

# CERTIFICATION Informs

An Urgent Bulletin from CSA Group

Ref No: I12-115

## Industrial Control Equipment No. 23A

(Supersedes Informs "Industrial Control Equipment No 23)

Existing Certification not affected

Date: December 27, 2012

Apply any time to have your products evaluated

Announcing: Publication of a new version of Manufacturing Control Checklist, Form CPC-1.

Class No: 3211 09, INDUSTRIAL CONTROL EQUIPMENT - Special (Custom) Industrial Control Assemblies

To purchase the Standard, visit us at [www.shopcsa.ca](http://www.shopcsa.ca)

### Who is affected?

Manufacturers of Special Industrial Control Panels.

### What do you do?

1. This publication outlines certification revisions that do not affect your currently certified product designs.
2. Please contact CSA engineering staff if you have questions or need information concerning this publication and how it applies to you.
3. If you would like to arrange for an evaluation of new products to the revisions, initiate a certification project by contacting our Client Services Centre at 1-866-797-4272. Please supply appropriate supporting documentation\*. If testing is needed, we will inform you of the samples required.

\*which includes technical information, company name, address, factory locations and CSA file number or master contract number (if assigned), and any other relevant documentation.

### Introduction:

This is the new edition of the Manufacturer Control Checklist, Form CPC-1 based on the eleventh edition of CSA C22.2 no 14 – *Industrial Control Equipment*.

### Background and Rationale:

Manufacturing Control Checklist, Form CPC-1, was revised to incorporate changes to the Canadian Electrical Code, CSA Standard C22.1-12 and to CSA Standard C22.2 No 14-10, Industrial Control Equipment. See Attachment 1 for the changes to CSA Standard C22.2 No. 14.

Attachment 1 contains the new Form CPC-1 which incorporates the changes to the Standards. Errata from the previous updates have also been corrected.

Clarifications were made on ratings and scope of control panels covered by the Special Industrial Control Panel program with type of controllers covered and the excluded equipment on page 1 of the Checklist.

The acceptable types of disconnect switches for branch and feeder circuits are those certified to CSA Standard C22.2 No. 4 listed under CSA Class Nos. 4651 01 and 4651 02 or to CSA Standard C22.2 No. 5, CSA listed under Class No. 4652 06

### Major Revisions:

See attachment 2

For questions specific to your file or products contact your regular CSA Group engineering staff.

Go to <http://directories.csa-international.org/> and enter your Master Contract # and the class numbers associated with this Informs to view your certified products.

### For technical questions on this Informs

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# ATTACHMENT 1

## Background and Rationale

### MANUFACTURING CONTROL CHECKLIST CPC-1

#### Industrial Control Panel, General Form Motor and Power Load Control and Control Circuits (Refer to DQD 207)

Company Name: \_\_\_\_\_


Project No: \_\_\_\_\_

Control Panel Purpose/Application: \_\_\_\_\_

Required Electrical Nameplate Ratings										
Input Circuits	Volts	Amp	Hz	Ph	Short-cir. #			# Short-circuit rating is the withstand value as per Table 24 of CSA-C22.2 No. 14-10 or as tested, not the interrupting rating on the overcurrent device. See sec. 14 & App. 1  * As Required		
cct. 1										
cct. 2										
cct. 3										
Output Circuits	Volts	Amp	Hz	Ph	Hp	kW	FLA*	LRA*	kvar*	Short-cir.#
cct. 1										
cct. 2										
cct. 3										
Enclosure type required (1, 2, 3, 3R, 4, 4X, 5, 12, 13)										
Special Requirements: _____ _____										
The following Controllers require an additional checklist along with the Basic Checklist: Please indicate with (Y) under "App" if applicable.							The following Equipment <u>does not</u> fall under this Program. Please contact CSA for more Information.			
<b>Controller</b>						<b>App</b>	<b>Excluded Equipment</b>			
Service Entrance (see checklist CPC-2)							Automatic Transfer Switch (CSA-C22.2 No. 178)			
Traffic (see checklist CPC-3)							Elevator Equipment (B44.1. etc.)			
							Enclosed Switches (CSA-C22.2 No. 4)			
NRTL, or CSAus only (see checklist CPC-5)							Switchgear (CSA-C22.2 No. 31)			
Heating (see checklist CPC-6)							Line isolator monitors (CSA-C22.2 No. 204)			
Panels with barriers for IS circuits (see checklist CPC-7)							Panel boards and Custom Panel boards (CSA-C22.2 No. 29)			
NRTL/C, or cCSAus, (i.e. Canada +USA) (See checklist CPC-8)							Hazardous location Equipment and Purged Enclosures for Hazardous Locations			
							Signal type ground fault devices (CSA-C22.2 No. 144)			
Enclosure (type 1) (see checklist CPC-14)							Hydro-massage Equipment			
Oil/Gas Burning (see checklist CPC-11)							Marine Equipment			
Compressor (see checklist CPC-12)							Motor Control Centres (CSA-C22.2 No. 254)			

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Relay / PLC	(see checklist CPC-13)		Power factor correction capacitor banks , to CSA-C22.2 No. 190, Assemblies to CSA-C22.2 No. 31 & Crane and Hoist Controls, (CSA-C22.2 No. 33)	
			Fire pump controllers (CSA-C22.2 No. 263 plus NFPA 20)	
Is the rating and scope of the assembly within the scope of CSA-C22.2 No. 14? See Clauses 1.1 to 1.4			YES	NO
Is the rating and scope of the assembly within your scope of certification? See CSA report.				

