



December 2000

BULLETIN

Proposed Amendment to Canada's *Energy Efficiency Regulations*

DRY-TYPE TRANSFORMERS

The Office of Energy Efficiency (OEE) of Natural Resources Canada (NRCan) is proposing to amend Canada's *Energy Efficiency Regulations* (the Regulations) under which Canadian dealers would be required to comply with minimum energy performance standards for dry-type transformers imported or shipped interprovincially for sale or lease in Canada.

NRCan is concerned about the energy efficiency of transformers available in the marketplace. Economic analyses have shown that there are substantial energy savings to be achieved by regulating minimum efficiency levels. The regulation of dry-type transformers would significantly contribute to the reduction of carbon dioxide and other atmospheric emissions.

The purpose of this document is to provide stakeholders with background information for meaningful consultation on the content of the regulation before proceeding with pre-publication in the *Canada Gazette*. It attempts to address key issues that have previously been raised. It is not intended to provide a definitive representation of the proposed regulation.

BACKGROUND

In June 1997, NRCan distributed a bulletin which contained proposed regulations for transformers. NRCan conducted three consultation workshops in November 1997, June 1998 and October 1999 to receive comments on these proposed regulations.

Issues identified at the workshops included the transformers to be regulated (and excluded), the proposed energy efficiency standards and the economic analysis. Also of interest was harmonization with other Canadian (provincial) standards and the voluntary standard National Electrical Manufacturers Association (NEMA) TP 1-1996, *Guide for Determining Energy Efficiency for Distribution Transformers* and associated document TP 2-1998, *Standard Test Method for Measuring the Energy Consumption of Distribution Transformers*, in the U.S.

NRCan places a great deal of importance on consultation with stakeholders in the development of the Regulations. As a result of their input and through continued discussion with affected groups, NRCan has separated the processes for Dry-Type and Liquid Filled Transformers. The regulation discussed in this bulletin deals solely with *dry-type transformers*.

PRODUCT DESCRIPTION

NRCan is proposing that the Regulations will apply to single- and three-phase, 60 Hz, dry-type transformers with a primary voltage of 35 kV and below and a secondary voltage of 600 volts and below, rated 15 to 833 kVA for single-phase and 15 to 7500 kVA for three-phase.

Products specifically excluded from this regulation include:

1. Drive transformers
2. Rectifier and converter transformers
3. Autotransformers
4. Sealed and non-ventilated transformers
5. Welding transformers
6. Transformers with tap ranges greater than 10%.
7. Testing transformers
8. Furnace transformers
9. Instrument transformers

These exclusions are selected from the reference document CSA C802.2-00. Any additional suggestions for exclusion should include a description of the equipment and reasons for the exclusion. NRCan will consider exclusions of equipment (and variations) that, under the existing definitions, cannot reasonably be expected to meet the proposed efficiency levels.

ENERGY EFFICIENCY STANDARDS

Originally, the maximum losses specified in CSA International standard CSA-C802-94, *Maximum Losses for Distribution, Power and Dry-Type Transformers*, was proposed as the regulated energy efficiency standard for transformers.

Transformer workshop participants encouraged NRCan to consider harmonization of the transformer minimum efficiency levels with those specified in NEMA TP-1. NEMA TP-1 specifies transformer minimum efficiency levels as per cent efficiency. NRCan consulted with members of the CSA-C802 Technical Subcommittee and other stakeholders and is now proposing the following minimum per cent efficiency levels as the dry-type transformer energy efficiency standards as found in CSA-C802.2-00, Table 1. This table introduces a second decimal place to the minimum levels.

The reference winding temperature is 75EC.

single-phase				three-phase			
kVA	Minimum Low Voltage, V	1.2 kV Class, % Efficiency at .35 per unit nameplate load	BIL 20 - 150 kV, % Efficiency at .5 per unit nameplate load	kVA	Minimum Low Voltage, V	1.2 kV Class, % Efficiency at .35 per unit nameplate load	BIL 20 - 150 kV, % Efficiency at .5 per unit nameplate load
15	120 / 240	97.70	97.60	15	208Y / 120	97.00	96.80
25	120 / 240	98.00	97.90	30	208Y / 120	97.50	97.30
37.5	120 / 240	98.20	98.10	45	208Y / 120	97.70	97.60
50	120 / 240	98.30	98.20	75	208Y / 120	98.00	97.90
75	120 / 240	98.50	98.40	112.5	208Y / 120	98.20	98.10
100	120 / 240	98.60	98.50	150	208Y / 120	98.30	98.20
167	120 / 240	98.70	98.70	225	208Y / 120	98.50	98.40
250	120 / 240	98.80	98.80	300	208Y / 120	98.60	98.50
333	120 / 240	98.90	98.90	500	208Y / 120	98.70	98.70
500	480	–	99.00	750	208Y / 120	98.80	98.80
667	480	–	99.00	1000	208Y / 120	98.90	98.90
833	480	–	99.10	1500	480Y / 277	–	99.00
				2000	480Y / 277	–	99.00
				2500	480Y / 277	–	99.10
				3000	600Y / 347	–	99.10
				3750	4160Y / 2400	–	99.20
				5000	4160Y / 2400	–	99.20
				7500	4160Y / 2400	–	99.20

