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(reaffirmed 2019)

Requirements for manually operated generator transfer panels

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Revision History

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The following revisions have been formally approved and are marked by the symbol delta (Δ) in the margin on the attached replacement pages:

Revised	Clauses 6.1 and 6.9
New	Clauses 5.9.6 and 6.8A
Deleted	None

- Update your copy by inserting these revised pages.
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5.7.4
Unless barriers that are riveted, welded, or otherwise secured in place are provided to prevent the running of wires from end to end in a transfer panel, sufficient wiring space shall be provided for
(a) twice the number of conductors required for the switching poles; and
(b) one additional neutral conductor when a solid neutral is provided.

5.7.5
The design and arrangement of an operating mechanism and its relation to a wiring space shall be such that the mechanism will not injure wires with which it may come in contact during its operation.

5.8 Electrical spacings

5.8.1
The electrical spacings in transfer panels shall be not less than those specified in Table 1.

5.8.2
In measuring a spacing between a bare live part and a bushing installed in the knockout, it shall be assumed that a bushing having the dimensions specified in Table 2 is in place, in conjunction with a single locknut installed on the outside of the enclosure.

5.8.3
Bare live parts shall not come into contact with the barrier or liner unless the barrier or liner is of a material suitable for use as a base for the mounting of live parts, and is
(a) not less than 0.66 mm (0.026 in) thick; or
(b) not less than 0.33 mm (0.013 in) thick if used in conjunction with an air gap of not less than half that required if the barrier or liner were omitted.

5.8.4
Barriers or liners that cannot come into contact with bare live parts shall be of a suitable material adequately supported against distortion that would result in their coming into contact with bare live parts under normal conditions of service. These barriers or liners shall be
(a) not less than 0.66 mm (0.026 in) thick; or
(b) not less than 0.33 mm (0.013 in) thick if used in conjunction with an air gap of not less than half that required if the barrier or liner were omitted.

Note: *Insulating materials having a thickness less than that specified in Clauses 5.8.3 and 5.8.4 may be used if, upon investigation, they are found to have mechanical and electrical properties adequate for all normal conditions of service.*

5.8.5
Wire connectors shall be prevented from turning so as to reduce the spacings below those required by Table 1, except that means to prevent turning may be omitted if the required spacings are maintained when connectors are turned 30° toward each other or toward other bare live parts or grounded metal, including the enclosure.

5.8.6
Terminals and other parts intended to be connected to the grounded conductor of a circuit shall be considered as bare live parts. The voltage from such neutral live parts to grounded non-current-carrying conductive parts shall be considered to be equal to the line-to-neutral voltage of the system.

5.9 Operating mechanism

5.9.1
The construction of the operating mechanism shall be strong enough to ensure reliable and positive electrical and mechanical performance (see Clause 7.4.1).

5.9.2
Provision shall be made to prevent adjusting screws and similar adjustable parts from loosening under the conditions of actual use.

5.9.3
Transfer switches in a transfer panel shall be externally operable without the necessity of opening the enclosure.

5.9.4
The operating mechanism shall be reliably interlocked mechanically to prevent simultaneous connection to both the normal and alternative supplies.

5.9.5
Removal of covers, doors, or access panels shall not result in defeating the interlocking mechanism.

Δ **5.9.6**
The operating mechanism used to interlock the switching means in Clause 5.13 shall be permanently attached to the switching means. There shall be no exposed screws, bolts, or other fastening devices that are externally removable and that are intended to be used to permanently attach the interlock to the switching means, unless those fastening devices are staked or are rendered inoperable.

5.10 Bonding and grounding

5.10.1
Transfer panels shall be constructed to comply with the requirements of CSA C22.2 No. 0.4.

5.10.2
The equipment shall be provided with means to terminate two ground wires. The termination means shall be suitable to terminate wires sized in accordance with Table 3.

5.11 Neutral connections

5.11.1
An isolated neutral bar together with two wire terminals shall be provided to facilitate the connection of the generator neutral to the neutral bus of the panelboard fed from the utility supply.

5.11.2
A transfer panel that is intended for use with generators where the bonding of the neutral to the generator frame is not removable shall be provided with a switch for the neutral such that the neutral is simultaneously disconnected when the transfer panel is in the normal (utility) supply mode.

5.11.3
The terminals shall be capable of terminating wire sizes for the current rating of the transfer panel based on 60 °C copper wire from Table 2 of the *Canadian Electrical Code, Part I,* or 60 °C aluminum wire from Table 4 of the *Canadian Electrical Code, Part I*.

5.12 Ratings

5.12.1
Transfer panels shall be rated in volts and amperes for each input and output circuit. The rating of alternating-current equipment shall include the number of phases and, if necessary, the frequency for both normal and alternative sources.

5.12.2
The following standard voltage ratings are applicable to transfer panels: 120, 240 V AC.

5.12.3
Transfer panels shall be rated with short-circuit ratings for both the normal and alternative sources.

5.13 Switching means

5.13.1 Circuit breakers and moulded-case switches

5.13.1.1
The use of independent moulded-case circuit breakers and/or switches for the utility (normal) source and the standby generator source, together with an interlock mechanism that complies with Clause 5.9, shall be permitted within the accepted ratings of the breaker or switch.

5.13.1.2
The short-circuit interrupting rating of each circuit breaker (or the short-circuit rating of each moulded-case switch) shall be sufficient for its source as indicated in Clause 5.12.3.

5.13.1.3
The endurance, short-circuit, closing, and dielectric withstand (repeated) tests shall not be required on a transfer panel incorporating moulded-case circuit breakers or moulded-case switches in accordance with Clauses 5.13.1.1 and 5.13.1.2.

5.13.1.4
The overload and dielectric withstand tests described in Clauses 7.2 and 7.5, respectively, shall be performed.

5.13.2 Special use (snap) switches

5.13.2.1
Where special use switches (e.g., snap switches) are used to switch between the utility (normal) and the standby generator, they shall be used within their ratings and shall
(a) be of the double-throw type; or
(b) be two independent switches, one for the utility (normal) source and one for the standby generator (emergency) source, and be equipped with an interlock mechanism in accordance with Clause 5.9.

5.13.2.2
The endurance test of Clause 7.4 shall not be required on individual transfer switches consisting of special use (snap) switches that have been tested in accordance with the requirements of CSA C22.2 No. 55.

5.13.2.3
Transfer panels with a short-circuit rating of 5000 A, incorporating snap switches and marked in accordance with Clause 6.7, shall not be subjected to the short-circuit tests of Clauses 7.6 to 7.9.

5.13.2.4
Except as noted in Clauses 5.13.2.2 and 5.13.2.3, transfer panels incorporating special use switches shall comply with the test requirements of Clause 7.

5.13.3 Other switches
Transfer panels incorporating switching means other than those described in Clauses 5.13.1 and 5.13.2 shall comply with the test requirements of Clause 7.

5.13.4 Use of supplementary protectors

5.13.4.1
Supplementary protectors, if included in transfer panels, shall
(a) be in accordance with CAN/CSA-C22.2 No. 235; and
(b) be tested in accordance with Clause 7.10 and be limited to the applications indicated in Clauses 5.13.4.2 and 5.13.4.3.

Note: *Test data for the supplementary protector may be reviewed for compliance with Clause 7.10.*

5.13.4.2
When a supplementary protector is provided in the transfer panel circuit, the branch circuit protection of that circuit shall be provided by a suitable overcurrent protective device included in the panelboard when the transfer switch is in the normal position.

5.13.4.3
The short-circuit rating of the supplementary protector, as tested in accordance with Clause 7.10, shall be suitable for the emergency or generator supply short-circuit rating indicated in Table 4, and, if included in the circuit when the transfer switch is in the normal or utility position, shall be suitable for the normal short-circuit rating.

6 Marking

Δ **6.1**
Transfer panels shall be readily marked with the wording "GENERATOR TRANSFER PANEL", the manufacturer's name or trademark, distinctive catalogue number or the equivalent rating, and a code to permit the determination of the month and year of manufacture. All markings shall be located so as to be visible after installation.

Note: *A marking that is readily visible by opening a door or by removing a cover after installation is considered acceptable, except as noted below.*

6.2
A transfer panel shall be marked in English and French as follows:
"WARNING: DISCONNECT ALL SOURCES OF SUPPLY BEFORE SERVICING"
and
"AVERTISSEMENT. COUPER TOUTES LES SOURCES D'ALIMENTATION AVANT DE FAIRE L'ENTRETIEN ET LES RÉPARATIONS".
The marking shall be visible after installation with doors and covers secured in place.

6.3
Wiring terminals shall be suitably marked for normal and emergency lines and load, and the equipment shall be provided with a suitable wiring diagram to indicate the connections.

6.4
The transfer panel shall be provided with instructions for periodic testing and maintenance.
See Clause 6.9.

6.5
A transfer panel having wiring terminals that are suitable for use with copper or aluminum wires shall be marked as follows:
"USE COPPER OR ALUMINUM WIRE" or with the abbreviation "CU-AL".

6.6
A transfer panel shall be marked with the following wording, or its equivalent, to indicate the neutral-to-ground configuration of the generators with which it is intended to be used:
"Suitable for use only with generators with floating neutral. See installation instructions"
or
"Suitable for use only with generators with neutral bonded to the generator frame. See installation instructions".

6.7
Where required by Clause 5.13.2.3, the following wording, or its equivalent, shall be marked on the equipment
"CAUTION: OPENING OF A PANELBOARD FUSE OR CIRCUIT BREAKER IS AN INDICATION THAT A FAULT HAS OCCURRED. HAVE THE ASSEMBLY INSPECTED BY A LICENSED ELECTRICIAN AND REPLACE DAMAGED COMPONENTS. SEE INSTRUCTIONS"
and
"ATTENTION. SI UN FUSIBLE GRILLE OU UN DISJONCTEUR S'OUVRE DANS LE PANNEAU, C'EST QU'UN DÉFAUT C'EST PRODUIT. FAIRE INSPECTER L'INSTALLATION PAR UN ÉLECTRICIEN AGRÉÉ ET REMPLACER LES COMPOSANTS ENDOMMAGÉS. VOIR LES INSTRUCTIONS".

6.8
The utility and emergency supply positions of all transfer switches shall be plainly marked so as to be visible after installation with all covers in place. Preferred designations are "Normal" and "Emergency" or "Utility" and "Standby".

Δ **6.8A**
The following wording, or its equivalent, shall be marked on the equipment:
WARNING: TAMPERING WITH THE INTERLOCK, OR INCORRECT WIRING OF EITHER NORMAL OR EMERGENCY POWER SOURCES TO THE LOAD TERMINALS, MAY RESULT IN EQUIPMENT DAMAGE OR ELECTRIC SHOCK AND FIRE HAZARDS"
and
"AVERTISSEMENT : L'ALTÉRATION DU VERROUILLAGE, OU UN MAUVAIS RACCORDEMENT DES SOURCES D'ALIMENTATION NORMALE OU DE SECOURS AUX BORNES DE SORTIE, PEUT ENTRAÎNER DES DOMMAGES, UN RISQUE DE CHOC ÉLECTRIQUE OU D'INCENDIE".

Δ **6.9**
Installation and maintenance instructions shall be provided with each unit and shall contain the following minimum information:
(a) installation instructions that detail how the assembly is intended to be installed in accordance with the *Canadian Electrical Code, Part I;*

(b) a statement, or its equivalent, as follows:
"CAUTION: THIS EQUIPMENT MUST BE INSTALLED IN ACCORDANCE WITH THE LOCAL ELECTRICAL CODES. IT IS INTENDED THAT THE INSTALLATION OF THIS EQUIPMENT BE PERFORMED BY A LICENSED ELECTRICIAN. INSPECTION OF THE INSTALLATION BY THE LOCAL INSPECTION AUTHORITY IS REQUIRED. PROOF OF THE INSPECTION SHOULD BE KEPT FOR INSURANCE CLAIMS"
and
"ATTENTION. CE MATÉRIEL DOIT ÊTRE INSTALLÉ CONFORMÉMENT AUX CODES DE L'ÉLECTRICITÉ LOCAUX. CONFIER L'INSTALLATION DU MATÉRIEL À UN ÉLECTRICIEN AGRÉÉ. L'INSPECTION DU MATÉRIEL PAR LES POUVOIRS DE RÉGLEMENTATION LOCAUX EST OBLIGATOIRE. CONSERVER LE CERTIFICAT D'INSPECTION POUR LES ASSURANCES";

(c) the following statement:
"WARNING: DISCONNECT MAIN SWITCH OR CIRCUIT BREAKER IN THE DISTRIBUTION PANELBOARD BEFORE INSTALLATION OR SERVICING"
and
"AVERTISSEMENT. OUVRIR L'INTERRUPTEUR PRINCIPAL OU LE DISJONCTEUR DANS LE PANNEAU DE DISTRIBUTION AVANT L'INSTALLATION OU L'ENTRETIEN";

(d) the instructions for the examination and replacement of component parts, including ordering information as required by Clause 6.7;

(e) the following phrase for transfer panels not provided with a switching means for the neutral, in accordance with Clause 5.11.2:
"WARNING: FOLLOW GENERATOR MANUFACTURER'S INSTRUCTIONS FOR REMOVING BOND BETWEEN GENERATOR NEUTRAL AND FRAME"
and
"AVERTISSEMENT. RESPECTER LES INSTRUCTIONS DU FABRICANT DE LA GÉNÉRATRICE POUR RETIRER LA CONNEXION ENTRE LE NEUTRE DE LA GÉNÉRATRICE ET LE BÂTI";

(f) the following phrase for transfer panels provided with a means to switch to neutral:
"WARNING: FOLLOW GENERATOR MANUFACTURER'S INSTRUCTIONS TO ENSURE A BOND BETWEEN GENERATOR NEUTRAL, GENERATOR FRAME AND GROUND EXISTS WHEN IN THE EMERGENCY SUPPLY POSITION"
and
"AVERTISSEMENT. RESPECTER LES INSTRUCTIONS DU FABRICANT DE LA GÉNÉRATRICE POUR ASSURER UNE LIAISON ENTRE LE NEUTRE, LA CARCASSE ET LA TERRE DE LA GÉNÉRATRICE EN POSITION 'ALIMENTATION DE SECOURS'", and

(g) the following warning:
"WARNING: TAMPERING WITH THE INTERLOCK, OR INCORRECT WIRING OF EITHER NORMAL OR EMERGENCY POWER SOURCES TO THE LOAD TERMINALS MAY RESULT IN EQUIPMENT DAMAGE OR ELECTRIC SHOCK AND FIRE HAZARDS"
and
"AVERTISSEMENT. L'ALTÉRATION DU VERROUILLAGE, OU UN MAUVAIS RACCORDEMENT DES SOURCES D'ALIMENTATION NORMALE OU DE SECOURS AUX BORNES DE SORTIE PEUT ENTRAÎNER DES DOMMAGES, UN RISQUE DE CHOC ÉLECTRIQUE OU D'INCENDIE".

6.10
A label shall be provided either on the unit or loose, with blank spaces to be used for the identification of the individual branch circuits.

7 Tests

7.1 General

7.1.1
The performance of transfer panels and transfer switches, as applicable, shall be investigated by subjecting

a representative sample or samples in commercial form to the tests described in Clause 7 and as determined by Clause 5.13. The order of tests, as far as applicable, shall be as indicated in Table 5 and, unless otherwise indicated, the various tests shall be conducted at rated supply frequency and at the test potential indicated in Table 5.

7.1.2

Except as permitted in Clause 7.1.3, one sample shall complete the overload, temperature, endurance, and dielectric withstand tests. Previously untested samples may be used for the short-circuit withstand and closing tests.

Standards Update Service

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M. Smith	Rockwell Automation, Cambridge, Ontario	
A. Tsisserev	City of Vancouver, Vancouver, British Columbia	
T. Pope	CSA, Mississauga, Ontario	*Project Manager*

In addition to the members of the subcommittee, the following people also contributed to the development and publication of this Standard:

J. de Vaal	Thomson Technology Inc., Surrey, British Columbia
D. Pybus	Ascoelectric Limited, Brantford, Ontario

Preface

This is the first edition of CSA C22.2 No. 178.2, *Requirements for manually operated generator transfer panels*, one of a series of Standards issued under Part II of the *Canadian Electrical Code*. This Standard incorporates the requirements of CSA International's Technical Information Letter No. M-03.

Once published, provisions for automatic transfer switches and high voltage transfer switches will be covered in CSA C22.2 No. 178.1 and C22.2 No. 178.3, respectively.

For general information on the Standards of the *Canadian Electrical Code, Part II*, see the Preface of CAN/CSA-C22.2 No. 0, *General Requirements — Canadian Electrical Code, Part II*.

This Standard was prepared by the Subcommittee on C22.2 No. 178, under the jurisdiction of the Technical Committee on Industrial Products and the Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the Technical Committee.

Interpretations: The Strategic Steering Committee on Requirements for Electrical Safety has provided the following direction for the interpretation of standards under its jurisdiction. "The literal text shall be used in judging compliance of products with the safety requirements of this Standard. When the literal text cannot be applied to the product, such as for new materials or construction, and when a relevant committee interpretation has not already been published, CSA's procedures for interpretation shall be followed to determine the intended safety principle".

January 2004

Notes:

(1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*

(2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*

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Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization *and are published in CSA's periodical* Info Update*, which is available on the CSA Web site at www.csa.ca.*

Foreword

The Canadian Standards Association (CSA) develops standards under the name Canadian Standards Association, and provides certification and testing under the name CSA International. CSA International provides certification services for manufacturers who, under license from CSA, wish to use the appropriate registered CSA Marks on certain products of their manufacture to indicate conformity with CSA Standards.

CSA Certification for a number of products is provided in the interest of maintaining agreed-upon standards of quality, performance, interchangeability and/or safety, as appropriate. Where applicable, certification may form the basis for acceptance by inspection authorities responsible for enforcement of regulations. Where feasible, programs will be developed for additional products for which certification is desired by producers, consumers, or other interests. In performing its functions in accordance with its objectives, CSA does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of the Association represent its professional judgement given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed.

Products in substantial accord with this Standard but which exhibit a minor difference or a new feature may be deemed to meet the Standard providing the feature or difference is found acceptable utilizing appropriate CSA International Operating Procedures. Products that comply with this Standard shall not be certified if they are found to have additional features which are inconsistent with the intent of this Standard. Products shall not be certifiable if they are discovered to contravene applicable laws or regulations.

Testing techniques, test procedures, and instrumentation frequently must be prescribed by CSA International in addition to the technical requirements contained in Standards of CSA. In addition to markings specified in the Standard, CSA International may require special cautions, markings, and instructions that are not specified by the Standard.

Some tests required by CSA Standards may be inherently hazardous. The Association neither assumes nor accepts any responsibility for any injury or damage that may occur during or as the result of tests, wherever performed, whether performed in whole or in part by the manufacturer or the Association, and whether or not any equipment, facility, or personnel for or in connection with the test is furnished by the manufacturer or the Association.

Manufacturers should note that, in the event of the failure of CSA International to resolve an issue arising from the interpretation of requirements, there is an appeal procedure: the complainant should submit the matter, in writing, to the Secretary of the Canadian Standards Association.

If this Standard is to be used in obtaining CSA Certification please remember, when making application for certification, to request all current Amendments, Bulletins, Notices, and Technical Information Letters that may be applicable and for which there may be a nominal charge. For such information or for further information concerning CSA Certification, please address your inquiry to Applications and Customer Service, CSA International, 178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3.

C22.2 No. 178.2-04
Requirements for manually operated generator transfer panels

1 Scope

1.1
This Standard covers manual transfer panels having maximum ratings of 250 V, 60 A, for use in non-hazardous locations in accordance with the *Canadian Electrical Code, Part I*.

1.2
This Standard covers manual transfer panels that are intended for use on the load side of a distribution on a single-phase, 2-wire or 3-wire system to provide manual switching from the normal supply to power supply from a generator in the event of failure of the normal power or in other similar situations.

1.3
Transfer panels are generally considered suitable for emergency use only and are intended to be operated when the power from the utility is not available.

1.4
Transfer panels covered by this Standard are intended to be used with generators where
(a) the neutral is not bonded to the frame of the generator;
(b) the bond between the neutral and the frame can be removed in accordance with the manufacturer's instructions; or
(c) there is no means of isolating the neutral from the generator frame.

1.5
In CSA Standards, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; and "may" is used to express an option or that which is permissible within the limits of the standard. Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material. Notes to tables and figures are considered part of the table or figure and may be written as requirements. Legends to equations and figures are considered requirements.

1.6
The values given in SI (metric) units are the standard. The values given in parentheses are for information only.

2 Reference publications
This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below, including all amendments published thereto.