Clause	Requirements	Conformance			Comments
		N/A	Yes	No	
<b>1</b>	<b>Nameplate</b>				
5.1	Metal nameplate riveted or mechanically secured to enclosure. Or				
	CSA approved adhesive nameplate (as documented in the CSA report) is used.				
5.1 5.3 5.4 5.8	The nameplate specifies the following information: - Manufacturer's name, trademark or CSA file no.; - complete Electrical Rating: Inputs -Volts: Current; No. of Phases/DC; Frequency - for each circuit. & Outputs - Volts; Current or Horsepower; No. of phases/DC - for each circuit; Exception Input/Output control circuits - catalogue number or equivalent; - short circuit current rating of each input power circuit. See "Short Circuit Ratings" below; and - CSA Monogram or				See _____ For nameplate information.
	The CSA Monogram with the "NRTL" or US indicator adjacent to the CSA Mark if CPC-5 is completed.				
	The CSA Monogram with the "NRTL/C" or cCSAus indicator adjacent to the CSA Mark if CPC-8 is completed				
5.1	Nameplates correspond with drawings.				
5.1	Manufacturer's instruction sheets have been installed in cabinet pocket.				
<b>2</b>	<b>Other Markings</b>				
5.17	Control circuit fuse replacement information appears adjacent to the fuse-holder.				
5.48	Branch circuit fuse replacement information appears adjacent to the fuse-holder.				
5.27 (*)	Instructions are provided for the proper setting of the instantaneous circuit interrupter in accordance with Sec. 28-210 of C22.1 and Cl. 5.27 of CSA-C22.2 No. 14				
5.28 (*)	The factory setting and marked "INTERRUPTER SETTING MINIMUM", or its specific installation and marked INTERRUPTER SETTING SPECIFIC TO INSTALLATION or equivalent. See Cl. 5.28 of CSA-C22.2 No. 14.				
5.45 Also see 5.53 And Rule 28-202	SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN _____ RMS SYMMETRICAL AMPERES, _____ V MAXIMUM. The following additional markings are added as required by clause 5.45.2: (a) WHEN PROTECTED BY _____ CLASS FUSES; or (b) WHEN PROTECTED BY A CIRCUIT BREAKER HAVING AN INTERRUPTING RATING NOT LESS THAN _____ RMS SYMMETRICAL AMPERES, _____ V MAXIMUM. Also, see Note under cautions regarding use of French.				
	Interrupting switching device markings are re-applied if their markings are obstructed by the addition of an interlocking device.				
CSA-C22.2 No. 0.4 cl. 3.5.1.2	All ground lugs are labeled. Unless its intended use is obvious, the grounding terminal means of permanently connected equipment shall be marked "G", "GR", "GROUND", or with the symbol  , or colored green.				

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Clause	Requirements	Conformance			Comments
		N/A	Yes	No	
5.18	All terminals are identified /labeled.				
CSA-C22.2 No. 0 5.6.1	Terminals that are intended for direct connection to either a grounded conductor or a neutral conductor of a supply circuit shall be identified unless their intended use is clearly evident. (white in color, or be marked "N", "Neutral", "W", or "White" either on or adjacent to the terminal).				
5.1.1 (d)	Field wiring terminals must be marked for temperature except if rated 30 A or less or 24 FLA or less (horsepower rated)				
(*) Indicate that the clause applies only to Certified Combination Motor Controller Type D with Instantaneous Trip circuit breaker.					
5.8	Equipment intended to control a motor exceeding 500 hp shall, in addition to the horsepower ratings, include the maximum full-load current for each rating.				
<b>3</b>	<b>Cautions and warnings (When Applicable).</b>				
5.16	"WARNING: MORE THAN ONE LIVE CIRCUIT. SEE DIAGRAM" <i>Note: Verify that it is readily visible from the outside of the enclosure.</i>				
C22.1 Sec. 28	"WARNING: SEPARATE MOTOR OVERCURRENT, OVERLOAD AND OVERHEATING PROTECTION IS REQUIRED TO BE PROVIDED IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE, PART 1." <b>Note: Only permitted where the design permits external devices.</b>				
5.23	Overload Relay Heater Schedule is affixed adjacent to the OLR. <i>Note: For replaceable thermal overload relay types only.</i>				
5.31	Overload relay heater schedule and relevant markings and cautions. (a) "WARNING: THE OVERLOAD RELAY MUST BE REPLACED IF BURN-OUT OF THE CURRENT ELEMENT OCCURS"				
5.34	(b) The outside ambient temperature (40°C) on which the rating of a non-ambient temperature compensated overload relay is based shall be marked along with the tripping current.				
5.40	(c) Industrial control equipment employing an automatic-reset overload relay and a wiring diagram indicating 2-wire control shall be permanently marked in English and French to indicate that a motor connected to the circuit may start automatically when the relay is in the automatic-reset position. <b>Note: If automatic starting of the motors may create a hazard, then set to "manual mode" at factory.</b>				
5.53	(d) The maximum size of short circuit protection of the overload relay, if other than allowed by the Canadian Electrical Code Part 1, and not provided in the assembly.				
5.43	"WARNING: TWIST WIRES TOGETHER BEFORE INSERTING IN TERMINAL" and where required - This apply to bonding only with conditions, see clause.				
5.42 4.2.5.11	"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 EXTENDED AT LEAST 150 mm BEYOND THE EQUIPMENT ON ALL SIDES MUST BE INSTALLED." <b>Note: This marking need not be permanent.</b>				
	"WARNING: CAPACITIVE VOLTAGES ABOVE 50V MAY REMAIN FOR _____ SECONDS AFTER POWER IS DISCONNECTED" or equivalent.				
5.30.1 a) & 5.27, 5.28 (*)	"WARNING: MANUFACTURERS INSTRUCTIONS FOR SELECTING CURRENT ELEMENTS AND SETTING THE INTERRUPTERS MUST BE FOLLOWED"				
5.30.1 b) & 5.27, 5.28 (*)	"WARNING: IF AN OVERLOAD OR FAULT CURRENT HAS OCCURRED, CURRENT-CARRYING COMPONENTS OR THE CONTROLLER SHOULD BE EXAMINED AND REPLACED IF DAMAGED. IF FAULT CONDITION HAS EXISTED, THEN THE INTEGRAL CURRENT SENSORS MUST ALSO BE REPLACED"				
CSA-C22.2 No. 0 6.1.1(k)	WARNING: ISOLATING MEANS ONLY. DO NOT INTERRUPT THE SWITCH UNDER LOAD. - adjacent to isolating duty switches or contactors.				

