

Il progetto INTAS

Milano, 21 marzo 2019

Risultati e raccomandazioni & la modifica del Regolamento 548/2014

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INTAS

INDUSTRIAL AND TERTIARY
PRODUCT TESTING AND
APPLICATION OF STANDARDS



Co-funded by the Horizon 2020
programme of the European Union

TRANSFORMERS



FANS



“INTAS” –INDustrial and tertiary product Testing and Application of Standards

16 partner da 11 Stati Membri:

■ Germania	WIP (coordinatore)
■ Austria	AEA
■ Belgio	BHTC
■ Danimarca	DTI
■ Finlandia	TUKES
■ Italia	ENEA
■ Portogallo	ASAE e DGEG
■ Polonia	FEWE
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■ Spagna	FFII-LCOE
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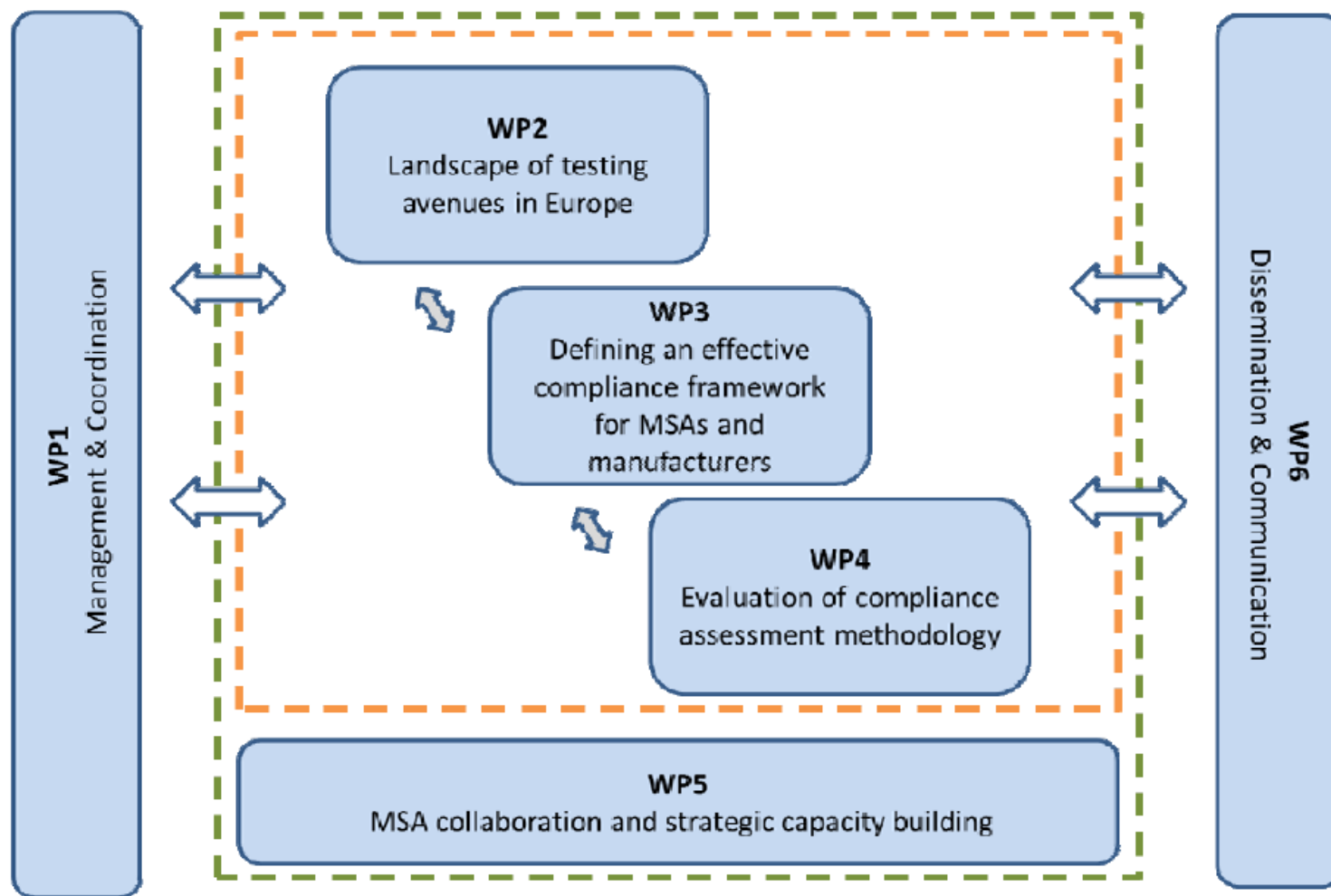
Durata: 36 mesi (01/03/2016 – 28/02/2018)

Finanziamento: programma “Horizon 2020
research and innovation” dell’UE, GA No 695943

<http://www.intas-testing.eu/>



Schema del progetto



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Scopo del progetto

- ▶ Definire la fattibilità tecnica e proporre alla Commissione Europea e alle Autorità nazionali di sorveglianza del mercato degli Stati Membri un comune approccio alla verifica della conformità per i grandi prodotti, nel dettaglio trasformatori e ventilatori industriali.
- ▶ Superare le difficoltà incontrate dalle Autorità di sorveglianza del mercato e dagli operatori economici nello stabilire prima e nel verificare poi la conformità ai requisiti di ecodesign per questi prodotti industriali. Le loro dimensioni e la necessità di adattarli alle esigenze dei clienti rendono particolarmente complesse le prove di laboratorio e richiedono laboratori specificamente attrezzati.
- ▶ Assistere le Autorità nazionali di vigilanza degli Stati Membri (in Italia la funzione è svolta dal Ministero dello Sviluppo Economico) nella verifica della conformità di questi prodotti, offrendo assistenza tecnica e una metodologia efficace.
- ▶ Assistere gli operatori industriali facilitando la dichiarazione della conformità dei prodotti con modalità condivise dalle Autorità nazionali.

Effective market surveillance for ecodesign: focus on large industrial products

12 February 2019, Brussels



Co-funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No. 695943.

- Design and construct in compliance with Eco-design requirements
- Use harmonized standards referenced in the OJEU for **presumption of conformity**
- Carry out conformity assessment: **self-assessment**
- Affix the CE marking
- Draft and sign **Declaration of Conformity (DoC)**

- Ensure only compliant products enter the Internal Market;
- Set up **market surveillance and enforcement**;
- Collaborate in the ADCO group; and
- Report to the Commission.

Every Ecodesign Regulation has a **Verification Procedure** for MSAs

Quick administrative check

- **CE marking** present ?
- DoC and Technical **documentation** file formally OK ?

Documentation check

- Test report uses harmonised **standaards** ?
- No abuse of **tolerances** ?
- Plausible information and correct **calculations**?

Laboratory testing of efficiency requirements

This is a **flexible system** that is based on trust.

- Not every unit of a product is tested
- Not every model of a product group is tested

Free riders are a problem.

- Random and intelligence based **checks** are necessary to deter, correct and punish abuses.
- Ecodesign complexity requires '**awareness raising**'

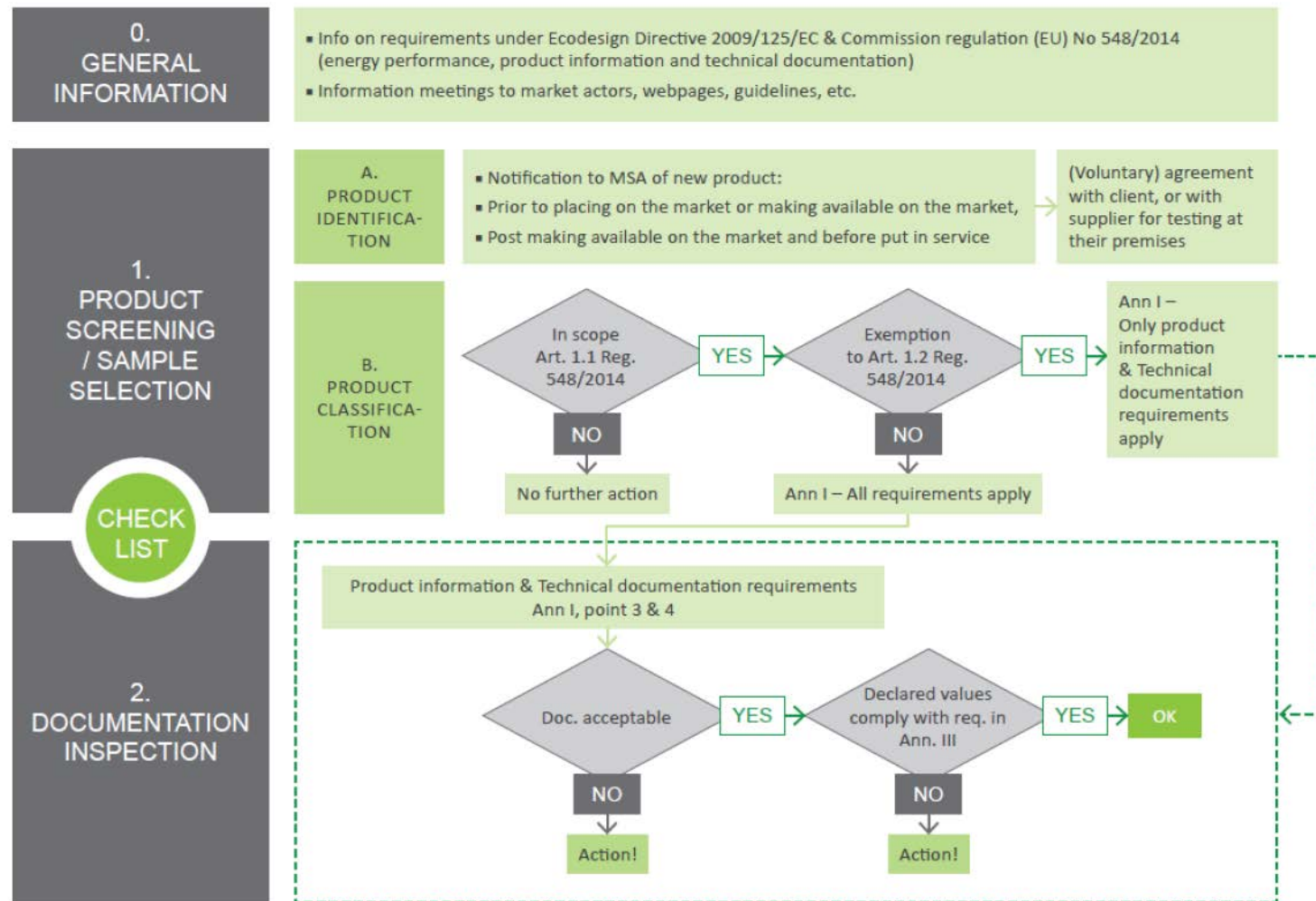
Benefits of improved testing?

Ensures **equal treatment** of competitors.

Guarantees **efficiency gains**.

