

SUMMARY



INTAS

INDUSTRIAL AND TERTIARY
PRODUCT TESTING AND
APPLICATION OF STANDARDS

Power Transformers and Industrial Fans: Summary of findings from the INTAS project

TRANSFORMERS



FANS



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and Application of Standards



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FANS



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About the INTAS project



The aim of the INTAS project is to provide technical and cooperative support, as well as capacity building activities, to Market Surveillance Authorities (MSAs). The need for the INTAS project arises from the difficulty that MSAs and market actors face in establishing and verifying compliance with energy performance requirements for large industrial products subject to requirements of the Ecodesign Directive, specifically transformers and industrial fans. Therefore, the project aims to:

- Support European Member State MSAs deliver compliance for large products (specifically for transformers and large fans);
- Support industry to be sure of what their obligations are under the Ecodesign Directive and to deliver compliance in a manner that will be broadly accepted by MSAs;
- Foster a common European approach to the delivery and verification of compliance for these products.

LIST OF PROJECT PARTNERS

- WIP Renewable Energies / [Europe](#)
- European Environmental Citizens' Organisation for Standardisation / [Europe](#)
- European Copper Institute / [Europe](#)
- Engineering Consulting and Design / [Europe](#)
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Executive summary



Non-compliant products placed on the EU market distort competition and create damages to society, the environment and the end-users of products. Experts estimate that 10 to 25% of products are non-compliant with Ecodesign rules, and that some 10% of energy is being lost due to non-compliance¹.

Large industrial products are no exception. Indeed, market surveillance of large industrial products covered by the Ecodesign Directive is particularly challenging due to the size and power of the products, the costs of transport and testing, but also the fact that they are mostly sold Business-to-Business (B2B), and therefore largely “invisible” to Market Surveillance Authorities (MSAs).

With Ecodesign requirements in place, the performance of large industrial products’ energy performance is no longer just a private contractual matter between the supplier and the purchaser. MSAs must have all the tools needed to undertake the compliance verification procedures of large industrial products.

Over the last three years, INTAS analysed current market surveillance practices for large industrial products, and explored a number of ideas that would facilitate the job of MSAs in conducting market surveillance of large industrial products. This document summarises the main findings from the INTAS project, for fans and transformers, the two focus products of the project. In particular, this document provides, for both fans and transformers:

- Best practices and experiences regarding testing (sections 1.1 and 2.1).
- Key policy recommendations to ensure effective market surveillance of Ecodesign (sections 1.2 and 2.2)
- An evaluation of costs, benefits and new methods of verification (section 3)
- An analysis of test laboratories (Annexes I and II).

The analysis of best practices and experiences in testing in sections 1.1 and 2.1 found that the standard Ecodesign market surveillance conformity verification approach based on selecting a product for independent laboratory testing is not very well adapted to fans and transformers, and that market surveillance conformity verification based on witnessing factory acceptance tests or testing at manufacturer’s premises could be much less costly and disruptive for cases where factory acceptance tests (FATs) are ordered by the client.

It also found that the biggest gap needing to be addressed is the limited means that MSAs have of knowing if a product has been placed on the market in time to conduct verification testing of the product without causing costly disruptions to the businesses downstream in the supply chain. A key fundamental need is therefore to ensure that mechanisms are put in place to maximise the

¹ Evaluation of the Energy Labelling Directive and specific aspects of the Ecodesign Directive. Background report I: Literature review



likelihood that an MSA will be informed early enough that a large industrial product will be placed on the market and put into service.

The policy recommendations in sections 1.2 and 2.2 try to address this and other gaps identified by INTAS analysis. They build as much as possible on previous INTAS research, analysis and consultations, but also on existing regulations and proposals. The underlying logic of the policy recommendations is one of pragmatism and of avoiding ‘reinventing the wheel’².

These sections develop a number of concrete, pragmatic policy recommendations which aim to provide MSAs with the full suite of verification options needed to adequately tackle non-compliance of large industrial products. While INTAS focus is mainly on fans (section 1.2) and power transformers (section 2.2), the challenges and regulatory framework for these two product categories are shared with other large industrial products.

Section 3 assembles best estimates of the costs and benefits from conducting performance verification or risk assessment actions on power transformers and large industrial fans. In the case of power transformers it established that in most instances the societal value (expressed in terms of the value of product lifetime energy savings to end-users) of conformity verification actions is greater than the cost that would be incurred by the MSA, even if the deterrent effect of having a product fail a verification check (i.e. the discouragement of non-compliance for other products produced by the same or other suppliers) is ignored.