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Clause	Requirements	Conformance			Comments
		N/A	Yes	No	
5.33	The motor overload trip setting, where provided by inherent electronic circuitry in drive or soft starter, is marked on the drive/starter or on the nameplate or on a separate label affixed adjacent to the drive/starter.				
5.20	The position/ function of manual switches are marked for proper operation.				
CSA-C22.2 No. 0 Cl. 6.3	<b>French translation of all cautions and warnings, instructions related to safe operation, installation etc. is provided on equipment. See Appendix 2.</b> <i>Note: Not required where installation location is known and French is not mandated by law.</i>				Provided: Y / N Installation Location:
(*) Indicate that the clause applies only to Certified Combination Motor Controller Type D with Instantaneous Trip circuit breaker.					
<b>4</b>	<b>Additional Marking Information</b>				
<b>5</b>	<b>Enclosure Requirements</b>				
4.1.1 or 4.2	Is the enclosure a purchased CSA certified enclosure? <b>or</b> The enclosure construction has been approved and documented in a CSA Certification report. <b>If not</b> , contact your CSA technical representative and complete Checklist CPC-14 <i>Non-certified Type 1 enclosure checklist</i> .				
4.2.1.2, CEC Rules 2-308, 310	Walk in enclosures comply with workspace, headroom and entrance/exit requirements of CEC, Part I.				Measured values workspace: Headroom:
4.1.2	Components front mounted such as pilot lights, push buttons, etc. are certified for the correct environment. i.e. Type 2, 3, 3R, 4, 4X, 5, 12, 13.				Type ratings :
4.2.2.3, CSA-C22.2 No. 0 cl. 4.4	Are additional barriers provided to protect against live parts where required? a. Operator Hazards: b. Service personnel hazards:				See Dwg:
4.2.5	Modification of enclosure complies with all the requirements for non-certified enclosures as well as allowable openings.				
4.2.2.1	Doors and covers are lockable or require the use of a tool to open the enclosure.				
Optional	Door is provided with an interlock to disconnect all the incoming power to the enclosure and /or warn user to disconnect all power before opening the door.				
4.3.3	No plastic covers are provided. Certified plug or closure may be used.				
<b>6</b>	<b>Allowed openings:</b>				
4.2.5	<u>Vents</u> are limited to less than 12.7 mm (1/2 in.), or comply with CSA-C22.2 No. 14, cl. 4.2.5.1.				Max dimension:
	Vents must leave sufficient metal to retain the strength of the enclosure (if at least 1 mm). See CSA-C22.2 No. 14, cl. 4.2.5.2 for details.				
	<u>Mounting Holes</u> are 3.2 mm dia. max. unless they can be mounted in such a manner as to cover the opening. See CSA-C22.2 No. 14, cl. 4.2.5.2 for details.				Max. dimension
	Conduit openings when provided comply with Table 1 of CSA-C22.2 No. 0.				Trade sizes: Diameters:
<b>7</b>	<b>Grounding and Bonding</b>				
4.16.1	One ground termination means is provided for each incoming power circuit and one for each outgoing power circuit OR Grounding Terminal kits are provided.				No. of Terminals ____
4.16.1.4	Minimum of one bonding conductor is provided for control circuits.				No. ____, Size:

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Clause	Requirements	Conformance			Comments
		N/A	Yes	No	
& .5	<b>Note:</b> Minimum No. 14 AWG copper or No. 12 AWG aluminum for control conductors and auxiliary devices.				___AWG
	Enclosure door(s) is (are) bonded to the enclosure.				via: _____
4.16.1.4 & .5	The size of the grounding conductors are as per Table 31 of CSA-C22.2 No.14 for power circuits and devices. The size and number of conductors per grounding terminal complies with table 30 of CSA-C22.2 No. 14.				Size of Terminals: ___AWG to ___AWG ___AWG to ___AWG
	Low impedance grounding connections are provided for ratings above 1000 A. (i.e. removal of paint with an application of conductive grease or pressure weld terminals etc.)  <b>NOTE:</b> Reliability of the bond provided by cut washers or thread cutting screws is questionable at high current and should not be the sole means of providing a reliable bond.				
4,16,1.1	Bonding of parts other than the enclosure is provided as required by Section 4.16 of CSA-C22.2 No. 14, CSA-C22.2 No. 0.4 and the requirements of PART I of the Canadian Electrical Code. Details as follows:				
CSA-C22.2 No. 0.4	Identification of parts required to be grounded – Assembly is reviewed to the requirements of Clauses 3.2 and 2.2 (definitions “Energized” and “Exposed”) of CSA-C22.2 No. 0.4				
	Bond Wire sizes comply with Table 9 of CSA-C22.2 No. 14 Note: Smaller bond wire sizes and alternative conducting means are permitted where investigated by CSA to the requirements of CSA-C22.2 No. 0.4 and described in the CSA report for this file. Documentation of the method used is included in the data pack for this assembly-				Circuit ratings:  Bond wire sizes:  Reference:
<b>8</b>	<b>Field Wiring Terminations</b>				
4.14.1.	Line and load terminals must be CSA certified lugs.				
4.14.1.4.3	The wire is properly sized. (use 75deg C copper (or aluminum) wire if greater than 100 A or 60deg C wire 100 A or less)				
5.2	If aluminum wire is allowed to be used terminal must be marked for use with aluminum. In addition the wire bending space, wiring space etc. are to be calculated using the aluminum wire. The assembly must then be marked to indicate that it is suitable for connecting with Aluminum wires.				
4.14.1.4.1	For Motor or Resistive Heating Circuits, the terminals are sized for 125 percent of the nominal full load current. (See table 18 & 19 of CSA CSA-C22.2 No. 14 for motor current FLA)				
	Input No. 1 rated: ___ A X ___ % = ___ AWG required _____ Input No. 2 rated: ___ A X ___ % = ___ AWG required _____ Input No. 3 rated: ___ A X ___ % = ___ AWG required _____  Output No. 1 rated: ___ A X ___ % = ___ AWG required _____ Output No. 2 rated: ___ A X ___ % = ___ AWG required _____ Output No. 3 rated: ___ A X ___ % = ___ AWG required _____ Output No. 4 rated: ___ A X ___ % = ___ AWG required _____ Output No. 5 rated: ___ A X ___ % = ___ AWG required _____ Output No. 6 rated: ___ A X ___ % = ___ AWG required _____				
<b>9</b>	<b>Wire Bending Space &amp; Wiring Space</b>				
4.6.2	<b>WIRE BENDING SPACE:</b> (For Line and Load Circuits) Wire bending space complies with Tables 32 and 33.  <i>Example:</i> For 100 Amps. rated current, the required ampacity for the supply conductor is 125 Amps. Based on the 75 degree C, the size of the conductor is No. 1 AWG based on three copper conductors. The wire bending space required per table 32 is 76 mm.  <i>Notes:</i> 1) Not applicable to wire sizes less than 10 AWG.				Table 32 is for opposite cable entrance. Table 33 is for other than opposite cable entrance.

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Clause	Requirements	Conformance			Comments
		N/A	Yes	No	
C22.2 No. 0 Clause 4.6 (d), (f)	bodies, heating elements, components mounted on heat-sinks, transformer cores etc.				
4.13.4	Wiring is routed and supported so as not to contact moving parts, or rest on sharp edges or projections, etc.				
4.13.6	Bare conductors are supported or covered by suitable insulating sleeving or tubing.				
CSA-C22.2 No.0.4	Ground and bonding conductors used are bare copper or green colored wires.				
4.13.4	Wires are flexible, with extra length and protection when connecting to door mounted equipment.				
<b>11</b>	<b>Components &amp; Installation</b>				
4.1.1	Components are CSA certified and have a visible CSA mark or are listed for Canada. The recognized, accepted components (CSA Triangle) and non-certified components are as listed in the section "Non-certified components" of the CSA Report. See Appendix 3.				
	Indicating instruments such as analog volt and ammeter, solid state devices (SCR's diodes, etc.) which are not CSA Certified, appear in section "Non-certified components" of the CSA Report				
	Special shielded low voltage wires, thermocouple leads, etc., which are not CSA Certified are Acceptable in Class 2 limited energy circuits provided they are installed in accordance with requirements of Section 16 of CEC, Part I.				
	Wires are installed properly. ( <i>i.e. insulation not under screws, No. strands of wire are loose around the connection, all connections are tight, etc...</i> )				
	Wiring corresponds with elementary diagrams.				
	Device part numbers correspond with bill of material.				
	Phasing is proper and in accordance with the drawing.				
	All items are securely fastened.				
4.2.2.3	Hinged doors and internal barriers are provided to prevent contact with bare live parts during normal operation.				
4.9.2	Single throw knife switch - blade(s) are dead when switch is open.				
4.9.9	Branch and feeder disconnects comply with 4.9.12- (Molded Case switches, Molded Case Circuit Breaker or Disconnect switches) See Appendix D Table D16 of CEC Part I.				
Sec. 28-602(3)(b)	Manual Motor Controllers that are marked "Suitable for motor disconnect" by the manufacturer may be used as local motor or controller disconnecting means only on the load side of the branch circuit disconnect and over-current device. Note: Manual Motor Controllers not marked as "Suitable for Motor Disconnect" with external operating mechanisms are permitted to be used if identified as not for use as an isolating means for maintenance functions.				
	The electrical ratings of the components are suitable for the application. Examples of special purpose electrical ratings are indicated below:				
	Horsepower - AC, 3-ph (Across-the-line/Reduced Voltage) Horsepower - AC, 1-ph Two pole interrupting or Single pole interrupting? Horsepower - DC (Across-the-line/reduced voltage)				
	General Purpose AC General Purpose DC Resistive Heating Duty AC/DC				
	Incandescent Lighting Duty Electric Discharge Lamp (Ballast) Duty Refrigeration Duty (HP or FLA/LRA) Capacitive switching (kVar) (for power factor correction of single motor)				

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Clause	Requirements	Conformance			Comments
		N/A	Yes	No	
	AC Pilot Duty rating (HD or A600) - 720VA AC Pilot Duty rating (SD Duty or B600) - 360VA DC Pilot Duty (Heavy Duty or N600) - 275VA DC Pilot Duty (Standard Duty or P600) - 138VA <b>Note:</b> Small relays & switches marked "Same Polarity" are to be wired with no voltage difference between adjacent poles				
<b>12</b>	<b>Protection Industrial control Assemblies – General</b>				
4.11.1.1 1	Branch Circuit Protection complies with CSA Std.C22.1 Sections 14, 26 and 28, as applicable.  <b>NOTE:</b> 1. Branch circuits must be protected against both short circuit and overload by CSA Certified fuses, thermal-magnetic circuit breakers or combination motor controllers. 2. Manual starters, magnetic only breakers/protectors, molded case switches, tap circuit protectors and supplementary protectors, supplementary fuses, semi-conductor fuses, etc. are not suitable for branch circuit protection. See Appendix 3				
4.11.1.1, C22.1 28-306  5.23	Overload relays when used, are of proper size and set for correct current ratings. (Ensure that appropriate heater elements are selected and installed as per the manufacturer's instruction.) <b>Note:</b> The self-adhesive label indicating the proper current element selection is affixed adjacent to the OLR. See Markings clause 5.23 above.				
C22.1 Sec 28-200 28-202	The overcurrent protection (fuse or Therm-mag breaker) is not greater than indicated in table 29 or Appendix D, Table D16 of CEC Part I nor greater than marked on the OLR or starter.  Exceptions - 1) see Group Fusing below; 2) Use of Certified type E combination motor controller - See "Comb. Mtr. CTR" marked on the self-protecting device. (Class 3211 08)				
Sec 28-202, 28-210	An Instantaneous-Trip Circuit Breaker (mag. only breaker) is part of a Certified combination starter and set per Sec. 28-210.  <b>Note</b> Marking is provided per 5.27, 5.28, 5.30., 5.46				
28-202	For high short circuit capacity ratings, the overcurrent protective device is in accordance with the markings of 5.45.				
Sec. 28-204 28-206	For controllers Certified for Group Installations applications, the line side overcurrent protection (fuse or thermal-mag breaker) is not greater than that indicated on the controller of the smallest motor of the branch, or per Sec. 28-206 <b>AND</b> in accordance with the maximum calculated value per Rule. 28-204. Example : Max Fuse = FLA1 ___x (300% non-time delay F or 250% c-breaker or 175% t-delay Fuse) + FLA2 + ... FLAn. Where FLA1 = the largest motor of the group.				Calculated value:  Max Fuse marked on smallest rated starter or overload relay: Feeder Conductor Ampacity:
4.11.1.3  4.11.1.6 2	Transformer protection complies with one of the following:  1) Power Transformers (includes combination of power and control circuits): CEC, Part I Rule 26-256 <b>NOTE:</b> 1) Primary protection 125% (No primary protection is required if the secondary protection is 125% and the feeder protection is 300%)  2) Control circuit transformers primary and secondary windings shall be protected by one or more of the followings: a) Primary protection size as per table 52 of CSA-C22.2 No.14 b) Secondary circuit protection at not more than 125% of the rated secondary current with the primary feeder circuit protection at not more than 250% of the rated primary current of the transformer c) Protection in accordance with the applicable clause 4.11.1.6.2 of CSA-C22.2 No.14 for specific transformer type (Class 2, etc.) <b>Notes:</b> (i) Secondary protective devices may be supplementary type (4.11.1.7). (ii) Primary protection must be suitable for branch circuit protection, provided in all primary conductors and with sufficient interrupting rating. (4.11.1.5) (iii) Where the primary protection also protects the secondary as per the				

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Clause	Requirements	Conformance			Comments
		N/A	Yes	No	
	<p>above (4.11.1.6), it can be considered as functional protection for both. (4.11.1.1 and 26-256(1)).</p> <p>(iv) If the motor branch circuit protective device provides the required short circuit protection for the transformer and conductors per the above, then additional protection is not required. (4.11.1.4)</p> <p>(v) Control circuit = the circuit that carries the electric signals directing performance of a control device, but that does not carry the power that the device controls.</p> <p>Record: Transformer Protection Provided: Transformer rating: ____ VA, I/P ____ Amp., O/P ____ Amp. Pri. protection ____ Amp. Sec.protection ____ Amp.</p> <p><i>NOTE: For c-CSA-us or CSA-us assemblies, refer to NRTL checklist</i></p>				
	Transformer 2: Transformer rating: ____ VA, I/P ____ Amp., O/P ____ Amp. Pri. protection ____ Amp. Sec.protection ____ Amp.				
	Power supplies are protected with the fuse type specified on its nameplate or its installation instructions.				
<b>13</b>	<b>Industrial Control Assemblies incorporating Drive or Soft Starter product.</b>				
	Ensure that the drive /starter product is CSA certified.				
Sec. 28-200	Branch Circuit Over Current protection complies with CSA Std. C22.1 Sections 14, 28 and Table D16. The overcurrent protection provided on the line side of variable speed drives and/or soft starter is not greater than 250% of the rated full load motor current reflected to the line side of the controller.				
Sec. 28-300	- Provide motor overload protection.				Motor Overload Protection provided by:
28-304	<p>If the motor overload protection is incorporated within the controller, see the next box.</p> <p>If a separate motor overload is provided, it must be a CSA Certified type. The OLR is located on the load side of the controller and the type is thermal sensing. (Electronic overload means may not respond as intended with the harmonic content of some output waveforms.).</p> <p>WARNING: The overload relay contact must act to inhibit the Drive or Starter before opening a main contactor.</p> <p>If the control assembly does not provide motor overload protection, then the controller must be marked to indicate that such protection must be provided separately, in accordance with local electrical codes. See Markings above.</p>				Verification of inhibit circuit operation:
Sec. 28-300	For inherent electronic motor overload protection -				
	Verify that this protection scheme was evaluated and approved by CSA as a motor overload protection scheme. If so, see next box.				
	<p>Set the motor overload trip setting for the specific motor full load current and the percentage allowed per Sec. 28-306, following the operating manual. (Attach checklist as applicable)</p> <p>The trip setting of the overload protection is marked on the drive or the panel. See: Markings above, reference clause 5.36/5.37.</p>				<p>Motor SF rating:</p> <p>Marked as factory set trip rating of ____ A (____ % FLA)</p>
<b>14</b>	<b>Assembly Short Circuit Rating(s)</b>				
5.4 & Sec. 14-012 App. B	It is the intent of Sec. 14-012 of C22.1 that the overcurrent protective <u>and control devices</u> , the total impedance, and other characteristics of the circuit to be so selected and co-ordinated as to permit the circuit protective devices used to clear a fault without the occurrence of extensive damage to the electrical components of the circuit.				Explanatory
Step 1	For each branch circuit in the assembly assign a short circuit rating based on the lowest component short circuit rating of the control and protective devices used in that circuit. List these ratings on page 1 of this checklist. See the				

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Clause	Requirements	Conformance			Comments
		N/A	Yes	No	
	Guidelines for Short Circuit Ratings attached as Appendix 1 to this Checklist.				
Step 2	The short circuit rating for the assembly is the lowest rating of any of the branch circuits.				
Step 3	Review the protective devices used in the branch circuits to ensure that they are of the correct type and rating needed to provide the coordinated protection for the control devices and conductors.				

	TESTS	Conformance			Comments
		N/A	Yes	No.	
<b>15</b>	<b>Dielectric Withstand</b>				
	Is the calibration date on the dielectric strength tester still effective?				
	<b>Record: Test voltages:_____ Duration:_____ Sec.</b>  <b>Note:</b> <i>The dielectric withstand is to be performed on the motor power wiring and the control wiring. Be sure to remove the ground from the transformer before starting the test and that the test panel ground is connected to the control panel ground. Also ensure that all electronic devices are removed from their sockets, high pot test may damage these devices. (This includes all PLC's, cards, communication devices etc.). Use the nameplate on the test panel for selection of proper test voltage.</i>				
	Were defective component(s) found?				
	Were defective component(s) replaced and retested in the panel?				

Drawing List:							
<b>Assembly</b>	_____	<b>rev</b>	_____	<b>Schematic</b>	_____	<b>rev</b>	_____
	_____		_____		_____		_____
	_____		_____		_____		_____
<b>Wiring</b>	_____	<b>rev</b>	_____	<b>Other</b>	_____	<b>rev</b>	_____
	_____		_____		_____		_____
	_____		_____		_____		_____

<b>Engineering Dept Representative:</b> _____
<b>Manufactured/Wired By:</b> _____ <b>Date of the Test:</b> _____
<b>Tested By (Print):</b> _____ <b>Signature:</b> _____

<b>THIS CONTROL PANEL COMPLIES WITH THE APPLICABLE CSA REQUIREMENTS</b>		
<b>APPROVED BY:</b> _____	<b>SIGNATURE:</b> _____	<b>DATE:</b> _____

Acronyms, Abbreviations, Convention	
C22.1 or CEC	- Canadian Electrical Code, Part I 22 <sup>nd</sup> Edition C22.1-2012
0.4	- CSA-C22.2 No. 0.4-04 - Grounding of Electrical Equipment
0.0	- CSA-C22.2 No. 0-10 - General Requirements Canadian Electrical Code, Part II

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*Note: 1) Certification status and ratings of CSA approved components may be verified on the CSA website –*

*<http://directories.csa-international.org>.*

2) Industrial Control Equipment is listed in classes 3211 xx. See Appendix 3 for information on electrical protective equipment.

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## **APPENDIX 1**

### **Guidelines for Short Circuit Withstand Ratings for Special Industrial Control Assemblies**

The short circuit rating of an assembly of industrial control components with single or multiple loads are to be determined as follows:

1. The overall panel short circuit rating shall be lowest short circuit withstand rating of any individual branch circuit within the assembly.
2. For motor loads the branch circuit short circuit withstand rating is determined from Table 24 in CSA-C22.2 No. 14-10, except as indicated in item 3.
3. The short circuit withstand rating of a CSA Certified motor starter marked in accordance with clause 5.45-a or -b of CSA-C22.2 No. 14-10 and either: (1) provided with the recommended over-current protection; or (2) arranged so that the over-current protection could be provided externally and the equipment is marked to indicate the type of protection required; shall be the rating indicated.
4. The short circuit withstand rating of control circuits shall be the same as the short circuit interrupting rating of the Certified branch circuit protective devices provided in the primary of these circuits.
5. The short circuit rating of non-motor branch circuits shall be the CSA withstand rating marked on the circuit components or based on Table 24 (using rated current in lieu of horsepower) of CSA-C22.2 No. 14-10.

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## APPENDIX 2

### French Translations of Cautions, Warnings and Safety Instructions

5.16	"WARNING: MORE THAN ONE LIVE CIRCUIT. SEE DIAGRAM"
	"AVERTISSEMENT: CET EQUIPEMENT RENFERME PLUSIEURS CIRCUITS SOUS TENSION. VOIR LE SCHEMA".
C22.1 Sec. 28 & CSA- C22.2 No. 0	"WARNING: SEPARATE MOTOR OVERCURRENT, OVERLOAD AND OVERHEATING PROTECTION IS REQUIRED TO BE PROVIDED IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE, PART 1."
	"AVERTISSEMENT: LE MOTEUR DOIT ETRE MUNI D'UNE PROTECTION DISTINCTE CONTRE LES SURINTENSITES, LA SURCHARGE ET LA SURCHAUFFE CONFRMEMENT AU CODE CANADIAN DE L'ELECTRICITE, PREMIERE PARTIE."
5.31	"WARNING: THE OVERLOAD RELAY MUST BE REPLACED IF BURN-OUT OF THE CURRENT ELEMENT OCCURS"  -"AVERTISSEMENT: LE RELAIS DE SURCHARGE DOIT ETRE REMPLACE SI L'ELEMENT PORTEUR DE COURANT EST GRILLE".
5.43	"WARNING: TWIST WIRES TOGETHER BEFORE INSERTING IN TERMINAL"  "AVERTISSEMENT: ENROULEZ LES FILS ENSEMBLE AVANT DE LES INTRODUIRE DANS LA BORNE".
5.42	"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 EXTENDED AT LEAST 150 mm BEYOND THE EQUIPMENT ON ALL SIDES MUST BE INSTALLED."
5.42	"AVERTISSEMENT: LORSQUE L'APPAREIL EST INSTALLE SUR OU AU-DESSUS D'UNE SURFACE COMBUSTIBLE, ON DOIT PREVOIR UNE PLAQUE D'ACIER GALVANISE D'AU MOINS 1.43 mm OU UNE PLAQUE SANS REVETEMENT DE 1.6 mm SE PROLONGEANT SUR AU MOINS 150 mm TOUT AUTOUR DE L'APPAREIL".
CSA- C22.2 No. 0	"WARNING: CAPACITIVE VOLTAGES ABOVE 50V MAY REMAIN FOR _____ SEC'S AFTER POWER IS DISCONNECTED" or equivalent;
	"AVERTISSEMENT: DES TENSIONS SUBSISTENT AUX BORNES DES CONDENSATEURS PENDANT _____ SECONDES APRES L'OUVERTURE DE CIRCUIT D'ENTREE."
5.30.2 a)	"WARNING: MANUFACTURERS INSTRUCTIONS FOR SELECTING CURRENT ELEMENTS AND SETTING THE INTERRUPTERS MUST BE FOLLOWED"
5.30.2 b)	"WARNING: IF AN OVERLOAD OR FAULT CURRENT HAS OCCURRED, CURRENT-CARRYING COMPONENTS OR THE CONTROLLER SHOULD BE EXAMINED AND REPLACED IF DAMAGED. IF FAULT CONDITION HAS EXISTED, THEN THE INTEGRAL CURRENT SENSORS MUST ALSO BE REPLACED"
5.30.2 a)	"AVERTISSEMENT: SUIVRE LES INSTRUCTIONS DU FABRICANT POUR LA SECTION DES ELEMENTS PORTEURS DE COURANT ET LE REGLAGES DES INTERRUPTEURS".
5.30.2 b)	"AVERTISSEMENT: SI L'INTERRUPTEUR S'EST DECLENCHE, EXAMINER LES PIECES PORTEUSES DE COURANT DU CONTROLEUR ET LES REMPLACER AU BESOIN."

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## APPENDIX 3

### Protective Devices

<u>DEVICE</u>	<u>Types of Protection Provided</u>	<u>Restriction of Use</u>	<u>CSA Std</u>	<u>US Std (UL)</u>	<u>Harmonization Status</u>	<u>Watch list Status</u>	<u>Identification Marking</u>	<u>Listing</u>	<u>Additional Comments</u>
Enclosed, Fusible Switch	Disconnect (D), Isolation (I), Short Circuit Interrupting (SCI), Overload (OL) & Coordination (C)	None	CSA-C22.2 No. 4	98	Yes	No	CSA Monogram	4651 01	
Circuit breaker, (inverse time, thermal magnetic)	D, I, SCI, OL, C	None	CSA-C22.2 No. 5	489	Yes	No	CSA Monogram	1431 01, 1432 01,	
Comb GFCI Breaker	D, I, SCI, OL, C & Ground Fault Circuit Interruption (GFCI)	None	CSA-C22.2 No. 5 & CSA-C22.2 No. 144	489, 943	Pending	No	CSA Monogram	1451 01	
Comb AFCI Breaker	D, I, SCI, OL, C, Arc Fault Circuit Interrupting (AFCI)	None	CSA-C22.2 No. 5 & T.I.L. M-02A	489, 1699	No Approximately equivalent	No	CSA Monogram	1431 02	
Combination Motor Controller - Types A, C, D, E. See Table 42 of CSA CSA-C22.2 No. 14 for details.	D, I, SCI, OL, C* (*for motors only)	Motor Branch Circuits - Per Section 28 of the CEC, Part I	CSA-C22.2 No. 14	508	No Approximately equivalent	No	CSA Monogram & the phrase - Combination Motor Controller or "Comb Mtr Cont."	3211 04	
Combination Motor Controller - Types F	D, I, SCI, OL, C* (*for motors only)	Not Recognized in the CEC, Part I at this time	NONE	508	No CSA Certification offered at this time	No	Not Available	NONE	

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<u>DEVICE</u>	<u>Types of Protection Provided</u>	<u>Restriction of Use</u>	<u>CSA Std</u>	<u>US Std (UL)</u>	<u>Harmonization Status</u>	<u>Watch list Status</u>	<u>Identification Marking</u>	<u>Listing</u>	<u>Additional Comments</u>
Enclosed, non-fusible switch	D, I, Short Circuit Withstand (SCW) or Conditional Short Circuit (CSC) rating.	For Disconnect & Isolation Uses only including Feeder and Branch Disconnects - per Sections 14, & 28 of CEC, Part I	4	98	Yes	No	CSA Monogram, May have SCW rating or CSC rating with indication of required SC protective Device.	4651 01	
Open, Non-fusible Switch	D, I, SCW or CSC rating	For Disconnect & Isolation Uses only including Feeder and Branch Disconnects - per Sections 14, & 28 of CEC, Part I	4	98	Yes	No	CSA Monogram, May have SCW rating or CSC rating with indication of required SC protective Device.	4651 02 ,	
Open, Non-fusible Isolating Duty Switch	D, I, SCW or CSC rating	For use only , requires use of another switching device to make or break current	4	98	Yes	No	CSA Monogram and "WARNING: Isolating Switch Only, Do Not Operate Under Load" or equivalent. May have SCW rating or CSC rating with indication of required SC protective Device.	4651 02 ,	
Open, Fusible Switch	D, I, SCI, OL & C	None	CSA-C22.2 No. 4	98	Yes	No	<u>CSA Monogram</u>	<u>4651 02</u> ,	
Fuses, Class H	SCI, OL, C	14-212 (a)	CSA-C22.2 No. 248 series, Parts 6 & 7	248 series, Parts 6 & 7	Yes	No	CSA Monogram	1421 01 / 02	

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<u>DEVICE</u>	<u>Types of Protection Provided</u>	<u>Restriction of Use</u>	<u>CSA Std</u>	<u>US Std (UL)</u>	<u>Harmonization Status</u>	<u>Watch list Status</u>	<u>Identification Marking</u>	<u>Listing</u>	<u>Additional Comments</u>
Fuses, Class CA, CB, CC, G, J, K, L, R, T	SCI, OL, C	None See 140212 (b)	CSA-C22.2 No. 248 series	248 series	Yes	No	CSA Monogram	1422 02	
Fuses, Class C, HRCII-Misc	SCI, OL, C	None See 140212 (c), (d) Not permitted in branch circuit applications, must review required short circuit ratings and overload coordination for the specific application. Not permitted in branch circuit applications, must review required short circuit ratings and overload coordination for the specific application.	CSA-C22.2 No. 248 series Part 2, CSA-C22.2 No. 106 respectively	248 series, No ULI type HRCII-Misc available	Yes (except HRCII-Misc)	No	CSA Monogram	1422 02	
Fuses - Supplemental	Limited SCI, OL	Not Permitted in branch circuit applications, must review required short circuit ratings and overload coordination for the specific application.	CSA-C22.2 No. 248 series, Part 14	248 Series, Part 14	Yes	UL Recognized	CSA Monogram	1422 01, Glass cartridge type	Most have a 10,000A SCI at 120V and a limited SCI (e.g. 35A, at 240Vac)
Fuses - Supplemental	Limited SCI, OL	See conditions of acceptability	CSA-C22.2 No. 248 Series Part 14 and TIL CA-07	NA	No	UL Recognized	CSA Component Acceptance Mark	1422 30	
Semiconductor Fuses	SCI	Not for branch circuit applications. Permitted as supplemental protection for solid state components only.	CSA-C22.2 No. 248 series, Part 13	248 series, Part 13	Yes	UL Recognized	CSA Component Acceptance Mark	1422 30	Most have a High fault interrupting rating, and non-standard or non tested overload

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<u>DEVICE</u>	<u>Types of Protection Provided</u>	<u>Restriction of Use</u>	<u>CSA Std</u>	<u>US Std (UL)</u>	<u>Harmonization Status</u>	<u>Watch list Status</u>	<u>Identification Marking</u>	<u>Listing</u>	<u>Additional Comments</u>
Molded Case Switch, open or enclosed	D, I, SCW or CSC rating.	For Disconnect & Isolation Uses only including Feeder and Branch Disconnects - per Sections 14, & 28 of CEC, Part I	CSA-C22.2 No. 5	489	Yes	No	CSA Monogram, and a) With the switch symbol: , orb) <sup>2</sup> Caution <sup>2</sup> and with the following or equivalent statement <sup>2</sup> Does not provide over-current protection. <sup>2</sup> May have SCW rating or CSC rating with indication of required SC protective Device.	4652 06	
Instantaneous Trip Circuit Breaker or Mag - Only CB or Motor Circuit Protector	D, I, Provides SC protection	Only permitted as part of a Certified, Type D combination motor controller per Rule 28-210	CSA-C22.2 No. 5 and tested as part of a Comb. Mtr Controller per CSA-C22.2 No. 14	489 and tested as part of a combination motor controller per UL 508	Equivalent	UL Recognized Yes. UL may not perform SC tests per more severe spec 14 requirements	CSA Mark. No Marked SC rating on the component. Has adjustable trip setting and instructions	4652 04	Some are not tested for an independent short circuit interrupting capacity
Overload Relay	OL, SCW or CSC	For use with a motor controller to provide motor overload protection per Rule 28-300 to 28-318	CSA-C22.2 No. 14	508	No		CSA Mark. May have SCW rating or CSC rating with indication of required SC protective Device.	3211 03	

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DQD 529.02 Rev 2012-03-10

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<u>DEVICE</u>	<u>Types of Protection Provided</u>	<u>Restriction of Use</u>	<u>CSA Std</u>	<u>US Std (UL)</u>	<u>Harmonization Status</u>	<u>Watch list Status</u>	<u>Identification Marking</u>	<u>Listing</u>	<u>Additional Comments</u>
Starter	Control, OL, SCW or CSC	For use with a motor controller to provide motor overload protection per Rule 28-300 to 28-318 For use as a local motor or local controller disconnect on the load side of the branch circuit over-current devices, per 28-602(3) (b)	CSA-C22.2 No. 14	508	No	Yes UL may not perform SC tests per more severe spec 14 requirements Yes. UL may not perform 1-ph SC tests per spec 14/ TIL D-24 requirements	CSA Mark. May have SCW rating or CSC rating with indication of required SC protective Device.	3211 04	
Manual Motor Controller Marked Suitable for Motor Disconnect	Control, may or may not have OL- check markings, D*, I* for limited applications	For use with a motor controller to provide motor overload protection per Rule 28-300 to 28-318 For use as a local motor or local controller disconnect on the load side of the branch circuit over-current devices, per 28-602(3) (b)	CSA-C22.2 No. 14-95 + TIL D-24 or CSA-C22.2 No. 14 - 05	508	Equivalent	Yes. UL may not perform 1-ph SC tests per spec 14/ TIL D-24 requirements	CSA Mark plus the phrase "Suitable for Motor Disconnect"	3211 05	
Supplementary Protectors	Performs at least one of the following: D*, I*, SC*, OL*, C*, Undervoltage trip (UV*), Overvoltage trip (OV*) or trip via other signal. Protection may or may not be compatible with CEC, Part I.	Not Acceptable for Use in Branch circuit or motor branch circuit applications.	CSA-C22.2 No. 235	77	Similar	UL Recognized	CSA Component Acceptance Mark. Plus mark or literature identifying the component as a "Supplementary Protector"	3215 30	See Appendix 4 for guidelines on the uses of supplementary protectors
Tap Circuit Protector	Control, SCI	Not mentioned I the CEC, Part I	None	508	No equivalence	??	none	None	Treated as controls suitable for installation on a common branch.

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## APPENDIX 4

### Guidelines for the Use of Supplementary Protectors

Supplementary protectors shall be permitted to be used as follows:

1. They are suitable for industrial use as determined by Table 1 of CSA-C22.1 No. 235
2. They are a type suitable for the function intended – i.e. under-voltage trip, over-voltage trip; overload trip etc.
3. Their short circuit rating is adequate for the circuit in which they are used.  
*Note: 2 kA minimum for a control circuit with an external source; or as determined  $X_{mer} VA / (Sec\ voltage \times \%z)$  of a single phase internal control transformer.*
4. The line side fuse is provided in accordance with the manufacturer's literature.
5. The contact rating is suitable to interrupt rated overload currents, See Application Codes – OL:0 and OL:1.
7. Where the protector is required to isolate a load from the source for personnel protection during maintenance, the protector has a suitable short circuit application code rating. See Application Codes – SC:U3; SC: U1a and SC: C1a.
8. Where the protector is intended to protect a component or circuit from overheating due to overload, the appropriate level of protection is provided. See Application Codes TC:0, TC:1, TC:2 and TC:3.
9. A protector used as the primary protection of a \*control transformer shall have application codes SC:U3; TC:3 and OL:1 and the short circuit rating shall be equal to or greater than the assembly rating.

*\*Note: Power transformers are required to be protected in accordance with the local electrical codes. See definitions within the code for "control circuit".*

**NOTE:** See Annexes to CSA-C22.2 No. 235 for details of Application Codes applicable to Supplementary Protectors

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## **ATTACHMENT 2**

### Major Revisions

#### of CSA Standard C22.2 No. 14-10, Industrial Control Equipment

<b>Subject</b>	<b><u>Affected Equipment</u></b>	<b><u>Type of Change</u></b> (i.e. New or Previous Requirement)	<b><u>C22.2 No. 14</u></b> (Clauses, Tables, Appendices)
Scope	All – Class No's 3211 02 to 09, 37, 46.	Clarification of intended scope.	1.1, 1.3
Ambient operating temperature 0-40C.	All – Class No's 3211 02 to 09, 37, 46.	New clause to clarify the intent.	1.5
Revised securement test values of field wiring terminals.	Class No's 3211 03/04/05/06, Industrial Control Components.	Incorporates TIL No. D-32	4.14.1.4.10 and Table 54
Test method for optional additional "inside-delta" horsepower rating.	Magnetic Motor Controllers – Contactors -Starters. Class No's 3211 04	Incorporates LTR M-002 into the body of this Standard.	6.5.16; Table 15; Table 20 and Fig 8.
Minimum conductors spacings for printed wiring boards.	Solid state motor controllers and Industrial Control Equip with PCB Class No. 3211 06/07		Table 40