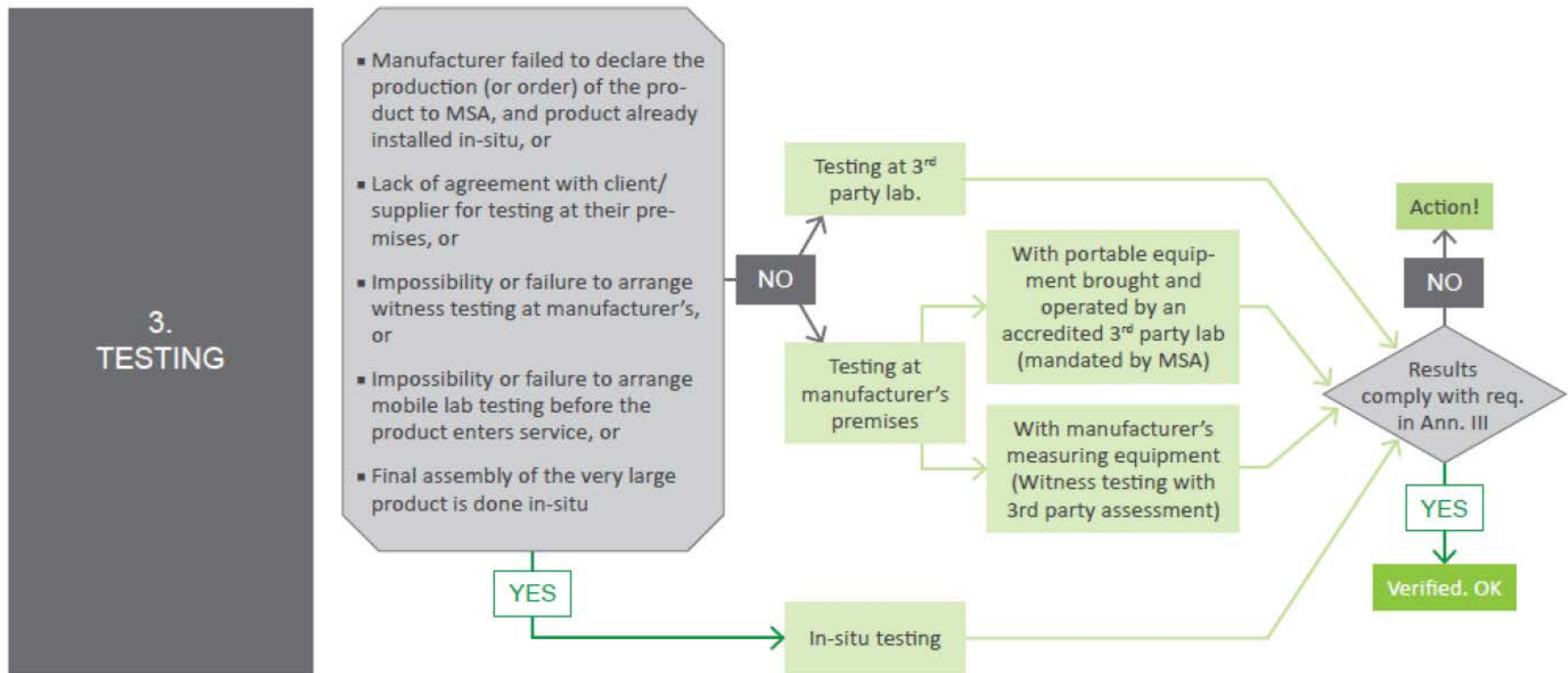
- More testing options gives MSAs **more tools to test**
- Expertise and specialisation lead to more effective surveillance: **better targeting** and **less mistakes**
- Witnessed testing by MSAs of planned efficiency measurements **avoids double testing**
- Clearer procedures lead to less delays in commissioning process

INTAS methodology: flowchart (1)



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INTAS methodology: flowchart (2)



Policy recommendations (1)

Developed by INTAS consortium in late 2018

0. GENERAL INFORMATION

- Set up a EU market surveillance TF transformers
- Foster cooperation with national stakeholders

Capacity
building

1. PRODUCT SCREENING / SAMPLE SELECTION

- Establish a mandatory notification to MSAs

Timely
reaction

2. DOCUMENTATION INSPECTION

3. TESTING

- Allow market surveillance to conduct witness testing or in-situ
- Improve standards on transformers for Ecodesign
- Insert clauses to deter circumvention

Legal
certainty

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TRANSFORMERS



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Summary of findings

Summary of Findings from INTAS

- Policy recommendations
- Best practice and experiences in verification procedures
- Evaluation of costs, benefits of compliance verification
- For both transformers and fans



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Modifiche al Reg. 548/2014

- Art. 1 - Scopo
- Art.2 - Definizioni
- Art. 4 - Conformity assessment
- Allegato I – Requisiti
- Allegato II - Metodo di calcolo
- Allegato III - Verifica della conformità

Articolo 1: Scopo (1)

Article 1

Subject matter and scope

1. This Regulation sets out ecodesign requirements for placing on the market or putting into service power transformers with a minimum power rating of 1 kVA used in 50 Hz electricity transmission and distribution networks or for industrial applications.

This Regulation shall apply to transformers purchased after 11 June 2014.

2. This Regulation shall not apply to transformers specifically designed for the following applications:

.....

except as regards the requirements set out in point 4 a), b) and d) of Annex I to this Regulation

3. Medium and large power transformers, regardless of when they were first placed on the market or put into service, shall be reassessed for conformity and comply with this Regulation, if they are subject to all of the following operations:

- a) replacement of the core or part thereof;**
- b) replacement of one or more of the complete windings.**

This is without prejudice to the legal obligations under other Union's harmonisation legislation that these products could be subject to.

Articolo 1: Scopo (2)

Article 1

Lista delle esenzioni

- a) instrument transformers, specifically designed to transmit an information signal to measuring instruments, meters and protective or control devices or similar apparatus;
- b) transformers specifically designed and intended to provide a DC power supply to electronic or rectifier loads. **This exemption does not include transformers that are intended to provide an AC supply from DC sources such as transformers for wind turbine and photovoltaic applications or transformers designed for DC transmission and distribution applications;**
- c) transformers specifically designed to be directly connected to a furnace;
- d) **transformers specifically designed to be installed on fixed or floating offshore platforms, offshore wind turbines or on board ships and all kinds of vessels;**
- e) **transformers specifically designed to provide for a situation limited in time when the normal power supply is interrupted due to either an unplanned occurrence (such as a power failure) or a station refurbishment, but not to permanently upgrade an existing substation;**

Articolo 1: Scopo (3)

- f) transformers (with separate or auto-connected windings) connected to an AC or DC contact line, directly or through a converter, used in fixed installations for railway applications;
- g) earthing or grounding transformers specifically designed to be connected in a power system to provide a neutral connection for earthing either directly or via an impedance;
- h) traction transformers specifically designed to be mounted on rolling stock, connected to an AC or DC contact line, directly or through a converter, for specific use in fixed installations for railway applications;
- i) starting transformers, specifically designed for starting three-phase induction motors so as to eliminate supply voltage dips and that remain de-energised during normal operation;
- j) testing transformers, specifically designed to be used in a circuit to produce a specific voltage or current for the purpose of testing electrical equipment;
- k) welding transformers, specifically designed for use in arc--welding equipment or resistance-welding equipment;
- l) transformers specifically designed for explosion-proof applications in accordance with Directive 94/9/EC of the European Parliament and of the Council and underground mining applications;

Articolo 1: Scopo (4)

- m) transformers specifically designed for deep water (submerged) applications;
 - n) medium Voltage (MV) to Medium Voltage (MV) interface transformers up to 5 MVA used as interface transformers used in a network voltage conversion programme and placed at the junction between two voltage levels of two medium voltage networks and that need to be able to cope with emergency overloads;
 - o) medium and large power transformers specifically designed to contribute to the safety of nuclear installations, as defined in Article 3 of Council Directive 2009/71/Euratom;
 - p) three-phase medium power transformers with a power rating below 5 kVA
-
- 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 in the regulation,
 - large power transformers which are for like replacements in the same physical location/installation as existing large power transformers, where this replacement can be achieved without entailing disproportionate costs as regards their transportation and/or installation

esenzioni sostituite da specifiche disposizioni all'Allegato I

Articolo 2: Definizioni (1)

Article 2

Definitions

- (3) 'medium power transformer' means a power transformer with all windings having rated power lower than or equal to 3 150 kVA, and highest voltage for equipment greater than 1,1 kV and lower than or equal to 36 kV;
- (4) 'large power transformer' means a power transformer with at least one winding having either rated power greater than 3 150 kVA or highest voltage for equipment greater than 36 kV
- (7) 'medium power pole-mounted transformer' means a power transformer with a rated power of up to 400 kVA suitable for outdoor service and specifically designed to be mounted on the support structures of overhead power lines
- (17) 'declared value(s)' mean the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC, and where applicable, the values used to calculate these values**
- (18) 'dual voltage transformer' means a transformer with one or more windings with two voltages available in order to be able to operate and supply rated power at either of two different voltage values;

Articolo 2: Definizioni (2)

(19) 'witnessed testing' means actively observing the physical testing of the product under investigation by another party, to draw conclusions on the validity of the test and the test results. This may include conclusions on the compliance of testing and calculations methods used with applicable standards and legislation;

(20) 'factory acceptance test' means a test on an ordered product where the customer uses witnessed testing to verify the product's full accordance with contractual requirements, before they are accepted or put into service;