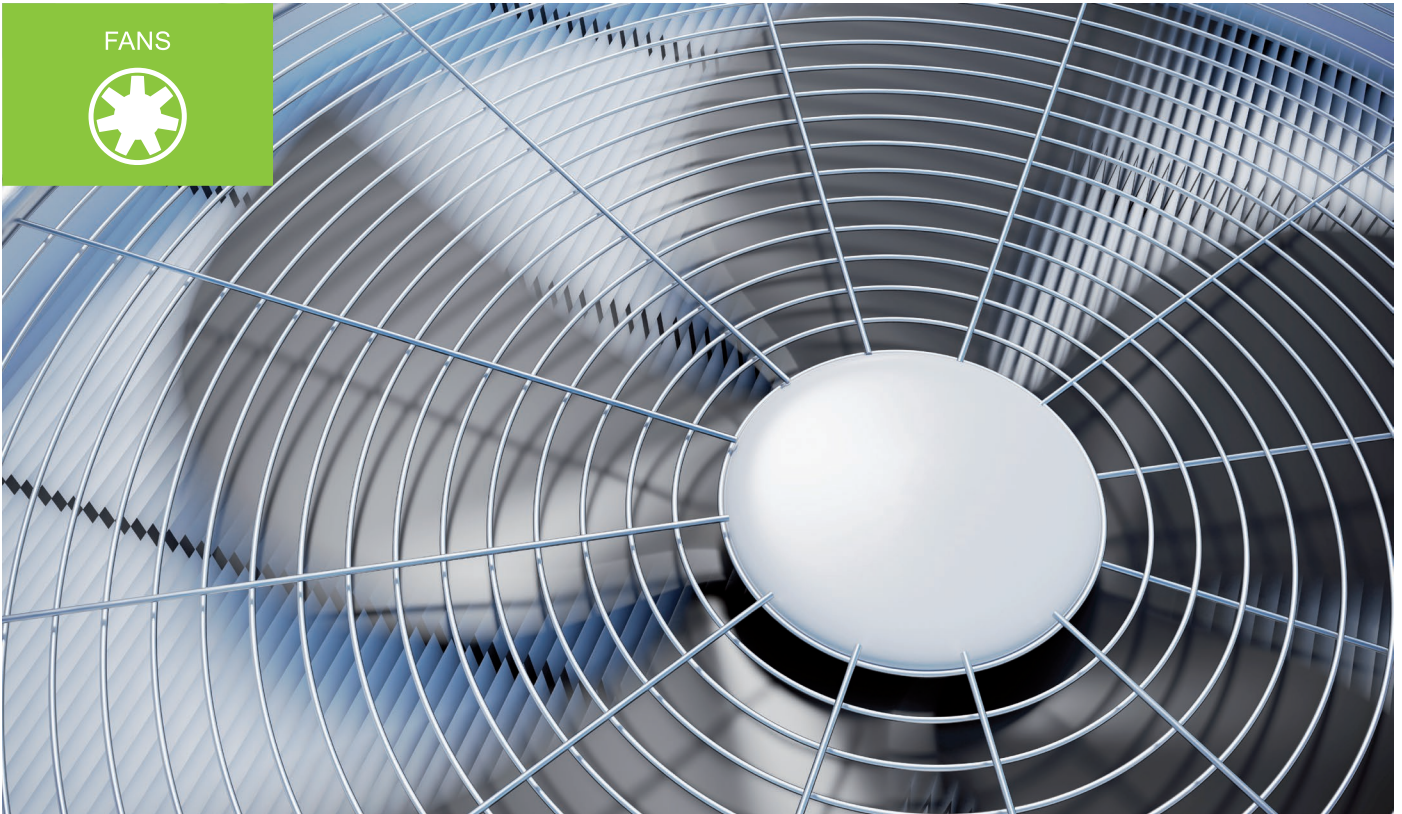
Similar findings are projected for industrial fans, but for this product group there is currently less evidence of the current levels of non-compliance and hence more speculation with regard to the magnitude of benefits expected from conformity verification actions. There are also more constraints with independent laboratory testing of very large fans (which is not possible at full load in current independent laboratory testing facilities) and less potential to routinely use FAT witness testing (due to it only being done under commercial contracts for the more sensitive end-use applications, and not all manufacturers having testing capability).

Finally, **Annexes I and II on test laboratories** contain the most relevant data to select the most suitable test laboratory when testing a fan or a transformer, depending on its characteristics. Both the analysis of findings and the database are classified according to whether the laboratories are independent, manufacturer or extra European, since their choice for certain market inspection activities may be conditioned by their status for legal or operational reasons.

Because of a relatively low sample of laboratories analysed, the data can therefore only provide some qualitative directions but cannot be considered for extrapolating towards the entire universe of fans and transformer labs in the EU. It is however possible to extract some conclusions:

- For fans laboratories, there are important differences in capacity, accreditation and costs.
- For transformers, survey results suggest that the possibility for the MSA to find a well-experienced and accredited lab which can perform the desired test is good, with both independent and manufacturer labs.

² The reader will notice for example, that many of the specific recommendations start by stating INTAS's support to some general provisions of the Commission proposal for a Regulation on Enforcement and Compliance COM(2017)795, published by the Commission under the “Goods Package”, and currently under discussion by the European legislative



1. Main Findings in the Area of Industrial Fans

1.1 Verification Procedures: Best Practice and Experiences

INTAS analysis found that the standard Ecodesign market surveillance conformity verification approach based on selecting a product for independent laboratory testing in a laboratory is not very well adapted to large fans because:

- Large fans are customised made-to-order products that are procured under private B2B commercial arrangements and hence they are not produced in series, are not ordinarily available at a manufacturers premises for sampling, and are not advertised – which means that MSAs cannot employ usual market research methods to establish whether a product is placed on the market or not, and to sample and test the product.
- Even when it is established that a product is placed on the market, conducting independent laboratory testing once a product has left the factory premises is costly to conduct and is liable to be disruptive and costly (mostly due to the delay it would cause in finalising the larger project the fan is a part of, but also in terms of lost operational value) to the business who has procured the product.

Market surveillance conformity verification based on witnessing factory acceptance tests, could be much less costly and disruptive for cases where factory acceptance tests (FATs) have been ordered by the client; however, this is not a panacea due to:

- The difficulty of an MSA knowing that a product order has been placed and hence being able to request a witness test.
- The fact that MSAs may not have the authority to insist on being present and to impose conditions on the FATs (critically the current Regulation 327/2011 has no provisions mandating this activity, unlike the equivalent regulation No 548/2014 for power transformers).
- The fact that FATs are only currently requested for very few products by clients and as a result test facilities are not always available.
- Challenges MSAs face in securing expert technical assistance to conduct this form of conformity verification.
- The potential for manipulation of test results by manufacturers.
- Possible limits on the legal powers that can be exercised in the event an MSA rejects a product following a witness test.

Prospective alternative approaches including independent laboratory testing prior to commissioning (i.e. putting into service on site), in situ testing and conformity verification of environmental management systems were also considered but are found to be unviable as a means for making a final compliance determination; they could however be used to establish non-conformity risk as a prelude to independent laboratory testing or to alert industrial fan clients to potential non-conformity risk.

Assessment, or certification, of manufacturing practices including conformity verification via the manufacturer's own software tools and records is an option favoured by some manufacturers who were interviewed for this project. However, the practicalities associated with doing this are not yet clear and nor are the legal possibilities were an MSA to conduct such checks and find a producer to be at fault.

Overall it is found that key areas need to be improved to enable effective conformity verification for these products or there is a risk that MSAs may feel obliged to assess conformity in ways that will produce legally defensible results with high integrity but that risk incurring significant costs to themselves and to the businesses at each end of the supply chain. The biggest gap needing to be addressed is the limited means that MSAs have of knowing if a product has been placed on the market in time to conduct verification procedures without causing costly disruptions to the businesses downstream of the product in the supply chain.

A key fundamental need, that requires robust action, is to ensure that mechanisms are put in place to maximise the likelihood that an MSA will be informed that a large fan will be placed on the market and put into service. To this end, Ecodesign MSAs are strongly encouraged to establish relationships with the following entities:

- All enterprises likely to procure large fans – including process industries, mining, infrastructure sectors responsible for tunnels and metros, electricity generators, transportation sector, etc.
- The system integration contractors likely to manage projects involving the installation of fans
- The authorities responsible for granting permission to move large loads on the road network so that they are informed when products are placed on the market and put into service.

For the first two cases, they should establish an agreement that they will inform the MSA whenever they have placed an order for a large fan and share the main details concerning the type of product and main characteristics, the supplier including contact details, the expected dates of completion, of any factory acceptance tests, and of delivery.

For the latter case, they should secure an agreement that they will systematically inform the MSA once they have received a request for a permit to transport a large fan and share the main details

concerning the type of product and its characteristics, the enterprise who is requesting the permit including contact information, the route being taken and the date of movement.

In addition, it is also advisable that the MSA makes an agreement with the principal ports, rail terminals, and customs authorities –for imports to the Single Market- to ensure they are notified whenever a large fan shipment comes to their notice.

If MSAs are informed when the order for the large fan is first placed then they have the option of approaching the manufacturer and client about potentially requesting to conduct conformity verification via FAT witness testing at the place of manufacture (presuming it is the same Member State as the place of installation). Otherwise, any conformity verification procedure would need to occur while the product is in transit or is poised to be put into to service. The possibility that MSAs may choose to do this if market actors have not chosen to inform them soon enough for a witness test to be conducted should serve as a deterrent against this behaviour, as it risks incurring significant lost service (downtime) costs to the product procurer. Note, the option to test in transit is true whether the product is manufactured within the European Economic Area (EEA) or not and hence helps to address any potential asymmetry of treatment that might create an uneven playing field based on the location of the supplier.

While witness of factory acceptance tests addresses many of the most important deficiencies in the other market surveillance verification approaches in that it is the most affordable and the least disruptive and costly option to suppliers, it still requires improvement to be fully viable. The most important needs are:

- To properly document ways that cheating in FATs could occur and to devise strategies to overcome them.
- To ensure there is a competent independent laboratory inspectorate community available for MSAs to hire.
- To establish minimum qualification criteria for the supplier’s test facilities and test procedures,
- To allow external measurement equipment to be used in a manufacturer’s lab.

Section 1.2 just below provides further insight into how to improve current regulations and standards in order to take into account these findings.

1.2 Policy Recommendations

According to Commission Regulation (EU) No 327/2011³, fans placed on the EU market must fulfil energy efficiency requirements in place as of January 2013. Thanks to these measures and the tougher requirements in tier 2 of the regulation, which are applied from 2015, it is estimated that the EU will save 28 TWh electricity per year.

Commission Regulation (EU) No 327/2011 has been reviewed and is in the process of being revised. The revised regulation, which was expected for 2018 but is now more likely to be adopted in 2019, is an opportunity to address some issues for large fans and ensure that additional energy savings potential is materialised. The proposals below support those objectives.

The proposals below aim at providing legal clarity and a level playing field for all involved actors. They attempt to provide MSAs with a full suite of verification procedures options that they may be able to use, depending on the particular circumstances. While INTAS supports MSAs counting on a full range of viable verification options, it is acknowledged that some of them are much more disruptive/challenging/costly than others and should therefore only be used as a last resort option.

³ COMMISSION REGULATION (EU) No 327/2011 of 30 March 2011 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW



1.2.1 Set up a dedicated European market surveillance task force for fans

JUSTIFICATION



Whereas businesses are often active both within the EU and worldwide, market surveillance authorities are often underfunded and constrained by national boundaries. In order to be effective, market surveillance efforts must be uniform across the Union and between EU and non-EU products, otherwise weak spots are created which threaten the public interest and encourage unfair competition.

According to analysis by the European Commission⁴, regulation (EC) No 765/2008 on market surveillance⁵ is not yet uniformly applied: sub-optimal cross-border exchange of information and cooperation, inconsistent implementation of the market surveillance framework at national level, and lack of resources hinder the uniform application of market surveillance activities across Europe.

INTAS analysis and consultations confirm these conclusions: according to responses from consulted stakeholders, lack of awareness, capacity, resources and expertise are the key issues jeopardising market surveillance of large industrial products⁶.

To ensure consistent enforcement and to efficiently tackle non-compliance spanning over several Member States, it is necessary to better coordinate activities across the Union. Improving cooperation among market surveillance authorities (MSAs) will improve the overview of their own market, and the understanding of regulations, which will in turn help them share information and create awareness among national market actors.

EXPLANATION



INTAS supports the key principles of the Commission proposal for a Regulation on Enforcement and Compliance COM(2017)795, in particular the establishment of an Union Product Compliance Network (the “Network”) whose main task would be coordinating enforcement across the Union, and whose financing and reporting would also be addressed at Union level. The Network would be hosted by the European Commission, and aim at coordinating and facilitating the implementation of joint enforcement activities by Member States, such as joint investigations. In addition, this administrative support structure should allow the pooling of resources and maintain a communication and information system between Member States and the Commission, thereby helping to strengthen enforcement of Union harmonisation legislation on products and deter infringements.

Proposal COM(2017)795 also sets out the framework for international cooperation with third countries or international organisations to ensure Union harmonisation legislation on products is enforced. It also provides for a system for product related pre-export controls carried out by a third country on products, before they are exported to the Union, the details of which will be established by implementing acts.

Within this general framework, INTAS suggests the creation of a dedicated Task Force on industrial fans, with a dedicated budget and responsibilities. Such a Task Force would:

- Be made up of national MSA representatives and, if appropriate, representatives of the single liaison offices⁷, and representatives of the relevant business associations and of consumer associations. The Commission may also attend the meetings of the Task Force.
- Count on a dedicated budget. INTAS estimates that €0,5-2 million per year would be an adequate amount.

⁴ COM(2017)795- Proposal for a Regulation laying down rules and procedures for compliance with and enforcement of Union harmonisation legislation on products and amending Regulations and Directives

⁵ Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (Text with EEA relevance)

⁶ See INTAS “Deliverable 6.3. National and EU stakeholders views” on the INTAS website: www.intas-testing.eu

⁷ According to proposal COM(2017)795, “the single liaison office of a Member State shall be responsible for coordinating the enforcement and market surveillance activities of the market surveillance authorities designated by that Member State.”

- Provide dedicated technical and legal trainings for MSA, and support MSAs in identifying and adapting procedures for national MSAs legislative and practical situations. The support could also include evaluation of tests and technical support for enforcement actions. To that end, the Task Force should also include independent technology experts to provide specialized support, as most MSA representatives are rather market experts than technology experts.
- Make the best possible use of the information and communication system of the above described “Network” for collecting and storing information on the enforcement of Commission Regulation (EU) No 327/2011. In particular, notify large fans imported or manufactured in the Single market for transit to another Member State than the point of entry. The MSA of the receiving country should then decide whether any market surveillance action is needed.
- Ensure that any information exchanged is subject to the strictest guarantees of confidentiality and of professional and commercial secrecy.
- Undertake a number of document inspections and verification tests across Europe. This could be document inspection of some 20 manufacturers per year; and testing and verifying some 10-20 fans (10-50kW) to show that market surveillance is actually taking place. These market surveillance activities will create the necessary demand for a network of recognised/accredited laboratories to exist. All such laboratories should follow well-defined criteria (accreditation, independence). This will ensure the consistency and reliability of testing across Europe, and facilitate the use of results from one country in another country.

INTAS partners believe that this dedicated Task Force, together with other key provisions in proposal COM(2017)795 (chiefly the appointment of a “person responsible for compliance information within the Union”, and the improvement of the principle of mutual recognition of non-compliant product) are a very good starting point for the improvement of market surveillance of products in general, and of fans in particular, in Europe.

1.2.2 Include a definition of “large fans” in Commission Regulation (EU) No 327/2011

JUSTIFICATION



Regulation (EU) No 327/2011 does not differentiate between small, medium, large and extra-large fans. In order to address some of the specificities of large fans and improve their market surveillance, it would be necessary to define such boundaries.

EXPLANATION



INTAS suggests including Under “Article 2: Definitions” of Regulation (EU) No 327/2011, definitions for “small fans”, “medium fans”, “large fans” and “extra-large fans”, or alternative terminology if more appropriate. These could be based on the size of the fans, their power, or a combination of the two. All along the project, INTAS used power as the defining criterium:

- Small fans: <1 kW
- Medium fans: 1–10 kW
- Large fans: 10–100 kW
- Extra-large fans: 100–500 kW

INTAS



1.2.3 Establish a mandatory notification to MSAs

JUSTIFICATION



In order to conduct effective market surveillance, MSAs must be able to have a clear picture of the products that plan to be placed on the market or put into service in their jurisdiction. Large industrial products such as fans are mostly sold business-to-business (B2B), which make them largely “invisible” to MSAs. A solution is needed to ensure that market surveillance authorities are made aware of such products being placed on the market or put into service in their jurisdiction.

The sooner an MSA knows about a large fan that will be placed on the market/put into service in its jurisdiction, the easier it becomes that any eventual verification procedure for market surveillance checks can avoid delays and additional costs for the economic operators involved in the transaction. Indeed, the logic of INTAS is to make viable the least disrupting verification procedures (e.g. witness testing of a Factory Acceptance Testing (FAT) if it exists; verifications at manufacturer’s premises, including document inspection⁸). This will help avoid testing in-situ, once the fan is already functioning, as this would cause disruptions, delays and additional costs.

A timely notification to the relevant MSAs would help meet those objectives.

EXPLANATION



As a first step to help MSAs have a clearer picture of their fans market, INTAS supports the Commission proposal COM(2017)795, whereby a product can only be made available on the market if a ‘person responsible for compliance information’ is established in the Union and can be a direct interlocutor for market surveillance authorities. This person could be the manufacturer, the importer or any other economic operator mandated by the manufacturer. The tasks of the person responsible for compliance information would essentially be to provide information on the product to market surveillance authorities and to cooperate with the authorities.

In addition to that general requirement, INTAS partners consider that an additional, fans-specific, mandatory notification would be needed in order to ensure that MSAs have a complete picture of what fans will be placed on the market or put into service in their jurisdiction; and to be able to effectively carry out verification procedure on products for which traditional verification procedures is impossible or challenging.

The request for a “Mandatory notification to MSAs” could therefore be inserted in Regulation (EU) No 327/2011, under “Article 3: Ecodesign requirements”. The new provision would specify that, for fans for which “traditional verification procedures” are impossible, or extremely difficult and/or costly, then the ‘person responsible for compliance information within the Union’ shall inform the MSA of the country where the fan will be put into service, or the MSA of the country where the product will be placed on the market if the place of putting into service is unknown, of the expected sale of the fan. This notification should include all the necessary documents for verifying the compliance with Ecodesign requirements, making use as much as possible of the “communication and information system between Member States and the Commission” suggested by the Commission under proposal COM(2017)795, which INTAS partners imagine as an improved version of the existing ICSMS⁹ and/or the EPREL¹⁰ database. The notification would remain within the protected area of the database, and would not contain any commercially sensitive information. Finally, the notification should happen “as early as possible, and in any case no later than six weeks prior to the conformity assessment”.¹¹

⁸ Factory acceptance testing (FAT) are not very common in the industrial fan business – at least not for fans in scope of Regulation (EU) No. 327. However, for those manufacturers doing FATs on a regular basis, there is the option that the MSA can participate in a witness test, where the performance of the fan is demonstrated along with the customer of just before/after the customer's FAT. In this case the MSA and fan manufacturer should agree on the conditions of the test which could be based on commercial practice e.g. with reference to EN ISO 13348 but with tolerances according to Regulation (EU) No. 327.

⁹ ICSMS is “the internet-supported information and communication system for the pan-European market surveillance.” <https://webgate.ec.europa.eu/icsms/>

¹⁰ EU Product Database for Energy Labelling

¹¹ An alternative, stepwise notification discussed within INTAS could look like this:

1. Manufacturer/importer must notify company if placing on the market fans according to Reg. No. 327/2011
2. “In the moment notification” of fans placed on the market for the first time
3. “In advance notification” – An option MSAs can require/demand in a limited period in case they want to use “verification at the manufacturers premises”



Encouraging the “person responsible for compliance information” to notify the MSAs as early as possible of the planned placing on the market/putting into service of a fan will ensure that delays and disturbances can be minimised in the event that verification procedures take place.

It is in the manufacturer’s own interest to notify the MSA, and to do it as early as possible. Indeed, if the MSA were to conduct verification procedures once the product is placed on the market, it would be very costly for the client in terms of lost operational time or delays. Manufacturers will not wish to develop a reputation of putting their clients at risk due to their failing to cooperate with MSAs.

EU vs non-EU manufacturers

The “mutual assistance” provisions of proposal COM(2017)795 make it possible for an MSA from an EU country to request information and enforcement to another MSA of an EU country, but not to non-EU MSAs. It also provides for a system for product related pre-export controls carried out by a third country on products, before they are exported to the Union. Such pre-exports controls will however depend on the ability of the European Commission and the third country to conclude appropriate agreements.

In other words, it seems likely that the standard approach for doing inspection campaigns, and even the new mandatory notification proposed in the paragraphs above, will miss large fans that are imported. Requesting information from customs and other national stakeholders should thus complement the MSA approach to the market surveillance of large fans. See section 1.2.4. just below for more information on this.

1.2.4 Foster cooperation with national stakeholders

JUSTIFICATION



In order to complete the market picture provided by the European task force on fans (section 1.2.1) and the mandatory notification by manufacturers (section 1.2.3), market surveillance authorities should establish cooperation agreements with national market actors such as the end-users of fans and the customs authorities. Collaboration with these stakeholders will allow to spot products that would have otherwise been “invisible” to market surveillance authorities, e.g. products sold by manufacturers that were not aware of the mandatory product notification.

An evaluation of Regulation (EC) No 765/2008 shows that border controls on imported products are insufficient, and that compliance controls need to be enforced in a more uniform manner. However, and despite the trend towards more European integration and exchange of information, market surveillance activities still fall and will continue to fall within competence of Member States. This means that better border and compliance controls can only be achieved through systematic cooperation between national MSAs and the authorities in charge of checking products at the EU’s external borders (i.e. customs). Effective cooperation of MSAs with customs in all European countries is therefore essential to ensure a level playing field and avoid “soft spots” along the Union’s borders.

In addition, establishing collaboration with national market actors will allow the MSAs to share information and make these stakeholders aware of Ecodesign requirements. INTAS consultations with national stakeholders show indeed that lack of basic information on Ecodesign is a key enforcement problem¹².

¹² INTAS activities on fans “engineered to order” show that:
 – Nameplate do not necessarily include the requested ED/ErP-data, but always the CE-mark;
 – Declarations of Conformity typically exists for the fans with reference to the Machinery Directive, but typically no ED/ErP-reference
 – Basic ErP-data (as requested on nameplate) are typically not included in the data sheet for the customer unless they ask (and they do not).
 Product selection/design software may include a check-box to include the ED/ErP-data in the data sheet if requested.



EXPLANATION



Regulation (EC) No 765/2008 already foresees the obligation for cooperation between customs officers and market surveillance officers. Obligations for cooperation are also included in Article 13 of the Community Customs Code¹³ which establishes that controls performed with customs and other authorities are undertaken in close cooperation between each other. In addition, the principles of cooperation between the Member States and the Commission established in Article 24 of the Regulation are extended to authorities in charge of external controls, when relevant (Article 27(5)). This should be enough of a legal basis for MSAs and customs to exchange the necessary information to identify large fans coming into their jurisdiction. In particular, it should allow MSAs to collaborate with customs to develop a method to identify large fans (>10kW) starting from available freight information (e.g. TARIC codes fans, weight and TARIC codes electric motors).

In addition to the collaboration between MSAs and customs, Article 3 of proposal COM(2017)795 encourages “compliance partnerships arrangements” with economic operators, as well as “memoranda of understanding with stakeholders”:

“A market surveillance authority may enter into a partnership arrangement with an economic operator established in its territory under which the authority agrees to provide the economic operator with advice and guidance in relation to the Union harmonisation legislation applicable to the products for which the economic operator is responsible.”

and

“MSAs should be able to build on the existing cooperation with stakeholders and be permitted to conclude memoranda of understanding with stakeholders, with a view to promoting compliance or identifying non-compliance with regard to categories of product within a given geographical area.”

INTAS supports these proposals, as its application to the fans market will allow MSAs to both increase awareness and understanding of Ecodesign requirements, and allow a better market picture and ultimately better market surveillance of fans.

In more concrete terms, MSAs could, under the partnership arrangements described above, work with end-users to help them include in their procurement documents the necessary tests and specifications which will follow the Ecodesign requirements. All manufacturers, including non-EU ones, are reminded of the obligation to comply with Ecodesign rules if they wish to sell in the EU. This would provide an additional layer of guarantee to protect EU companies from unfair competition.

1.2.5 Allow MSAs to conduct market surveillance actions at manufacturers’ and to witness-test FATs

JUSTIFICATION



Conducting verification procedures at manufacturers’, and in particular the witness-testing of any eventual FAT, is considered the least disruptive option for both manufacturers and end-users. Market surveillance authorities should count explicit powers to undertake such verification procedures.

EXPLANATION



As a first step, INTAS supports recital 23 of the proposal COM(2017)795, which reads:

“Market surveillance authorities should be able to carry out the necessary on-site inspections, and should have the power to enter any premises, land or means of transport, that the economic operator uses for purposes relating to his trade, business, craft or profession.”

While recitals have no independent legal value, they state the rationale for the legislation that they precede.

¹³ Regulation (EU) No 952/2013 of the European Parliament and of the Council of 9 October 2013 laying down the Union Customs Code

In addition, INTAS partners suggest that ‘Annex III: Verification procedures’ of Regulation 327/2011 should be amended to include the following text:

“Given the weight and size limitations in the transportation of medium, large, and extra-large fans, 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.”

Annex III should also ensure that in-situ verification procedures at the end-user premises are fully viable. While INTAS fully acknowledges that this is the least desirable option for all economic operators, it still needs to be legally possible as a last resort option, and to deter unethical behaviour from unscrupulous manufacturers.

In addition, and despite FATs not being commonplace for fans, Annex III should also include a clause for MSAs to witness FATs:

“If Factory Acceptance Tests (FATs) are planned, which test minimum requirements set out in Annex I of this Regulation, the competent authorities may decide to use witnessed testing during these FATs to assess compliance of the fan under investigation or have an independent test house carry out such assessment on their behalf. The authorities may request a manufacturer to disclose information on any planned FATs relevant for witnessed testing.”

The following definitions will also need to be added in ‘Article 2: Definitions’ of 327/2011:

“‘Witnessed testing’ means conducting a product verification test by examining all product and testing documentation, and actively observing the physical testing of the product under investigation by another party, to independently draw up conclusions on the validity of the parameters being tested. This may include conclusions on the compliance of testing and calculations methods used with applicable standards and legislation;”

and

“‘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 at the premises of the manufacturers, before they are accepted or put into service in their final destination;”

and

“‘Test house’ means a governmental or non-governmental third-party organisation independent from the manufacturer, possessing the necessary competence and responsibility to carry out product verification in accordance with this Regulation;”

1.2.6 Allow and clarify alternatives to full-size, full-load testing as verification options

JUSTIFICATION



Full-size, full-load testing of fans might not always be possible due to lack of suitable testing facilities, in particular for the largest fans. Manufacturers use a number of alternative techniques to evaluate the performance of their products without having to test full-size and/or full-load: scale-model testing, part-load or reduced speed testing, computational fluid dynamics, calculations of performance and other “calculations and extrapolations”.

Tests are typically carried out in the development phase of e.g. a new impeller wheel or fan model and often only on relatively small fans. The test results of the smaller fans are used to document the basic design that is afterwards scaled-up to establish a complete fan series. So in many cases no test data available for the larger fans. Even, if test results are available for a smaller fan, the

test results may not be for exactly the final fan design as the tests were carried out in the R&D phase and Computational Fluid Dynamics may have been used to fine tune the design or changes were made in the process of making the design ready for production.

Market surveillance authorities should be able to know what techniques, calculations and extrapolations have been used. They should also be able to use the same techniques, in particular when full-size, full-load testing is impossible or extremely difficult/expensive. Market surveillance authorities should be able to evaluate whole product series if they are based on the same set of tests and extrapolations and/or scale up calculations.

EXPLANATION



Ecodesign regulation should therefore be amended to permit part-load and scale-model testing, as well as computational fluid dynamics and other “calculations and extrapolations” as legally enforceable compliance verification options for very large fans. INTAS suggests the following regulatory changes:

- Article 4 of Regulation (EU) No 327/2011 should include a requirement to provide, in the technical documentation, details of the calculations and extrapolations carried out:
 - “Where the information included in the technical documentation for a particular fan model has been obtained by calculation on the basis of design, or extrapolation from other fans, or both, the technical documentation shall include the following information:*
 - (a) details of such calculations or extrapolations, or both, including references to standards or other documents on which they are based.*
 - (b) details of tests undertaken by manufacturers to verify the accuracy of the calculations and extrapolations;*
 - (c) a list of any other fan models where the information included in the technical documentation was obtained on the same basis;*
 - (d) a list of equivalent fan models.*
 - (e) details of the certifications of the person/body who performed the calculations and/or extrapolations“*
- ‘Annex III: Verification procedure for market surveillance purposes’ of Regulation 327/2011 should also include a process for MSAs to be able to decide what testing option to use, a sort of “hierarchy” of testing options.

1.2.7 Improve fans standards for Ecodesign

JUSTIFICATION



There are no EU-harmonised standards yet for measuring energy efficiency of fans and no transitional methods specified by the European Commission. However, internationally widely accepted test standards exist:

- **EN ISO 5801:2017 Fans – Performance testing using standardised airways**
- **EN ISO 5802:2009 Industrial fans – Performance testing in-situ**

In addition, based on mandate M/500 from 2012 from the European Commission to CEN, CENELEC and ETSI, a harmonised standard should be developed to cover essential requirements related to Ecodesign Directive 2009/125/EC and the implementing measure for fans. A candidate standard is being developed and is currently in a draft version (Final Vote is expected for early 2019) by CEN/TC 156.

- **prEN 17166 Fans – Procedures and methods to determine the energy efficiency for the electrical input power range of 125 W up to 500 kW**

This standard is referring to the test standards EN ISO 5801 and EN ISO 5802. In case of scale testing/scaling the standard referred to is:

- **ISO 13348:2007 Industrial fans - Tolerances, methods of conversion and technical data presentation**

More generally, there is a need to improve consistency between the development of Ecodesign measures and the standardisation agenda, in order to ensure availability of unequivocal and appropriate measurement and assessment methods.

EXPLANATION



The Commission should urgently adopt a transitional method to support Commission regulation (EU) No 327/2011 with regard to Ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW (based on prEN 17166 if appropriate), and eventually a harmonised standard covering test methods for all of the possible testing options described in previous sections (witness testing; in-situ testing; scale testing, part-load and other calculations and extrapolations, etc.).

The verification tolerances for each of the testing options should be specified in Commission regulation (EU) No 327/2011.

1.2.8 Insert clauses to deter circumvention

JUSTIFICATION



Last but not least, circumvention of Ecodesign regulations should be avoided as it results in an uneven playing field and loss of energy savings and money for society.

The relevant provisions on circumvention and defeat devices included in the revised energy labelling Regulation (EU) 2017/1369¹⁴ have prompted debates and led to initiatives with the view to address it. However, moving from the provisions in the horizontal regulation to their implementation in product-specific regulations and standards merits systematic consideration.

Following the latest developments within the revision of Ecodesign measures for other products (e.g. fridges, washing machines, dishwashers, etc.), the upcoming regulations on industrial products should also include an article on circumvention.

EXPLANATION



A new article should be included in Commission Regulation (EU) No 327/2011 which mirrors that included in other Ecodesign regulations:

*“Article X
Circumvention*

The manufacturer or importer shall not place on the market products designed in such a way that a model's performance is automatically altered under test conditions with the aim of reaching a more favourable level for any of the parameters declared by the manufacturer in the technical documentation or included in any of the documentation provided with the product.”



¹⁴ Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU (Text with EEA relevance.)



2. Main Findings in the Area of Power Transformers

2.1 Verification Procedures: Best Practice and Experiences

INTAS analysis found that the standard Ecodesign market surveillance conformity verification approach based on selecting a product for independent laboratory testing in a laboratory is not very well adapted to Large Power Transformers (LPTs) because:

- LPTs are customised made-to-order products that are procured under private B2B commercial arrangements and hence they are not produced in series, are not ordinarily available at a manufacturer's premises for sampling, and are not advertised – which means that MSAs cannot employ usual market research methods to establish whether a product is placed on the market or not
- Even when it is established that a product is placed on the market, conducting independent laboratory testing once a product has left the factory premises is very costly to conduct and is liable to be disruptive and costly (in terms of lost operational value) to the business who had procured the product

By contrast, market surveillance conformity verification based on witnessing factory acceptance tests or testing at manufacturer's premises, which are permitted under the Ecodesign regulation

applying to transformers, is much less costly and disruptive; however, it also presents challenges due to:

- The difficulty of an MSA knowing that a product order has been placed and hence being able to request a witness test
- Challenges MSAs face in securing expert technical assistance to conduct this form of conformity verification
- The potential for manipulation of test results
- Possible limits on the legal powers that can be exercised in the event an MSA rejects a product following a witness test.

Prospective alternative approaches including independent laboratory testing prior to commissioning (i.e. putting into service on site), in situ testing and conformity verification of environmental management systems are also considered but are found to be unviable, or too immature to be used at present without further development.

Overall it is found that key areas need to be improved to enable effective conformity verification for these products or there is a risk that MSAs may feel obliged to assess conformity in ways that will produce legally defensible results with high integrity but that risk incurring significant costs to themselves and to the businesses at each end of the supply chain.

A key fundamental need, that requires robust action, is to ensure that mechanisms are put in place to maximise the likelihood that an MSA will be informed that a transformer will be placed on the market and put into service. To this end, Ecodesign MSAs are strongly encouraged to establish relationships with the following entities:

- Any manufacturers of large power transformers
- All enterprises likely to procure large and medium power transformers – most, notably electricity generators, TSOs, DSOs and large industrial enterprises
- The conformity assessment bodies responsible for certifying the electrical safety of a transformer and granting it a license to be operated.

so that they are informed when products are placed on the market and put into service.

Procurers should establish an agreement that they will inform the MSA once they have placed an order for a power transformer and share the main details concerning the type of product and main characteristics, the supplier including contact details, the expected dates of completion, the factory acceptance test and delivery.

For safety bodies, they should secure an agreement that they will systematically inform the MSA once they have received a request to conduct a safety assessment of a new power transformer and share the main details concerning the type of product and its characteristics, the enterprise who is having the product installed including the location of where it will be put into service and their contact details, the supplier including contact details, the expected dates of the safety test and of putting into service.

In addition, it is also advisable that the MSA makes an agreement with the principal ports, rail terminals, customs authorities –for imports to the Single Market- and the authorities charged with granting approval for large loads to be moved via road haulage to ensure they are notified whenever a large or medium power transformer shipment come to their notice.

In this way MSAs can close the information gap that currently makes it difficult for them to conduct market surveillance and conformity verification for these products.

If MSAs are informed when the order for the power transformer is first placed then they have the option of seeking to conduct conformity verification via FAT witness testing at the place of manufacture (presuming it is the same Member State as the place of installation). Otherwise, any conformity verification procedure would need to occur while the product is in transit or is poised to be put into to service. The possibility that MSAs may choose to do this if market actors have not chosen to inform them soon enough for a witness test to be conducted should serve as



a deterrent against this behaviour, as it risks incurring significant lost service (downtime) costs to the product procurer. Note that the option to test in transit is true whether the product is manufactured within the EEA or not and hence helps to address any potential asymmetry of treatment that might create an uneven playing field based on the location of the supplier.

While witness of factory acceptance tests addresses many of the most important deficiencies in the other market surveillance verification approaches, in that it is the most affordable and the least disruptive and costly option to suppliers, it still requires improvement to be made fully viable. The most important needs are:

- To properly document ways that cheating in FATs could occur and to devise strategies to overcome them.
- To ensure there is a competent independent laboratory inspectorate community available for MSAs to hire.
- To establish minimum qualification criteria for the supplier's test facilities and test procedures.

It may also be necessary to explore means of allowing external measurement equipment to be used in a manufacturer's lab.

Section 2.2 just below provides further insight into how to improve current regulations and standards in order to take into account these findings.

2.2 Policy Recommendations

During the course of the INTAS project, a set of available methodologies were assessed with the help of MSAs, manufacturers of transformers, end-users like utilities and testing experts from independent laboratories. Documentation inspection of nameplates and technical documentation; testing transformers at independent laboratory; testing transformers at manufacturer's premises or in-situ at the end user's premises, with support from staff and equipment from independent laboratories; witness testing at manufacturer's premises in combination with Factory Acceptance Testing (FAT) assessment, using the test facility and equipment of the manufacturer¹⁵.

The proposals below aim at providing legal clarity and a level playing field for all involved actors. They attempt to provide MSAs with a full suite of verification procedures options that they may be able to use, depending on the particular circumstances. While INTAS supports MSAs counting on a full range of viable verification options, it is acknowledged that some of them are much more disruptive/challenging/costly than others and should therefore only be used as a last resort option.