ENERGY PERFORMANCE TEST PROCEDURE

The CSA International standard, CSA-C802-94, *Maximum Losses for Distribution, Power and Dry-Type Transformers*, was revised by the Technical Subcommittee and will be republished as three separate standards entitled:

CSA-C802.1-00, *Minimum Efficiency Values for Liquid-Filled Distribution Transformers*; CSA-C802.2-00, *Minimum Efficiency Values for Dry-Type Transformers*; and
CSA-C802.3-00, *Minimum Efficiency Values for Power Transformers*.

NRCan is now proposing the document CSA-C802.2-00, *Minimum Efficiency Values for Dry-Type Transformers*, as the test procedure for transformers under regulation as described in this document.

The standard can be ordered after December 31, 2000 from:

CSA International
178 Rexdale Boulevard
Etobicoke, Ontario
M9W 1R3
1 800 463-6727
(747-4044 in Toronto)
<http://www.csa-international.org>

EFFECTIVE DATE

NRCan is proposing that these energy efficiency standards for transformers come into effect on **January 1, 2002**.

ECONOMIC ANALYSIS

There has been no change to the economic analysis for dry-type transformers.

NRCan employed benefit-cost analysis to determine the economic attractiveness of improving the energy efficiency of dry-type transformers. The net present value, calculated by subtracting the present value of incremental costs from the present value of incremental benefits, over the useful life of the product, was chosen as the indicator of economic attractiveness. The Base Case analysis used a 7 percent social discount rate, as prescribed by the Government of Canada Treasury Board, and Canada average industrial electricity prices, based on NRCan's official energy supply demand forecast (*Canada's Energy Outlook 1992–2020: Update 1996*). Sensitivity analyses were conducted around the discount rate (5 and 10 percent) and energy prices (high and low industrial electricity prices).

The economic analysis showed positive net benefits for the Base Case and all sensitivity scenarios for dry-type transformers. This finding supports the case for regulated minimum energy efficiency levels for dry-type transformers.

The industry representatives have indicated agreement with the market information and analysis presented at the previous workshops.

VERIFICATION REQUIREMENTS

The same verification requirements that applied to other products regulated under the *Energy Efficiency Act* will apply to dry-type transformers.

NRCan is proposing that regulated transformers will carry a verification mark indicating that the energy performance of the product has been verified. The verification mark is the mark of a Standards Council of Canada accredited certification organization that administers an energy performance verification program for this product. This organization must also be recognized by NRCan. NRCan will also accept labels issued by a province indicating that the product meets the provincial energy efficiency levels as a verification mark, providing that the provincial level is equivalent to or exceeds the federally regulated level.

The industry representatives have indicated agreement with the verification requirements presented at the previous workshops.

REPORTING REQUIREMENTS

The energy efficiency report (as per section 5 of Canada's *Energy Efficiency Act*) required for this product will include the following information:

- the product name (i.e. Dry-Type Transformer)
- the manufacturer
- the brand name (i.e. model name)
- the model number
- the kVA rating
- the name of the organization or province that carried out the verification and authorized the verification mark that will appear on the product
- single- or three-phase
- the voltage (primary and secondary), and
- the % efficiency

This report must be submitted, by the dealer, to the Minister of NRCan *before* the product is imported into Canada or traded interprovincially for the first time.

IMPORTING REQUIREMENTS

A dealer who is importing these products into Canada must include the following information on the customs release document:

- the product name (i.e. Dry-type Transformer)
- the model number
- the name and address of the dealer importing the product, and
- the purpose for which the product is being imported (i.e. for sale or lease in Canada without modification; for sale or lease in Canada after modification to comply with energy efficiency standards; or for use as a component in a product being exported from Canada)

MODEL NUMBER

It is essential that the product name and model number used on the import documents correspond to those used in the initial report to ensure compliance to the regulations by providing a link between the documents. Comments at previous workshops indicated that the model number is not used in transformer manufacturing. It will be necessary to create a unique identifier for use in the compliance process. NRCan is proposing that a combination of the manufacturer, the model name and kVA rating (i.e. DELTACDTC30) be used to create a "model number". Input is required by dealers to ensure that the number can be provided and used by everyone in the process.