(21) 'equivalent model' means a model which has the same technical characteristics relevant for the technical information to be provided, but which is placed on the market or put into service by the same manufacturer or importer as another model with a different model identifier;

(22) 'model identifier' means the code, usually alphanumeric, which distinguishes a specific product model from other models with the same trade mark or the same manufacturer's or importer's name

Articolo 4: Conformity assessment

1. The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV to that Directive or the management system set out in Annex V to that Directive.
2. For the purposes of the conformity assessment pursuant to Article 8 of Directive 2009/125/EC, the technical documentation shall contain a copy of the product information provided in accordance with point 4 of Annex I, and the details and the results of the calculations set out in Annex II to this Regulation.
3. Where the information included in the technical documentation for a particular model has been obtained:
 - a) from a model that has the same technical characteristics relevant for the technical information to be provided but is produced by a different manufacturer, or
 - b) by calculation on the basis of design or extrapolation from another model of the same or a different manufacturer, or both,
4. the technical documentation shall include the details of such calculation, the assessment undertaken by the manufacturer to verify the accuracy of the calculation and, where appropriate, the declaration of identity between the models of different manufacturers.
5. The technical documentation shall include a list of all equivalent models, including model identifiers

Article 8 **Circumvention**

The manufacturer, importer or authorised representative shall not place on the market products designed to be able to detect they are being tested (e.g. by recognizing the test conditions or test cycle), and to react specifically by automatically altering their performance during the test with the aim of reaching a more favourable level for any of the parameters declared by the manufacturer, importer or authorised representative in the technical documentation or included in any documentation provided.

Annex I

1. Minimum energy performance or efficiency requirements for medium power transformers

Medium power transformers shall comply with the maximum allowed load and no-load losses or the Peak Efficiency Index (PEI) values set out in Tables I.1 to I.5, excluding medium power pole-mounted transformers, which shall comply with the maximum allowed load and no load losses values set out in Table I.6.

As of the date of application of Tier 2 requirements (1st July 2021), when the **one-to-one replacement of an existing medium power transformer** entails disproportionate costs associated with their installation, the replacement transformer is, exceptionally, only required to meet Tier 1 requirements for the given rated power.

In this respect, installation costs are disproportionate if the costs of the replacement of the complete substation housing the transformer and/or the acquisition or rental of additional floor space are higher than the net present value of the additional avoided electricity losses (tariffs, taxes and levies excluded) of a Tier 2 compliant replacement transformer over its normally expected service life. The net present value shall be calculated based on capitalised loss values using widely accepted social discount rates.

Allegato I: Medium power transformers (2)



In this case, the manufacturer, importer, or authorised representative shall **include in the technical documentation** of the replacement transformer the following information:

- Address and contact details of the commissioner of the replacement transformer
- The station where the replacement transformer is to be installed. This shall be unequivocally identified by either a specific location or a specific installation type (e.g., station or cabin model)
- The technical and/or economic justification of the disproportionate cost to install a transformer that is only Tier 1 compliant instead of a Tier 2 compliant one. If the transformers(s) were commissioned by a tendering process, all the necessary information regarding the analysis of bids and the award decision shall be provided.

In the above cases, the manufacturer, importer or authorised representative shall notify the competent national market surveillance authorities.

The European Commission Better Regulation Toolbox suggest using a value of 4% for the social discount rate
https://ec.europa.eu/info/sites/info/files/file_import/better-regulation-toolbox-61_en_0.pdf

Annex I

1.4. Requirements for medium power pole-mounted transformers

1.4. For the **one-to-one replacement of existing medium power pole-mounted transformers** with power ratings between 25 kVA and 400 kVA, the applicable maximum levels of load and no-load losses are not the ones in Tables I.1 and I.2, but those in Table I.6 below.

The correction factors for special combinations of winding voltages indicated in Tables I.3a and I.3b are also applicable.

For the one-to-one replacement of existing medium power pole-mounted transformers, the manufacturer, importer or authorised representative shall **include in the technical documentation** of the transformer the following information:

- the address and contact details of the commissioner of the replacement transformer;
- the station where the replacement transformer is to be installed. This shall be unequivocally identified either by a specific location or an specific installation type (e.g. technical description of the pole).

In the above cases, the manufacturer, importer or authorised representative shall **notify the competent national market surveillance authorities.**



Annex I

2. Minimum energy efficiency requirements for large power transformers

Minimum efficiency requirements for large power transformers are set out in Tables I.7, I.8 and I.9.

There may be specific instances where the replacement of an existing transformer, or the installation of a new one, meeting the applicable minimum requirements set out in Tables I.7, I.8 and I.9 would result in disproportionate costs.

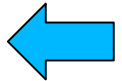
As general rule, costs can be considered to be disproportionate when the extra transportation and/or installation costs of a Tier 2 or Tier 1, as applicable, compliant transformer would be higher than the net present value of the additional avoided electricity losses (tariffs, taxes and levies excluded) over its normally expected service life.

This net present value shall be calculated based on capitalised loss values using widely accepted social discount rates

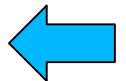
In those cases, the following **fall-back provisions** apply:

- **one-to-one replacement of a large power transformers**

As of the date of application of Tier 2 requirements (1st July 2021), **when the one-to-one replacement of a large power transformers** in an existing site entails disproportionate costs associated to its transportation and/or installation, or is technically infeasible, the replacement transformer is, exceptionally, only **required to comply with Tier 1 requirements** for the given rated power.

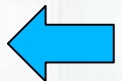


Furthermore, if the cost of installing a replacement transformer complying with Tier 1 requirements are also disproportionate, or where no technically feasible solutions exist, **no minimum requirements shall apply** to the replacement transformer.



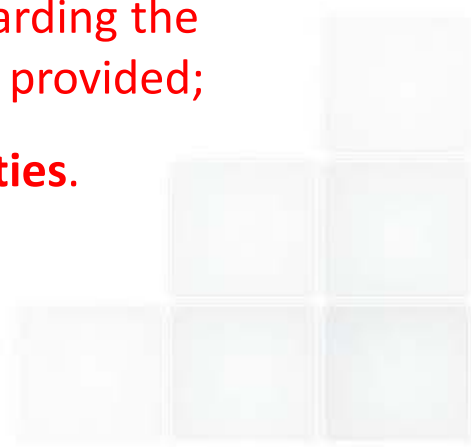
- **installation of a new large power transformer in a new site**

As of the date of application of Tier 2 requirements (1st July 2021), when the installation of a new large power transformer in a new site entails disproportionate costs associated to their transportation and/or installation, or is technically infeasible, the new transformer is, exceptionally, only **required to meet Tier 1 requirements** for the given rated power.



In these cases, the manufacturer, importer or authorised representative responsible for placing on the market or putting into service the transformer shall:

- **include in the technical documentation** of the new or replacement transformer the following information:
 - address and contact details of the commissioner of the transformer;
 - the specific location where the transformer is to be installed;
 - the technical and/or economic justification to install a new or replacement transformer that does not comply with Tier 2 or Tier 1 requirements. If the transformer(s) were commissioned by a tendering process, all the necessary information regarding the analysis of bids and the award decision, shall also be provided;
- **notify the competent national market surveillance authorities.**



Annex I

4. Product information requirements

From 1 July 2015, the following product information requirements for transformers included in the scope of this Regulation (Article 1) shall be included in any related product documentation, including free access websites of manufacturers:

- (a) information on rated power, load loss and no-load loss and the electrical power of any cooling system required at no load;
- (b) for medium power (where applicable) and large power transformers, the value of the Peak Efficiency Index and the power at which it occurs;
- (c) for dual voltage transformers, the maximum rated power at the lower voltage, according to Table I.3;
- (d) information on the weight of all the main components of a power transformer (including at least the conductor, the nature of the conductor and the core material);
- (e) For medium power pole mounted transformers, a visible display 'For pole-mounted operation only'.

For medium and large power transformers only, The information under a); c) and d) shall also be included on the rating plate of the power transformers.

Annex I

4. Technical documentation

The following information shall be included in the technical documentation of power transformers:

- (a) manufacturer's name and address;
- (b) model identifier, the alphanumeric code to distinguish one model from other models of the same manufacturer;
- (c) the information required under point 3.
- (d) the specific reason(s) why transformers are considered to be exempted from the Regulation in accordance with Article 1.2

If (parts of) the technical documentation is based upon / derived from the technical documentation of another model, the model identifier of that model shall be provided and the technical documentation shall provide the details of how the information is derived from the technical documentation of the other model, e.g. on calculations, extrapolations, including the tests undertaken by the manufacturer to verify the calculations or extrapolations undertaken.

paragrafo cancellato e spostato all'Art. 4 conformity assessment

Annex II

Calculation method

The formula to be used for the Peak Efficiency Index calculation is:

$$PEI = 1 - \frac{2(P_0 + P_{c0} + P_{ck}(k_{PEI}))}{S_r \sqrt{\frac{P_0 + P_{c0} + P_{ck}(k_{PEI})}{P_k}}} = 1 - \frac{2}{S_r} \sqrt{(P_0 + P_{c0} + P_{ck}(k_{PEI}))P_k} \quad (\%)$$

formula sostituita

where:

P_0 is the no load losses measured at rated voltage and rated frequency on the rated tap

P_{c0} is the electrical power required by the cooling system for no load operation, **derived from the type test measurements of the power taken by the fan and liquid pump motors (for ONAN and ONAN/ONAF cooling systems P_{c0} is always zero)**

$P_{ck}(k_{PEI})$ is the electrical power required by the cooling system in addition to P_{c0} to operate at k_{PEI} times the rated load. P_{ck} is a function of the load. $P_{ck}(k_{PEI})$ is derived from the type test measurements of the power taken by the fan and liquid pump motors (for ONAN cooling systems P_{ck} is always zero).

P_k is the measured load loss at rated current and rated frequency on the rated tap corrected to the reference temperature

S_r is the rated power of the transformer or autotransformer on which P_k is based

k_{PEI} is the load factor at which Peak Efficiency Index occurs

ANNEX III

Product compliance verification by market surveillance authorities

The verification tolerances defined in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the manufacturer or importer as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

Where a model has been designed to be able to detect it being tested (e.g. by recognizing the test conditions or test cycle), and to react specifically by automatically altering its performance during the test with the objective of reaching a more favourable level for any of the parameters specified in this Regulation or included in the technical documentation, or included in any of the documentation provided, the model and all equivalent models shall be considered not compliant.

Allegato III: Verifica della conformità (2)



When verifying the compliance of a product model with the requirements laid down in this Regulation and its Annexes pursuant to Article 3(2) of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the following procedure:

(1) The Member State authorities shall verify one single unit of the model. Given the weight and size limitations in the transportation of medium and large power transformers, Member States authorities may decide to undertake the verification procedure at the premises of manufacturers, before they are put into service in their final destination. **The Member State authority can do this verification using its own testing equipment.**

If Factory Acceptance Tests (FATs) are planned for such transformers, which will test parameters laid down in Annex I of this Regulation, the Member State authorities may decide to use witnessed testing during these FATs to gather test results which can be used to verify compliance of the transformer under investigation. The authorities may request a manufacturer to disclose information on any planned FATs relevant for witnessed testing.

If the result referred to in point 2 (c) is not achieved, the model and all equivalent models shall be considered not to comply with this Regulation. The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision is taken on the non-compliance of the model.

- (2) The model shall be considered to comply with the applicable requirements if:
- (a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and
 - (b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values; and
 - (c) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as given in Table 1.

Allegato III: verifica della conformità (4)

(3) If the results referred to in point 2(a), (b) or (c) are not achieved, the model and all equivalent models shall be considered not to comply with this Regulation.

(4) The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision being taken on the non-compliance of the model according to point 3.

The Member State authorities shall use the measurement and calculation methods set out in Annex II.

The Member State authorities shall only apply the verification tolerances that are set out in Table 1 and shall only use the procedure described in points 1 to 4 for the requirements referred to in this Annex. No other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

Table 1

Verification tolerances

Parameters	Verification tolerances
Load losses	The determined value shall not exceed the declared value by more than 5 %.
No-load losses	The determined value shall not exceed the declared value by more than 5 %.
The electrical power required by the cooling system for no-load operation	The determined value shall not exceed the declared value by more than 5 %.

Grazie per la vostra attenzione!

Per ulteriori informazioni: milena.presutto@enea.it

