

T&D Europe¹ Position Paper For clarification of EU Commission regulation N° 548/2014 on implementing the Eco-design Directive to small, medium and large power transformers

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The target of this position paper is to clarify the definition of each category of excluded transformers defined in the EU regulation (Article 1) as well as to provide interpretations of other aspects of the Regulation.

1. Main aspects

On 11th June 2014, EU Commission regulation N° 548/2014 implementing the “Eco-design directive” to small, medium and large power transformers entered into force².

This regulation establishes eco-design requirements which manufacturers (or their legal representatives or importers) have to meet in order to be allowed to place transformers on the market or to put them into service. Compliance with such requirements will be declared by the manufacturer (or its legal representative or by the importer) by issuing a declaration of conformity.

As this is a European Union Regulation, it is directly applicable as law and comes into force in all Member States at the same date.

2. Scope

Article 1 provides that the regulation applies to all small, medium and large power transformers rated above 1 kVA, with a list of exemptions concerning specifically designed transformers (however, exempted transformers are subject to product information requirements and technical documentation as set in Annex I points 3 and 4).

A set of definitions, including of small, medium and large power transformers, is provided in Article 2.

3. Requirements on eco-design

All requirements are described in tables included in Annex I of the Regulation:

Maximum level of load and no-load losses are defined for:

¹ T&D Europe is the European Association of the Electricity Transmission & Distribution Equipment and Services Industry, which members are the European National Associations representing the interests of the electricity transmission and distribution equipment manufacturing and derived solutions. The companies represented by T&D Europe account for a production worth over € 25 billion EUR, and employ over 200,000 people in Europe. Further information on T&D Europe can be found here: <http://www.tdeurope.org>

² <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2014:152:FULL&from=EN>

- *Three phase medium power transformers with rated power ≤ 3150 kVA (liquid immersed or dry-type)*
- *Medium power transformers with rated power ≤ 3150 kVA equipped with tapping connections suitable for operation while being energised or on-load for voltage adaptation purposes*
- *Pole-mounted transformers*

Minimum peak efficiency index requirements are defined for

- *Medium power transformers with rated power > 3150 kVA (liquid immersed or dry-type)*
- *Large power transformers (liquid immersed or dry-type)*

4. Product information requirements and technical file

Manufacturers (or their legal representatives or importers) are requested to include specified pieces of information (described in Annex I.3) in the product documentation. Moreover, they have to keep a technical file containing the information, as well as the manufacturer's name and address, the model identifier, the alphanumeric code to distinguish one model from other models of the same manufacturer.

5. Conformity assessment³

Before placing a transformer on the market or putting it into service, the manufacturer (or its legal representatives or the importer) has to ensure that an assessment of its conformity to the regulation requirements has been carried out, using one of the two methods provided in the directive 2009/125/CE on Eco design (Article 8 - internal design control procedure or management system procedure).

6. Market surveillance

The Member States authorities are responsible for ensuring market surveillance checks, using a verification procedure defined in Annex III.

7. Entry into force and application

The Regulation describes the starting time for its application:

- *Only transformers purchased after 11th June 2014 are covered, with a definition of what purchase means in the case of framework agreements. In this context, purchase occurs on the date of signature of the contract between the manufacturer and their customer (for the delivery of a given volume of transformers). Therefore, it is strongly advised that, after the date of entry into force, manufacturers do not engage in (new) framework contracts for transformers with energy efficiency specifications below the minimum requirements of the Regulation, as they will not be allowed to place them on the market*

³ Provisions on the declaration of conformity are to be found at:

<http://eur-lex.europa.eu/legal-content/EN/TEXT/PDF/?uri=CELEX:32009L0125&from=EN>

- *Eco-design requirements will be applicable in two steps: Tier 1 as of 1st July 2015 and Tier 2 as of 1st July 2021: after those dates, it will not be possible to place transformers on the market which do not fulfil the minimum requirements. It should be noted that the Commission will have to review the regulation by 11th June 2017 in the light of technological progress, with specific issues to be assessed in the review.*

8. *Date of application*

Isn't there a need to wait until the European Directive is transformed into national law?

This is a European Regulation, and as such is applicable as a law in all Member States of the European Union. The official date of coming into force is June 11, 2014.

9. *Questions of Interpretation*

- A. The contracts often provide for "options" for the future purchase of additional transformers. These options are exercised by the purchaser by a special letter to the supplier. In case of contracts signed before 11 June 2014 and providing "options" that are exercised after 1 July 2015, should the manufacturer provide transformers compliant with the Regulation or not?

T&D Europe interpretation:

If the contract contains an option for delivery of transformers in the future with parameters not meeting the requirements in the regulation, these transformers are only exempt if the contract specifies their number and a clearly limited period in which this option is valid. A declaration of intent between manufacturer and customer is not enough to consider that the transformer was purchased before 11 June 2014

- B. In paragraph (4) of the preamble to the Regulation 548/2014, it states that "transformers are usually purchased under framework agreements. In this context, purchase refers to the act of contracting with the manufacturer for the delivery of a given volume of transformers. The contract is deemed to have come into force on the date of signature by the parties". When the contract is signed before 11 June 2014 but provides for delivery of the transformers after 1 July 2015, should the manufacturer provide transformers compliant with the Regulation or not?

T&D Europe interpretation:

As stated in Article 1, "the Regulation is only applicable to transformers purchased after the entry into force of the Regulation" and then only to contracts signed after 11 June 2014 (the date of entry into force of the Regulation) and for transformers placed on the market after 1 July 2015. If the contract is signed before 11 June 2014, transformers not compliant with the Regulation can be placed on the market after 1 July 2015.

C. Can a letter of intent be treated like a firm contract?

T&D Europe interpretation:

No, it cannot.

D. Can a letter of award be treated like a firm contract?

T&D Europe interpretations:

Yes, it can. If the transformers mentioned in the Letter of Award (LOA) are completely defined, so that the transformers subject to the official purchase order will be exactly the same as the technical specification of the LOA, then the date of the LOA can be considered as the date of signing the contract. Furthermore the letter of award should be binding according to the applicable contract law in each member state.

E. How would the Regulations treat a economic operator that imports a transformer from outside the European Economic Area for its own use?

T&D Europe Interpretation:

In such case the economic operator would have responsibility for complying with the Regulations. The only difference is that the moment of compliance would be when putting the transformer into service for its own use.

F. Can transformers which are not compliant be repaired and installed again at their original place?

T&D Europe interpretation:

Repaired transformers which remain the property of the same customer are not subject to the eco-design regulation.
Repaired or renovated transformers which are put back on the market need to be eco-design compliant.

G. Does a rental transformer need to be compliant?

T&D Europe interpretation:

A rental transformer which has been placed on the market before July 1, 2015 doesn't need to be compliant. Otherwise, the same rules apply, a rental transformer need to be eco-design compliant if it is placed on the market after Jul 1, 2015.

10. Consideration of the meaning of “placed on the market” or put into service?

T&D Europe has identified a variety of different scenarios for placing transformers on the market and implications in terms of the applicability of the requirements

Case	Must comply	No need to comply
1.Transformers purchased before June 11, 2014		X
2a.Transformers placed on the market or put into service before July 1, 2015		X
2b.Transformers energized before July 1, 2015		X
3.Transformers ready for use and delivered – implied placed on the market - to an end-user customer before July 1, 2015 (even if still not energized on July 1, 2015) (see “FAQ_Guidance-Ecodesign-Directive-Implementing-measures-oct2014”, page 3)		X
4.Transformers ready for use, sold and owned by an end-user customer before July 1, 2015 (even if still not energized on July 1, 2015), wherever the place of storage		X
5.Transformers purchased as an option of a contract signed before June 11, 2014, with a specific given volume		X
6a.Catalogue transformers ready for dispatch, ready for use at a manufacturer’s premises before July 1, 2015, purchased by a customer and still in stock after July 1, 2015		X
6b.Catalogue transformers ready for dispatch at a manufacturer’s premises before July 1, 2015, NOT purchased and still in stock after July 1, 2015	X	
7.Transformers which are purchased and designed specifically for a single customer ready for dispatch, ready for use at a manufacturer’s premises before July 1, 2015 and still in stock after July 1, 2015		X
8. Catalogue transformers delivered to an intermediate before July 1, 2015 and still in stock at the intermediate premises after July 1, 2015 (1)		X
9.Transformers contained in an energy related product (MV/LV substation for example) delivered before July 1, 2015, and the energy related product is ready for dispatch after July 1, 2015		X
10. Transformers routine tested after July 1, 2015	X	

(1) T&D Europe notice: an unusually big quantity of non-compliant transformers which remain in stock after July 1, 2015, and have not been sold to end-user customers, could be considered as a distortion of the market and could be considered as illegal

- The act of energizing can be assimilated as “put into service” on a physical point of view, although “put into service” also has a legal meaning, as stated in chapter 9, paragraph E.
- Placed on the market = purchase order needed and documentation available, test reports completed and ready for use: transformer can be energized without any other extra components to be added afterwards and ready for dispatch.
- Put into service = effective date is the first time that the manufacturer or importer can establish that the transformer is compliant on site when the transformer is not literally placed on the market.

All cases - except case 1- are for transformers purchased AFTER June 11, 2014

11. *Cases of exclusions from the regulation*

I. Clarification on the definitions of the excluded transformers

This position paper provides an interpretation on the excluded transformers only when the definition can be interpreted in different ways.

A. EU definition: instrument transformers, specifically designed to supply measuring instruments, meters, relays and other similar apparatus,

T&D Europe recommendations:

The definition of these transformers is given by the scope of their relevant standards (Example: EN60044 Instrument transformers,...).

B. EU definition: transformers with low-voltage windings specifically designed for use with rectifiers to provide a DC supply,

T&D Europe recommendations:

1. These transformers are defined by the scope of EN 61378 series (power transformers which are intended for integration within semiconductor converter plants...) and EN 60146 series.
These transformers are placed at the rectifier side of a converter and especially dedicated to supply converter applications. They are excluded because of the extra losses due to harmonic currents, and in some case multi-winding designs and requirements for grounding shields.
2. The specific cases of Photovoltaic transformers are step-up transformers, located at the inverter side of the converter. They are covered by the regulation and shall follow the level of losses defined in the regulation. This also applies to other applications where the transformer is at the inverter side of the converter
3. In case of transformers with dual voltage on one winding (table I3) (Windings being considered as voltage functions), then the following sentence of the regulation (Table I3) shall apply: *“If the full nominal power is available regardless of the*

combination of voltages, the levels of losses indicated in Tables I.1 and I.2 can be increased by 15 % for no load losses and by 10 % for load losses”

4. *The term “Low-voltage winding” refers to the winding having the lowest rated voltage as per EN60076-1. Its voltage can also be >1.1 kV.*

C. EU definition: transformers specifically designed for offshore applications and floating offshore applications,

T&D Europe recommendations:

The definition refers to transformers which shall be installed on fixed or floating offshore platforms, offshore wind turbines or on board of ships and all kind of vessels.

D. EU definition: transformers specially designed for emergency installations,

T&D Europe recommendations:

Emergency installation shall be considered as temporary installation with a clear replacement planning.

These transformers cannot be installed for a long period (At least less than two years for large power transformers and one year for medium power transformers)

Mobile installations shall also be considered as emergency installations.

Emergency transformer installations are further considered as fixed and permanent installations, but being energized and in operation only for emergency power supply, like e.g. from UPS installations.

E. EU definition: transformers and auto-transformers specifically designed for railway feeding systems,

T&D Europe recommendations:

The definition of these transformers is given by the scope of their relevant standards. EN 50329 and CLC/SC 9XC.

F. EU definition: earthing or grounding transformers, this is, three-phase transformers intended to provide a neutral point for system grounding purposes,

T&D Europe recommendations:

The definition of these transformers is given by the scope of their relevant standards, EN60076-6.

Single phase earthing or grounding transformers are also excluded from the regulation

G. EU definition: traction transformers mounted on rolling stock, this is, transformers connected to an AC or DC contact line, directly or through a converter, used in fixed installations of railway applications,

T&D Europe recommendations:

The definition of these transformers is given by the scope of their relevant standards. EN 60310 and CLC/SC 9XC.

- H. EU definition: starting transformers, specifically designed for starting three-phase induction motors so as to eliminate supply voltage dips,**

T&D Europe recommendations:

This exclusion is also related with single phase induction motors connected to a single or three phase transformers, and also starting transformers used to start also synchronous motors/machines (not only induction motors).

- I. EU definition: medium Voltage (MV) to Medium Voltage (MV) interface transformers up to 5 MVA,**

T&D Europe recommendations:

“The definition of these transformers is given in IEC TC22.

This definition is for transformers with special coupling (extended delta, polygon) that are dedicated, for example, to connect two networks.

The voltage classes of primary and secondary transformers shall be the same.

In addition to what is covered by the scope of IEC TC22, interface transformers include also transformers which are placed at the junction between two voltage level between two MV networks and which need to be able to cope with emergency overloads. Note: such units are normally part of a packaged compact substation including also MV Reclosers and protection equipment”.

- J. EU definition: large power transformers where it is demonstrated that for a particular application, technically feasible alternatives are not available to meet the minimum efficiency requirements set out by this Regulation,**

T&D Europe recommendations:

The process should be the following:

1. Customer has to give all constraints and specifications for the transformers and for the installation in technical terms and economic terms.
2. The transformer manufacturer has to demonstrate if there are disproportionate cost (ex:20% of the total installation over cost) , and technical difficulties to achieve the constraints given
3. Manufacturer, with the help of the customer, has to notify the authorities in charge of the application of the Transformers Regulation of the Eco-Design (where transformers will be installed) before signing the contract justifying why this transformer doesn't follow the Eco-Design regulation

- K. EU definition: large power transformers which are like for like replacements in the same physical location/installation for existing large power transformers, where this replacement cannot be achieved without entailing disproportionate costs associated to their transportation and/or installation,**

T&D Europe recommendations:

The process should be the following:

1. Customer has to give all constraints and specifications for the transformers and for the installation in technical terms and economic terms.
2. The transformer manufacturer has to demonstrate if there are disproportionate cost (ex:20% of the total installation over cost) , and technical difficulties to achieve the constraints given
3. Manufacturer, with the help of the customer, has to notify the authorities in charge of the application of the Transformers Regulation of the Eco-Design (where transformers will be installed) before signing the contract justifying why this transformer doesn't follow the Eco-Design regulation

II. Clarifications for those cases not defined enough in the regulation

- A. Which tolerances have to be applied in case of losses lower than those losses given in the tables for medium power transformers? (Example A0Bk declared value for A0Ck mentioned in the losses tables)?

T&D Europe recommendations:

The losses measured and declared shall be equal to or less than the maximum value authorised in the regulation for the rated power specified. No tolerances are allowed beyond declared values.

- B. ONAN/ONAF and ONAN/Future ONAF Losses and PEI have to be calculated in ONAF/AF or future ONAF/AF.

T&D Europe recommendations:

Losses and PEI shall comply for both initial and future rating according to IEC60076-1

Both values shall be stated on the rating plate

Extract of EN60076-1 Clause 5.1.1

This rules has also to be applied for AN / AF transformers

“If different values of apparent power are assigned under different circumstances, for example, with different methods of cooling, the highest of these values is the rated power.”

- C. Losses shown on the rating plate in case of corrected values according to table I.3:

T&D Europe recommendations:

In case of correction factors for insulation levels or dual voltage, losses shall be indicated with correction factor in the documentation.

- D. Some applications need to have storey winding (photovoltaic case) or more than 2 windings. For medium power transformers table I.3 is a corrected table for windings.3

T&D Europe recommendations:

For medium power transformers dual winding corrections from table I.3 shall be applied.

For transformers with more than 2 windings corrections from table I.3 is applicable

- E. **Cumulative correction:** For example, a 36 kV and dual voltage: correction table give +15% for no load losses and +10% for load losses for the 36 kV and +15% for no load losses and +10% on load losses for dual voltage. Is the result +30% for no load losses and +20% of load losses?

T&D Europe recommendations:

Corrections shall be added.

In case of the transformer satisfy two or more cases of the situation of the regulation table I3 the allowances are cumulative

- F. In case of dual voltage transformers, for a rated power which is the same regardless of the combination of voltages, are the maximal losses values guaranty on the maximal voltage and the resultant losses on the minimal voltage can be higher that the tables ? Or do the maximal losses have to be guaranteed for both voltages? Which value has to be shown on the rating plate?

T&D Europe recommendations:

The value shall be guaranteed on the highest voltage and then written on the documentation.

G. Transformers with more than 2 winding

T&D Europe recommendations:

On multiple windings transformers measurements are performed on the multiple different two windings combination.

Pk can then be recalculated for rated multi-winding combination using the method as indicated in IEC60076-8.

PEI value shall be calculated taking into account the Pk value defined by the method above.