REFURBISHED / REBUILT / REWOUND TRANSFORMERS

Concerns were expressed at the previous workshops regarding the application of the proposed transformer regulations to refurbished or rebuilt transformers since there is an active transformer refurbishment industry in Canada. NRCan has investigated this issue and determined that most repair and overhaul of transformers is done by or for the equipment owners in localised areas. By definition, the federal *Energy Efficiency Regulations* would not apply to these transformers. However, it may be possible that they could be covered by complementary provincial requirements.

HARMONIZATION

A major consideration in developing all regulations is harmonization with other regulatory authorities. This avoids placing undue competitive pressure on manufacturers and purchasers.

The test standard for NRCan's proposed regulation is CSA C802.2. This document uses as a basis the voluntary standard issued by the National Electrical Manufacturers Association (NEMA) in the US. NEMA Standard TP-2 is referred to for Test Accuracy (section 2), Resistance Measurements (Section 3) and Loss Measurements (Section 4). The minimum efficiency levels correspond with NEMA TP-1.

There are strong indications that TP-1 and TP-2 will influence the USDOE's rulemaking process. NRCan is closely following the progress that DOE is making in their rulemaking and exchanging information where possible.

Provincial regulations for transformers are not yet in effect. NRCan will work with the provinces to ensure a level playing field for interprovincial trade.

COMMENTS INVITED

The information in the bulletin is being issued to allow time for concerned parties to comment before amending the regulations. This comment can be done in person at the workshop scheduled in Montréal on **February 5, 2001** or in writing. All correspondence should be forwarded to:

Katherine Delves
Office of Energy Efficiency
Natural Resources Canada
580 Booth Street, 18th Floor
Ottawa, Ontario K1A 0E4
tel.: (613) 947-1207
fax: (613) 947-0373
e-mail: kdelves@nrcan.gc.ca
http://oee.nrcan.gc.ca/regulations/home_page.cfm

Notification of workshop attendance and / or requests to speak will be received until **January 31, 2001**.

Written comments will be received until **February 14, 2001**.



WORKSHOP (February 5, 2001) – Draft Agenda

DRY-TYPE TRANSFORMERS

Proposed Amendment to Canada's Energy Efficiency Regulations

LOCATION: Holiday Inn, Montreal Airport,
6500 Côte-de-Liesse, Montréal
Tel. (514) 739-6440, Fax (514) 738-3189

DATE: Monday, February 5, 2001
10:00 a.m. to 4:00 p.m.

The purpose of this workshop is to provide interested parties with the opportunity to personally comment on the proposed regulations. It also provides NRCan with a forum to discuss particular issues that require public input and clarification.

10:00	Introduction <i>(agenda review)</i>	K. Delves
10:15	Climate Change Update	J. Cockburn
10:45	DOE Rulemaking Status	T. Bouza
11:00	Update on CSA Standard C802.2.	D. Wiegand
11:15	Participant Comments <i>(Individuals who wish to comment are asked to limit their statements to 5 minutes, there will be opportunity to provide more detail under the appropriate discussion topic)</i>	
12:30	Lunch (to be provided)	
1:30	Product Description <i>(exclusions)</i>	
1:45	Energy Efficiency Standards and Test Procedure	
2:00	Economic Analysis	G. Taylor
2:30	Verification, Reporting and Importing Requirements <i>(model number)</i>	
3:15	Other Issues <i>(Refurbished transformers, Harmonization)</i>	
3:45	Closing Remarks	K. Delves
4:00	Adjournment	



WORKSHOP (February 5, 2001) – FAX-BACK SHEET

DRY-TYPE TRANSFORMERS

Proposed Amendment to Canada's *Energy Efficiency Regulations*

To: K. Delves
Fax: (613) 947-0373

From: _____

Company: _____

Fax: _____

E-mail: _____

- | | | |
|---|---|--|
| Y | N | I will attend the workshop |
| Y | N | I wish to present a position paper at the workshop |
| Y | N | I want to continue receiving information on <i>Dry-Type Transformers</i> |
| Y | N | I am interested in future mailings on <i>Liquid Filled Transformers</i> |

additional comments and address / contact update:
