with an indication as to which switch or circuit breaker handles are the service disconnects.

Exception No. 2: A disconnect means provided for the control circuit of a ground-fault protection system is not required to be so marked.

Clause 77.4.2:
For equipment marked as "Suitable only for use as service equipment," the marking or indication identifying a service disconnecting switch or circuit breaker required in 77.4.1 is to appear on or adjacent to the switch or circuit breaker handles where visible without removing a trim or dead front.

6.0 Critical Features

Clause 77.4.3:
When the equipment is marked "Suitable for use as service equipment," the marking "Service disconnect" shall be provided in the form of pressure sensitive labels in an envelope, or on a card, with instructions to apply near the disconnect handles when the equipment is used as service equipment.

Clause 77.5.1:
When ground-fault protection is provided, a marking shall be provided to indicate the circuit (main, feeder, or branch) that is so protected. The marking shall be on the ground-fault sensing or relaying equipment and shall be visible from the front of the equipment with a cover removed, or a separate marking visible from the front of the equipment with a cover removed (such as on a wiring diagram) shall be provided.

Clause 77.5.2:
When a transformer providing control voltage for ground-fault protection is connected to the line side of the main disconnect, this disconnect is able to be identified as the "main" and the service equipment shall be marked adjacent to the main disconnect "DANGER – This main does not disconnect control and instrument circuits."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"DANGER - Ce principal ne déconnecte pas les circuits de commande et d'instrument"

Clause 77.5.3:
In equipment with ground-fault protection, the part of the neutral bus for load termination shall be marked "WARNING – Do not connect grounding conductors to these or any other neutral terminals; to do so will defeat ground-fault protection." The marking shall be located on or adjacent to the portion of the grounded service conductor for load terminals.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"AVERTISSEMENT - Ne connectez pas de conducteurs de mise à la terre à ces bornes ou à toute autre borne neutre; cela annule la protection contre les défauts à la terre"

Clause 77.5.4:
Equipment that is not provided with ground-fault protection as specified in the Exception to 75.6.2 shall be marked for its intended use as follows:
a) For equipment rated 3-phase, 4-wire, "Suitable only for use as service equipment when supplying a continuous industrial process"; or
b) For equipment rated 3-phase, 3-wire, "Suitable only for use as service equipment when supplying a continuous industrial process or for systems where the neutral is not solidly grounded."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

a) "Convient uniquement pour une utilisation comme équipement de service lors de la fourniture d'un processus industriel continu"; or
b) "Convient uniquement pour une utilisation en tant qu'équipement de service lors de la fourniture d'un processus industriel continu ou pour des systèmes où le neutre n'est pas solidement mis à la terre."

6.0 Critical Features

22. **Industrial Control Panels For Service Equipment Installation Instructions and markings:**

Installation Instructions

Clause 78.1:

To provide for system performance testing, each ground-fault relay or apparatus incorporating a ground fault relay or its functions intended for protection of a solidly grounded wye service rated more than 150 volts to ground and not exceeding 600 volts phase-to-phase shall be provided with information sheets describing system testing instructions, and with a test form. The form shall include a space for the date the test was performed and the results, and shall state that the form should be retained by those in charge of the building's electrical installation in order to be available to the authority having jurisdiction. The instructions shall include the following items and shall basically prescribe only that information necessary to perform the tests. The instructions shall be separate and apart from any more elaborate test detail that the manufacturer wishes to provide. The instructions shall specify that:

a) The interconnected system shall be investigated in accordance with the panel manufacturer's detailed instructions, and that this investigation is to be undertaken by qualified personnel.
b) The location of the sensors around the bus of the circuit to be protected shall be determined. This can be done visually with knowledge of which bus is involved
c) The grounding points of the system shall be verified to determine that ground paths do not exist that would bypass the sensors. The use of high-voltage testers and resistance bridges is able to be suggested.
d) The installed system is to be tested for correct response by the application of full scale current into the equipment to duplicate a ground-fault condition, or by equivalent means such as by a simulated fault current generated by:
   1) A coil around the sensors; or
   2) A separate test winding in the sensors.
e) The results of the test shall be recorded on the test form provided with the instructions.

Markings:

Control panels intended for service use shall be marked adjacent to the nameplate with the following or equivalent:

"SUITABLE FOR USE AS SERVICE EQUIPMENT"

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"CONVIENT À L'UTILISATION COMME APPAREILLAGE DE BRANCHEMENT"

A compartment in a control panel that is intended for supply authority use shall be marked with the following or equivalent text:

"COMPARTMENT FOR SUPPLY AUTHORITY USE ONLY"

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"COMPARTIMENT POUR L'USAGE DE DISTRIBUTEUR D'ÉLECTRICITÉ SEULEMENT"

23. **If manufacturer is authorized to build Industrial Control Panels for Flame Control per Section 2 of this report, then the Industrial Control Panel for Flame Control shall include the following additional marking:**

6.0 Critical Features

Clause 83.1:
The nameplate required in 52.1 shall additionally include the words "Flame Control Panel."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Panneau de contrôle de la flamme"

24. **If manufacturer is authorized to build Industrial Control Panels for Marine Use per Section 2 of this report, then the Industrial Control Panel for Marine Use shall include the following additional markings, as applicable:**

Clause 87.1:
The nameplate required in 52.1 shall additionally include the ambient temperature rating and the following: "Industrial Control Panel for Marine Use."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Panneau de commande industriel pour usage marin"

Clause 87.2:
A heat-resistant, durable wiring diagram shall be permanently attached to the inside of the controller door. An adhesive-backed label used for this marking shall comply with the Standard for Marking and Labeling Systems, UL 969, for the surface and environment involved and the marking and labeling system shall be evaluated and described in section 4.

Clause 87.3:
A dripproof or watertight enclosure that complies with 85.1.2 shall be marked "Dripproof" or "Watertight," as appropriate.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Preuve d'égouttement" or "Étanche" as appropriate.

25. **If manufacturer is authorized to build Industrial Control Panels For Air Conditioning And Refrigeration Equipment per Section 2 of this report, then the Industrial Control Panels For Air Conditioning And Refrigeration Equipment shall include the following additional marking:**

Clause 92.1:
The nameplate required in 52.1 shall additionally include “Industrial Control Panel for Refrigeration Equipment” or "Industrial Control Panel for Air Conditioning Equipment."

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Panneau de commande industriel pour équipement de réfrigération" or "Panneau de commande industriel pour équipement de climatisation"

6.0 Critical Features

26. **If manufacturer is authorized to build Industrial Control Panels For Fountain Control per Section 2 of this report, then the Industrial Control Panel For Fountain Control shall include the following additional markings:**

Clause 96.1:
The nameplate required in 52.1 shall additionally include “Industrial Control Panel for Floating Fountain” or “Industrial Control Panel for Permanently Installed Fountain” or “Fountain Control Panel”.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Panneau de commande industriel pour fontaine flottante" or "Panneau de contrôle de la fontaine"

Clause 96.2:
96.2 For panels intended to control a non-submersible, single phase, 120 or 240 volt motor, the motor output terminals on the panel or installation drawing shall be additionally marked “Not For Control of Submersible Motor” or the equivalent.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Pas pour le contrôle du moteur submersible"

Clause 96.3:
96.3 The installation instructions for controllers intended for connection to floating fountains shall specify mounting a minimum of 300 mm (12 in.) above the electrical datum plane.

27. **If manufacturer is authorized to build Industrial Control Panels For Irrigation Equipment per Section 2 of this report, then the Industrial Control Panel For Irrigation Equipment shall include the following additional markings:**

Clause 99.1:
The industrial control panel nameplate shall include the following information:

a) The rating of the main disconnecting means and branch circuit protection if not provided in the industrial control panel;
b) “Industrial Control Panel for Electric Irrigation Equipment” or “Industrial control panel for center pivot irrigation equipment”, as appropriate; and
c) The output ratings for motors shall be marked, “intermittent duty only”, when the provisions of 98.1.2 have been applied for sizing the motor controller and disconnecting means.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

b) "Panneau de commande industriel pour équipement d'irrigation électrique" or "Panneau de commande industriel pour équipement d'irrigation à pivot central", as appropriate; and
c) "Service intermittent uniquement"

6.0 Critical Features

28. **If manufacturer is authorized to build Control Panels For Aquatic Playgrounds per Section 2 of this report, then the Control Panel For For Aquatic Playgrounds shall include the following additional markings:**

Clause 104.1:
The nameplate required in 52.1 shall include the phrase ″Industrial Control Panel for Aquatic Playground″ or ″Aquatic Playground Control Panel″.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

″Panneau de contrôle industriel pour terrain de jeu aquatique" or "Panneau de configuration du terrain de jeu aquatique″

Clause 104.2:
The nameplate required in 52.1 shall include the phrase “Not for use with installations with water in common to a pool or spa″.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Ne pas utiliser avec des installations avec de l'eau commune à une piscine ou un spa″

29. **If manufacturer is authorized to build Control Panels For Swimming Pools and In-Ground Spas per Section 2 of this report, then the Control Panel For Swimming Pools and In-Ground Spas shall include the following additional markings:**

Clause 109.1:
The nameplate required in 52.1 shall include the phrase: ″Industrial Control Panel for Swimming Pool and Spa″ or ″Swimming Pool and Spa Control Panel″.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

″Panneau de contrôle industriel pour la natation Piscine et spa″ or "Panneau de commande de la piscine et du spa″

30. **If manufacturer is authorized to build Control Panels For Water Park Rides and Similar Installations per Section 2 of this report, then the Control Panel For Water Park Rides and Similar Installations shall include the following additional marking:**

Clause 114.1:
The nameplate required in 52.1 shall include the phrase: ″Industrial Control Panel for Water Park Ride″ or ″Industrial Control Panel for Wave Pool″.

For products bearing the cETL or cETLus mark, the control panel shall be marked with the following French text:

"Panneau de commande industriel pour tour de parc aquatique" or "Panneau de commande industriel pour piscine à vagues"

6.0 Critical Features

31 **Enviromental Temperatures (Canada)**

Clause 4.12:
Where a control panel is intended to be installed in an environment where the external ambient temperature may at times be below 0 °C, Anti-condensation heaters or space heaters, or both, shall be supplied, with their operation controlled by humidistat, thermostat, or both, as applicable.

Heaters shall be located so that the heat they provide will not negatively affect the operation or life expectancy of any components or wiring.

The enclosure may be supplied with thermal insulation suitable for the external ambient temperature range specified, in order to maintain the temperature internal to the panel within the operating temperature range of the components used.

A control panel shall be marked for use in external ambient temperatures on a label attached to the panel. This label may be located on the outside or inside of the panel provided it can be read after the panel installation is completed.
Where a control panel is intended to be installed in an environment where the external ambient temperature may at times be greater than 40 °C, one or more of the following shall apply:

a) Means shall be provided to control the internal ambient of the panel, such as ventilation, forced, cooling means, etc.

b) Components employed in panel shall be suitably rated for the elevated ambient, or otherwise ambient compensated, particularly with respect to thermally dependent components such as circuit breakers, magnetics, etc.

c) Compliance with temperature limits and proper intended operation shall be demonstrated via applicable methods such as the temperature testing.

7.0 Illustrations

Illustration 1 - Table 52.1 of UL 508A. The control panel shall be provided with all applicable markings. See Table 52.1 of UL 508A.

Table 52.1
Locations of required markings

Paragraph	General description	Location categories (see notes)	
		Enclosed	Open
	General markings		
52.1	Nameplate stating: manufacturer, maximum voltage, total FLA, largest motor FLA, phase, frequency, field wiring diagram, environmental type rating, short circuit current rating	a or b	f
67.1.1	Nameplate stating: manufacturer, maximum voltage, total FLA, largest motor FLA, phase, frequency, field wiring diagram, environmental type rating, short circuit current rating	a	–
52.2	External load ratings	a, b, or e	e or f
	Enclosure markings		
53.1	Environmental type	a or b	–
53.2	Conduit hubs for Type 2, 3R or 3RX enclosures	a, b, or e	–
53.3	Conduit hubs for Type 3, 3S, 3SX, 3X, 4, 4X, 5, or 12 enclosures	a, b, or e	–
53.4	Modular enclosure marking, specifying interconnections	a or b	–
53.5	Single conduit entry, non-metallic enclosure only	a, b, or e	–
53.6	Location of conduit entry	a or b	–
53.7	Instructions for field installed bonding means	a, b, or e	–
53.8	Instructions for field installed equipment to maintain Type ratings	a, b or e	–
	Field wiring terminal markings		
54.1	Field wiring terminal identification	c	c
54.2 – 54.4, 54.11	Type of field wiring conductors, field wiring temperature rating (power circuit only), terminal tightening torque	b, c, or e	c, e, or f
54.5	Equipment grounding terminal identification	c	c
54.6	Class 1 markings	b, c, or e	c, e, or f
54.7	Class 2 markings	b, c, or e	c, e, or f
54.8	Routing of Class 1 and Class 2 conductors	b, c, or e	c, e, or f
54.9	Control circuit wire size [less than 14 AWG (2.1 mm^2)]	b, c, or e	c, e, or f
54.10	Connect secondary neutral to grounding electrode conductor	b, c, or e	c, e, or f
54.12	Slash voltage rating	a, b, or e	e or f

7.0 Illustrations

Illustration 2 - Table 52.1 of UL 508A continued:

Table 52.1 Continued

Paragraph	General description	Location categories (see notes)	
		Enclosed	Open
	Cautionary markings		
55.4	Multiple disconnect marking	a	d
55.5	Polymeric enclosure with multiple conduit entries	b	–
55.6	Instantaneous trip circuit breaker used as branch circuit protection for a combination motor controller	a, b, or c	c or d
55.7	Self-protected combination motor controller, including manual type	a, b, or c	c or d
55.8	UPS equipment outputs remain live with main disconnect in off position	a	d
	Fuseholders		
56.1	Fuse replacement marking	b or c	c or d
	Switches		
57.1	Disconnect handle, "on" and "off"	c	–
57.2	Manual switch, not to operate under load	c	c
57.3	Reverse fed disconnecting means	a	d
	Overload Relay Heater Tables		
58.1	Overload relay heater element table	b or c	c or d
	Receptacles		
59.1	General use receptacle in power circuit	c	c
59.2	Multi-pin receptacle, identification of load connection	c	c
59.3	General use receptacle in control circuit	c	c
59.4	Receptacle not to operate under load	c	c
	Field provided components		
60.1, 60.2	Disconnect switch, branch circuit protection and/or overload relay to be provided by installer	e	e
60.3	Other devices to be provided by installer	e	e
60.4	Pressure wire connectors, cable lugs or terminal kit provided by installer for connection to busbars	e	e
	Schematic Wiring Diagrams		
61.1, 61.2	Complete schematic	e	e

NOTES

a) Marking shall be visible without opening the door or cover of the enclosure.

b) This marking is able to be provided on the door or cover of the enclosure or on the inside walls of the enclosure.

c) Marking shall be on or adjacent to the component in question. Fuse replacement markings are able to be on a chart displayed as specified in (b) when each fuseholder is marked with a distinctive designation, such as F1. For open panels, the chart is able to be supplied as described in (d).

d) Marking shall be shipped separately on a self-adhesive label with the device (this is intended to be placed on or in the ultimate enclosure).

e) Marking shall be on the field wiring diagram, prints, or instructions that are referenced on the panel nameplate and is to be shipped with the panel (either loosely, in the "print pocket," or adhered to the inside of the enclosure).

f) Marking shall be on the subpanel component mounting plate.

7.0 Illustrations

Illustration 3 - Components that do not have a marked short circuit rating shall be assigned a rating in accordance with Table 9 (C22.2 No. 286) and/or Table SB4.1 (UL 508A)

Table 9
SCCRs for unmarked components
(See Clauses 4.13.3.1.5, 4.13.3.1.7, 4.13.4.1, 4.13.6.2, 4.13.6.3, 4.13.7.3, and 4.13.11.3.)

Component	Assigned SCCR, kA
Circuit breakers (all types)	5
Supplementary protectors	0.2
Terminal blocks	10 (pending approval to CSA C22.2 No. 158)
Power distribution blocks	10 (pending approval to CSA C22.2 No. 158)
Bus bars	10
Fuseholders	10
Combination meter-mounting devices (meter mounting device with load-side circuit breaker)	5
Industrial control equipment (overload relays or equipment incorporating overload relays)	See Table 8 for applicable short-circuit current rating
Enclosed or dead-front switches	5
GFCI receptacles	2
Electromagnetic interference (EMI) or radio frequency interference (RFI) filters rated	
a) 100 A or less	5
b) 101 A or more	10

Note: *Assigned ratings in this Table should be applicable only when used within an industrial control panel or assembly.*

7.0 Illustrations

Illustration 3a - Components that do not have a marked short circuit rating shall be assigned a rating in accordance with Table 9 (C22.2 No. 286) and/or Table SB4.1 (UL 508A) continued

Table SB4.1 Continued

Component		Short circuit current rating or interrupting rating[c], kA
Fuseholder		10
Industrial control equipment:		
a. Auxiliary devices (overload relay)		5
b. Switches (other than mercury tube type)		5
c. Mercury tube switches		
Rated over 60 amperes or over 250 volts		5
Rated 250 volts or less, 60 amperes or less, and over 2 kVA		3.5
Rated 250 volts or less and 2 kVA or less		1
Motor controller, (including combination motor controllers, float and pressure operated motor controllers, power conversion equipment and solid state motor controllers), and active and passive harmonic filters rated in horsepower (kW)[d]		
Controller Rated 0-600V	**Controller Rated 601-1000V**	
a. 0 – 50 (0 – 37.3)	0 – 50 A	5[e]
b. 51 – 200 (38 – 149)	51 – 200 A	10[e]
c. 201 – 400 (150 – 298)	201 – 400 A	18[e]
d. 401 – 600 (299 – 447)	401 – 600 A	30[e]
e. 601 – 900 (448 – 671)	601 – 900 A	42[e]
f. 901 – 1600 (672 – 1193)	901 – 1600 A	85[e]
Meter socket base		10
Receptacle (GFCI type)		2
Receptacle (other than GFCI type)		10
Supplementary protector		0.2
Switch unit		5
Terminal block or power distribution block		10
Multi-point interconnection power cable assembly		10
Cable Assemblies and Fittings for Industrial Control and Signal Distribution		10
Multiwire (power distribution) lug		10
Electromagnetic interference (EMI) or radio frequency interference (RFI) filters rated:		
a. 100 amperes or less		5
b. More than 100 ampers		10

7.0 Illustrations

Illustration 4 - Electrical spacings in industrial control panels and assemblies shall be as specified in Table 10 (C22.2 No. 286) and/or Table 10.1, 10.1A, and 10.2 (UL 508A)

Table 10
Minimum spacings for live parts
(See Clauses 4.2.2.7, 4.2.3.3, 4.6.1, 4.14.1, and 4.14.6.)

Nominal voltage involved, V	Minimum spacings, air or oil, mm			
	Between bare live parts of opposite polarity and between bare live parts and grounded metal parts other than the enclosure		Between bare live parts and the walls of metal enclosures, including fittings for conduit or armoured cable*	
	Clearance	Creepage	Clearance	Creepage
51–150‡	3.0†	6.3	12.7	12.7
151–300	6.3	9.4	12.7	12.7
301–600	9.4	12.7	12.7	12.7
601–1000	14.0	21.6	20.3	25.4
1001–1500	17.8	30.5	30.5	41.9
601–1000	11.4§	15.7§	20.3§	25.4§
1001–1500	15.2§	17.8§	30.5§	41.9§

** A metal piece attached to the enclosure is considered to be a part of the enclosure if deformation of the enclosure is likely to reduce spacings between the metal piece and uninsulated live parts.*

† The spacing between wiring terminals of opposite polarity and the spacing between a wiring terminal and a grounded non-current-carrying metal part shall be not less than 6.3 mm if short-circuiting or grounding of such terminals can result from projecting strands of wire.

‡ Spacings for components or equipment rated at voltages below 51 V are not specified in this Table, but are subject to investigation. See also Clause 4.14.4.

§ Oil only.

Notes:

1) *In measuring an over-surface spacing, any slot, groove, or the like that is 0.33 mm wide or less in the contour of insulating material shall be disregarded.*
2) *In measuring spacings, an air space of 0.33 mm or less between a live part and an insulating surface shall be disregarded.*

Table 10.1
Minimum required spacings in branch and control circuits

Potential involved in volts rms ac or dc		Minimum spacing, inch (mm)					
		A			B		C
		General industrial control equipment			Devices having limited ratings[a]		All circuits[d]
		51 – 150	151 – 300	301 – 600	51 – 300	301 – 600	0 – 50
Between any uninsulated live part and an uninsulated live part of opposite polarity, uninsulated grounded part other than the enclosure, or exposed metal part[f,g]	Through air or oil	1/8[b] (3.2)	1/4 (6.4)	3/8 (9.5)	1/16[b] (1.6)	3/16[b] (4.8)	1/16[b] (1.6)
	Over surface	1/4 (6.4)	3/8 (9.5)	1/2 (12.7)	1/8[b] (3.2)	3/8 (9.5)	1/16[b] (1.6)
Between any uninsulated live part and the walls of a metal enclosure including fittings for conduit or armored cable[c,e]	Shortest distance	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/4 (6.4)	1/2 (12.7)	1/4 (6.4)

NOTES –

1 A slot, groove, or similar gap, 0.013 inch (0.33 mm) wide or less in the contour of insulating material is to be disregarded for the purpose of measuring over surface spacings.

2 An air space of 0.013 inch (0.33 mm) or less between a live part and an insulating surface is to be disregarded for the purpose of measuring over surface spacings.

[a] See 10.5.

[b] The spacing between field wiring terminals of opposite polarity and the spacing between a field wiring terminal and a grounded dead metal part shall be at least 1/4 inch (6.4 mm) when short-circuiting or grounding of such terminals results from projecting strands of wire. For circuits involving no potential greater than 50 volts rms ac or dc, spacings at field wiring terminals are able to be 1/8 inch (3.2 mm) through air and 1/4 inch (6.4 mm) over surface.

7.0 Illustrations

Illustration 4a - Electrical spacings in industrial control panels and assemblies shall be as specified in Table 10 (C22.2 No. 286) and/or Table 10.1, 10.1A, and 10.2 (UL 508A) continued

[c] For the purpose of this requirement, a metal piece or component attached or mounted to the enclosure is evaluated as a part of the enclosure when deformation of the enclosure reduces the spacings between uninsulated live parts or between uninsulated live parts and metal parts.

[d] Spacings do not apply within a low-voltage limited energy circuit or a Class 2 circuit.

[e] Applicable to devices with sheet metal enclosures regardless of wall thickness and cast metal enclosures with a wall thickness of less than 1/8 inch (3.2 mm).

[f] These spacings are also applicable between any uninsulated live parts and the walls of a cast metal enclosure with a wall thickness of minimum 1/8 inch (3.2 mm) for devices with a limited rating complying with 10.5.

[g] These spacings are also applicable between an insulated live part and the wall of a metal enclosure to which the component is mounted. Deformation of the enclosure shall not reduce spacings.

Table 10.1A
Minimum required spacings in branch circuits rated 601 – 1000 V

Voltage, V rms ac or dc	Minimum Spacing, in (mm)			
	Between any uninsulated live part and an uninsulated live part of opposite polarity, uninsulated grounded part other than the enclosure, or exposed metal		Between any uninsulated live part and the walls of a metal enclosure including fittings for conduit or armored cable	
	Through Air	Over Surface	Through Air	Over Surface
601 – 1000	0.55 (14.0)	0.85 (21.6)	0.80[a] (20.3)[a]	1.00 (25.4)

[a] The through-air spacing shall not be less than 1/2 inch between live parts of a circuit breaker or fusible disconnecting means and grounded metal.

Table 10.2
Spacings in feeder circuit

Voltage involved	Minimum spacing, inch (mm)		
	Between live parts of opposite polarity		Between live parts and grounded metal parts, through air and over surface
	Through air	Over surface	
125 or less	1/2 (12.7)	3/4 (19.1)	1/2 (12.7)
126 – 250	3/4 (19.1)	1-1/4 (31.8)	1/2 (12.7)
251 – 1000	1 (25.4)	2 (50.8)	1[a] (25.4)[a]

NOTE – An isolated dead metal part, such as a screw head or a washer, interposed between uninsulated parts of opposite polarity or between an uninsulated live part and grounded dead metal is evaluated as reducing the spacing by an amount equal to the dimension of the interposed part along the path of measurement.

[a] The through-air spacing shall not be less than 1/2 inch between live parts of a circuit breaker or fusible disconnecting means and grounded metal, and between grounded metal and the neutral of an industrial control panel rated 277/480 volt, 3-phase, 4-wire.

8.0 Test Summary			
Evaluation Period	28-Nov-2024	Project No.	41785

No testing was considered necessary due to the use of all Listed and Recognized components used within their intended use and ratings and the application of proper electrical spacings in accordance with UL 508A and C22.2 No. 286.

List of manufacturer trained personnel:

Name	Position	Location
Gianluca Checchi	Electrical Technician	Via Aurelia, 65 54033 Carrara (MS)
Claudio Belloni	Electrical Technician	Via Aurelia, 65 54033 Carrara (MS)
Andrea Battaglia	Electrical Technician	Via Aurelia, 65 54033 Carrara (MS)
Ramon Ortega	Electrical Technician	Via Aurelia, 65 54033 Carrara (MS)
Gianmatteo Zambarda	Electrical Technician	Via Aurelia, 65 54033 Carrara (MS)
Letizia Pucci	Electrical Technician	Via Aurelia, 65 54033 Carrara (MS)
Matteo Mosti	Electrical Designer	Via Aurelia, 65 54033 Carrara (MS)
Fabio Bardini	Electrical Designer	Via Aurelia, 65 54033 Carrara (MS)
Andrea Mei	Electrical Designer	Via Aurelia, 65 54033 Carrara (MS)
Giuseppe Volpe	Software Engineer	Via Aurelia, 65 54033 Carrara (MS)
Federico Guiggi	Software Engineer	Via Aurelia, 65 54033 Carrara (MS)
Adnan Khaja	I and C Dept.	Via Aurelia, 65 54033 Carrara (MS)
Maurizio Fini	Electrical Technician	Via Aurelia, 65 54033 Carrara (MS)

8.1 Signatures			
A representative sample of the product covered by this report has been evaluated and found to comply with the applicable requirements of the standards indicated in Section 1.0.			
Completed by:	Francesco Polo	Reviewed by:	Daniele Fattori
Title:	Project Engineer	Title:	Industrial Team Leader
Signature:	*Signature on file*	Signature:	*Signature on file*

9.0 Correlation Page For Multiple Listings	
The following products, which are identical to those identified in this report except for model number and Listee name, are authorized to bear the ETL label under provisions of the Intertek Multiple Listing Program.	
BASIC LISTEE	MATEC INDUSTRIES SRL
Address	Via Corso Venezia, 36 20121 Milano (MI)
Country	Italy
Product	Industrial Control Panels For General Use Industrial Control Panels For Industrial Machinery

MULTIPLE LISTEE 1	None
Address	
Country	
Brand Name	
ASSOCIATED MANUFACTURER	
Address	
Country	

9.0 Correlation Page For Multiple Listings	
MULTIPLE LISTEE 1 MODELS	BASIC LISTEE MODELS

MULTIPLE LISTEE 2	None
Address	
Country	
Brand Name	
ASSOCIATED MANUFACTURER	
Address	
Country	

MULTIPLE LISTEE 2 MODELS	BASIC LISTEE MODELS

MULTIPLE LISTEE 3	None
Address	
Country	
Brand Name	
ASSOCIATED MANUFACTURER	
Address	
Country	

MULTIPLE LISTEE 3 MODELS	BASIC LISTEE MODELS

10.0 General Information

The Applicant and Manufacturer have agreed to produce, test and label ETL Listed products in accordance with the requirements of this Report. The Manufacturer has also agreed to notify Intertek and to request authorization prior to using alternate parts, components or materials.

COMPONENTS

Components used shall be those itemized in this Intertek report covering the product, including any amendments and/or revisions.

LISTING MARK

The ETL Listing mark applied to the products shall either be separable in form, such as labels purchased from Intertek, or on a product nameplate or other media only as specifically authorized by Intertek. Use of the mark is subject to the control of Intertek.

The mark must include the following four items:

1) applicable country identifiers "US" and/or "C" or "US", "C" and "EU"
2) the word "Listed" or "Classified" or "Recognized Component" (whichever is appropriate)
3) a control number issued by Intertek
4) a product descriptor that identifies the standards used for certification. Example:

For US standards, the words, “Conforms to” shall appear with the standard number along with the word, “Standard” or “Std.” Example: “Conforms to ANSI/UL Std. XX.”

For Canadian standards, the words “Certified to CAN/CSA Standard CXX No. XX.” shall be used, or abbreviated, “Cert. to CAN/CSA Std. CXX No. XX.”

Can be used together when both standards are used.

If all standards on the ATM have the same standard title, the shared title or its abbreviation may be used in place of the examples above. Example: "Medical Electrical Equipment" or "MEE"; "Information Technology Equipment" or "ITE"; "Audio/Video Information And Communication Technology Equipment" or "A/V ICTE".

Note: A facsimile must be submitted to Intertek, Attn: Follow-up Services for approval prior to use.
The facsimile need not have a control number. A control number will be issued **after signed Certification Agreements** have been received by the Follow-up Services office, approval of the facsimile of your proposed Listing Mark, satisfactory completion of the Listing Report, and scheduling of a factory assessment in your facility.

MANUFACTURING AND PRODUCTION TESTS

Manufacturing and Production Tests shall be performed as required in this Report.

FOLLOW-UP SERVICE

Periodic unannounced audits of the manufacturing facility (and any locations authorized to apply the mark) shall be scheduled by Intertek. An audit report shall be issued after each visit. Special attention will be given to the following:

1. Conformance of the manufactured product to the descriptions in this Report.
2. Conformance of the use of the ETL mark with the requirements of this Report and the Certification Agreement.
3. Manufacturing changes.
4. Performance of specified Manufacturing and Production Tests.

In the event that the Intertek representative identifies non-conformance(s) to any provision of this Report, the Applicant shall take one or more of the following actions:

1. Correct the non-conformance.
2. Remove the ETL Mark from non-conforming product.
3. Contact the issuing product safety evaluation center for instructions.

10.1 Evaluation of Unlisted Components

Because Unlisted Components are uncontrolled, and they do not fall under a third party follow up program, Intertek may require these components to be tested and/or evaluated at least once annually, more often for certain components, as part of the independent certification process. The Unlisted Components in Section 5.0 require testing and/or evaluation as indicated.

The Applicant will be notified, in writing, via the applicable contact methods, as defined in Section 1.0, when these components must be selected and sent to Component Evaluation Center (CEC) for re-evaluation.

Due to particular testing requirements, some components may be requested to be shipped to specific labs. Thus, specific shipment destination(s) for each sample will be provided in the written notification.

Managing CEC Location:
Intertek Italia SpA
ETL Component Evaluation Center
Via Principe di Udine, 114
33030 Campoformido (Udine), Italy
Attn: Fabio Diacoli
Sample Disposition: Due to the destructive nature of the testing, all samples will be discarded at the conclusion of testing unless, the manufacturer specifically requests the return of the samples. The request for return must accompany the initial component shipment.

11.0 Manufacturing and Production Tests

The manufacturer agrees to conduct the following Manufacturing and Production Tests as specified:

Required Tests

Ground Fault Circuit Interrupter Test

11.1 Ground Fault Circuit Interrupter (GFCI) Test

Method

If the panels employs a Ground Fault Circuit Interrupter (GFCI) in accordance with Appendix B of UL 508A, then the manufacturer shall conduct the test in B3.2 of UL 508A, as described below, to determine that the ground-fault circuit-interrupter protects against all ground faults.

With the control circuit energized, a resistance is to be connected between live parts of the component and ground. The value of the resistance shall be such that the current through it is greater than 6 mA and less than the rating of the secondary overcurrent protective device. The ground fault circuit interrupter shall open the circuit. Alternatively, the manufacturer shall test the correct bonding of the component: using an impedance measuring device, the measured impedance shall be 0.1 ohm or less. The measurement is between grounded parts adjacent to the component and the neutral side of the isolation transformer in B.2.2 that is supplying the component.

The manufacturer shall maintain records of the use of components evaluated to the requirements of Appendix B of UL 508A, for periodic review by the Intertek representative.

Records of all components evaluated to this test shall be retained for at least six months.

Products Requiring Ground Fault Circuit Interrupter (GFCI) Test:

All Ground Fault Circuit Interrupters (GFCIs) used in accordance with Appendix B of UL 508A.

12.0 Revision Summary				
The following changes are in compliance with the declaration of Section 8.1:				
Date/ Proj # Site ID	Project Handler/ Reviewer	Section	Item	Description of Change
5-Dec-2024	Polo F.	1	-	Applicant data changed from: MATEC INDUSTRIES SPA Via Montenapoleone, 8 20121 Milano (MI) Italy Mr. Alessandro Tonazzini Mr. Gabriele Paladini (+39) 3408369500 (+39) 3206390674 a.tonazzini@matecindustries.com g.paladini@elettromatec.com to: MATEC INDUSTRIES SRL Via Corso Venezia, 36 20121 Milano (MI) Italy Mr. Alessandro Tonazzini Mr. Gianluca Checchi (+39) 3408369500 (+39) 3703197889 a.tonazzini@matecindustries.com g.checchi@matecindustries.com
41785UDI	Fattori D.	1	-	Manufacturer data changed from: MATEC INDUSTRIES SPA Via Aurelia, 65 54033 Carrara (MS) Italy Mr. Alessandro Tonazzini Mr. Gabriele Paladini (+39) 3408369500 (+39) 3206390674 a.tonazzini@matecindustries.com g.paladini@elettromatec.com to: MATEC INDUSTRIES SRL Via Aurelia, 65 54033 Carrara (MS) Italy Mr. Alessandro Tonazzini Mr. Gianluca Checchi (+39) 3408369500 (+39) 3703197889 a.tonazzini@matecindustries.com g.checchi@matecindustries.com

12.0 Revision Summary				
The following changes are in compliance with the declaration of Section 8.1:				
Date/ Proj # Site ID	Project Handler/ Reviewer	Section	Item	Description of Change