CSA GROUP™

**CSA C390:10**
National Standard of Canada
*(reaffirmed 2019)*

# Test methods, marking requirements, and energy efficiency levels for three-phase induction motors

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Standards Council of Canada
Conseil canadien des normes

REVISED JANUARY 2020

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# *Revision History*

**CSA C390:10, Test methods, marking requirements, and energy efficiency levels for three-phase induction motors** — originally published March 2010

**Note:** *For information about the* ***Standards Update Service*** *or if you are missing any updates go to* ***store.csagroup.org*** *or* ***techsupport@csagroup.org***.

**Revisions issued:**
**Update No. 1** — April 2015
**Update No. 2** — November 2016

| **Update No. 3 — January 2020** |
| --- |
| C390 calculation sheet (Excel attachment)<br><br>**Note:** *This updated calculation sheet replaces "C390_Calculation_Sheet_V1_2015".* |

| **National Standard of Canada — December 2019** |
| --- |
| Outside front cover, National Standard of Canada text and title page.<br><br>This Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group. |

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# *Update No. 2*
# *C390-10*
# *November 2016*

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**Title:** *Test methods, marking requirements, and energy efficiency levels for three-phase induction motors* — originally published March 2010

**Revisions issued:** Update No. 1 — April 2015

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

| | |
|---|---|
| **Revised** | Preface, Clauses 1.1, 2, and 9, Tables 3, 4, and 5, and Annexes D, E, and F |
| **New** | None |
| **Deleted** | Clause D.3 |

- Update your copy by inserting these revised pages.
- Keep the pages you remove for reference.

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# Δ *Preface*

This is the fourth edition of CSA C390, *Test methods, marking requirements, and energy efficiency levels for three-phase induction motors*. It supersedes the previous editions, published in 1998, 1993, and 1985, under the title *Energy Efficiency Test Methods for Three-Phase Induction Motors*, and Preliminary Standards C390.1 and C390.2, published in 1982. This new edition was revised to expand the scope to cover premium efficiency levels for 8-pole motors, update referenced standards, and update the Annexes.

CSA acknowledges that the development of this Standard was made possible, in part, by the financial support of BC Hydro, the Canadian Electricity Association (CEC), Hydro-Québec, Manitoba Hydro, Natural Resources Canada (NRCan), the Ontario Ministry of Energy and Infrastructure (OMEI), and the Ontario Power Authority.

This Standard is considered suitable for use for conformity assessment within the stated scope of the Standard.

This Standard was prepared by the Subcommittee on the Performance of Three-Phase Induction Motors, under the jurisdiction of the Technical Committee on Industrial Equipment and the Strategic Steering Committee on Performance, Energy Efficiency, and Renewables, and has been formally approved by the Technical Committee. It will be submitted to the Standards Council of Canada for approval as a National Standard of Canada.

*March 2010*

**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.*

**(3)** *This publication was developed by consensus, which is defined by* CSA Policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this publication.*

**(4)** *CSA Standards are subject to periodic review, and suggestions for their improvement will be referred to the appropriate committee.*

**(5)** *All enquiries regarding this Standard, including requests for interpretation, should be addressed to Canadian Standards Association, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6.*

*Requests for interpretation should*

*(a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*

*(b) provide an explanation of circumstances surrounding the actual field condition; and*

*(c) be phrased where possible to permit a specific "yes" or "no" answer.*

*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.*

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# C390-10
# Test methods, marking requirements, and energy efficiency levels for three-phase induction motors

## 1 Scope

Δ **1.1**
This Standard specifies the test methods and marking requirements, and references energy efficiency levels for three-phase induction motors.
**Note:** *The test methods contained in this Standard are not limited to specific types of motors, but where this Standard is referenced in regional legislation, some specific motor types might be included or excluded from the regulations.*

**1.2**
This Standard applies to three-phase induction motors rated 0.746 kW at 1800 rpm (or equivalent) and greater.

This Standard establishes minimum efficiency levels for both NEMA and IEC motor designations covered by legislated requirements. Efficiency requirements for units rated for operation at 60 Hz are defined in Tables 2 and 3. Efficiency requirements for units rated for operation at 50 Hz are defined in Tables 4 and 5.
**Note:** *An equivalent motor is a motor with the same torque output but with different kilowatt output and speed.*

**1.3**
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.

Annexes are designated normative (mandatory) or informative (nonmandatory) to define their application.

**1.4**
The values in SI (metric) units are the units of record for the purposes of this Standard. The values given in parentheses are for information and comparison only.

## Δ 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.

**CSA (Canadian Standards Association)**
C22.2 No. 77-95 (R2009)
*Motors with inherent overheating protection*

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### 1.2
This Standard applies to three-phase induction motors rated 0.746 kW at 1800 rpm (or equivalent) and greater.

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# *Annex D (informative)*
# ***Guideline for compliance with Canadian (federal and provincial) energy efficiency regulations for electric motors***

**Note:** *This Annex is not a mandatory part of this Standard. Specific details on regulatory requirements can be found in the applicable federal and provincial regulations where motors are regulated.*

## D.1 Scope
This Annex is a guideline to regulatory requirements for the minimum nominal efficiency of three-phase induction motors in Canada. It clarifies the types of motors that are subject to energy efficiency regulation, as this Standard applies to a wider scope of motor types than those subject to regulation. This Standard was developed to provide a common motor test methodology for reference by manufacturers, utilities, the federal government, and provincial/territorial governments.

## D.2 Jurisdiction
In Canada, the federal government and the provinces of Ontario, British Columbia, Nova Scotia, New Brunswick, and Québec have implemented energy efficiency regulations for three-phase induction motors.

The federal *Energy Efficiency Regulations* apply to motors that are imported into Canada or transported across provincial/territorial borders for the purpose of sale or lease. The provincial regulations apply to motors that are sold or leased within the provinces.

The federal regulations do not take precedence over the provincial regulations. Therefore, a motor that is imported into Canada and sold in a province that has motor regulations will have to meet both the federal and provincial requirements. The two levels of regulations are intended to be fully harmonized, but the motor dealer should be aware that some differences could exist.

## D.3 Summary of regulations

### D.3.1 General
The federal *Regulations Amending the Energy Efficiency Regulations* (the "Motor Amendment") specifying the minimum nominal efficiency levels for electric motors (given in Table 2) became effective on November 27, 1997. The Motor Amendment applies to motors manufactured on or after November 27, 1997. Explosion-proof motors and motors contained within an integral gear assembly as defined in the Motor Amendment did not have to meet these requirements until November 27, 1999.

Provincial regulations specifying the minimum nominal efficiency levels for electric motors (given in Table 2) came into effect in British Columbia and Nova Scotia on January 1, 1995; in New Brunswick on June 1, 1995; and in Ontario on January 1, 1996. Québec implemented energy efficiency regulations for electric motors on September 1, 1995. The regulations apply to motors manufactured on or after the respective effective dates.

At the time of revision of this Standard, the Government of Canada and some provincial governments were reviewing their energy efficiency regulations for electric motors with the intention of harmonizing them with proposals submitted by the National Electrical Manufacturers Association (NEMA) in cooperation with the US Department of Energy. The proposed revisions, which will include both NEMA and equivalent IEC motors, are intended to come into effect on January 1, 2011.

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