Although for transformers all options have been verified in general as applicable, reliable and cost-effective, depending on the product size, it was found that witness of factory acceptance tests (FATs) was the most affordable and the least disruptive and costly to suppliers. The recommendations below aim at making the least disruptive options fully viable for MSAs, while keeping the less desirable options (e.g. in-situ testing) open as a last resort.

2.2.1 Set up a dedicated European market surveillance task force for transformers

Whereas businesses are often active both within the EU and worldwide, market surveillance authorities are often underfunded and constrained by national boundaries. In order to be effective, market surveillance efforts must be uniform across the Union, otherwise weak spots are created which threaten the public interest and encourage unfair competition.

JUSTIFICATION



¹⁵ See INTAS deliverable "4.2. Final Methodology for Market Surveillance of Transformers" on INTAS website www.intas-testing.eu

According to analysis by the European Commission¹⁶, regulation (EC) No 765/2008 on market surveillance¹⁷ is not yet uniformly applied: sub-optimal cross-border exchange of information and cooperation, inconsistent implementation of the market surveillance framework at national level, and lack of resources hinder the uniform application of market surveillance activities across Europe.

INTAS analysis confirms these conclusions: according to responses from consulted stakeholders, lack of awareness, capacity, resources and expertise are the key issues jeopardising market surveillance of large industrial products¹⁸.

To ensure consistent enforcement and to efficiently tackle non-compliance spanning over several Member States, it is necessary to better coordinate activities across the Union. Improving cooperation among market surveillance authorities (MSAs) will improve the overview of their own market, and the understanding of regulations, which will in turn help them share information and create awareness among national market actors.

EXPLANATION



INTAS supports the key principles of the Commission proposal for a Regulation on Enforcement and Compliance COM(2017)795, in particular the establishment of an Union Product Compliance Network (the “Network”) whose main task would be coordinating enforcement across the Union, and whose financing and reporting would also be addressed at Union level. The Network would be hosted by the European Commission, and aim at coordinating and facilitating the implementation of joint enforcement activities by Member States, such as joint investigations. In addition, this administrative support structure should allow the pooling of resources and maintain a communication and information system between Member States and the Commission, thereby helping to strengthen enforcement of Union harmonisation legislation on products and deter infringements.

Proposal COM(2017)795 also sets out the framework for international cooperation with third countries or international organisations to ensure Union harmonisation legislation on products is enforced. It also provides for a system for product related pre-export controls carried out by a third country on products, before they are exported to the Union, the details of which will be established by implementing acts.

Within this general framework, INTAS suggests the creation of a dedicated Task Force on transformers, with a dedicated budget and responsibilities. Such a Task Force would:

- Be made up of national MSA representatives and, if appropriate, representatives of the single liaison offices¹⁹, and representatives of the relevant business associations and of consumer associations. The Commission may also attend the meetings of the Task Force.
- Count on a dedicated budget. INTAS estimates that €0,5–2 million per year would be an adequate amount.
- Provide dedicated technical and legal trainings for MSA, and support MSAs in identifying and adapting procedures for national MSAs legislative and practical situations. The support could also include evaluation of tests and technical support for enforcement actions. To that end, the Task Force should also include independent technology experts to provide specialized support, as most MSA representatives are rather market experts than technology experts.
- Make the best possible use of the information and communication system of the above described “Network” for collecting and storing information on the enforcement of Commission Regulation (EU) No 548/2014²⁰. In particular, notify power transformers imported or manufactured in the Single market for transit to another Member State than the point of entry. The MSA of the receiving country should then decide whether any market surveillance action is needed.

¹⁶ COM(2017)795- Proposal for a Regulation laying down rules and procedures for compliance with and enforcement of Union harmonisation legislation on products and amending Regulations and Directives

¹⁷ Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (Text with EEA relevance)

¹⁸ See INTAS “Deliverable 6.3. National and EU stakeholders views” on the INTAS website: www.intas-testing.eu

¹⁹ According to proposal COM(2017)795, “the single liaison office of a Member State shall be responsible for coordinating the enforcement and market surveillance activities of the market surveillance authorities designated by that Member State.”

²⁰ Commission Regulation (EU) No 548/2014 of 21 May 2014 on implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to small, medium and large power transformers

- Ensure that any information exchanged is subject to the strictest guarantees of confidentiality and of professional and commercial secrecy.
- Undertake a number of document inspections and verification tests across Europe. This could be document inspection of some 2-3 manufacturers per year; and testing and verifying some medium-sized transformers to show that market surveillance is actually taking place. These market surveillance activities will create the necessary demand for a network of recognised/accredited laboratories to exist. All such laboratories should follow well-defined criteria (accreditation, independence). This will ensure the consistency and reliability of testing across Europe, and facilitate the use of results from one country in another country.

INTAS partners believe that this dedicated Task Force, together with other key provisions in proposal COM(2017)795 (chiefly the appointment of a “person responsible for compliance information within the Union”, and the improvement of the principle of mutual recognition of non-compliant product)²¹ are a very good starting point for the improvement of market surveillance of products in general, and of transformers in particular, in Europe.

2.2.2 Establish a mandatory notification to MSAs

JUSTIFICATION



In order to conduct effective market surveillance, MSAs must be able to have a clear picture of the products that plan to be placed on the market or put into service in their jurisdiction. Large industrial products such as transformers are mostly sold business-to-business (B2B), which make them largely “invisible” to MSAs. A solution is needed to ensure that market surveillance authorities are made aware of such products being placed on the market or put into service in their jurisdiction.

The sooner an MSA knows about a transformer that will be placed on the market/put into service in its jurisdiction, the easier it becomes that any eventual verification procedure for market surveillance can avoid delays and additional costs for the economic operators involved in the transaction. Indeed, the logic of INTAS is to make viable the least disrupting verification procedures (e.g. witness testing of a Factory Acceptance Testing (FAT); verifications at manufacturer’s premises²²). This will help avoid testing in-situ, once the transformer is already functioning, as this would cause enormous disruptions, delays and additional costs at best, and impossible at worst.

A timely notification to the relevant MSAs would help meet those objectives.

EXPLANATION



As a first step to help MSAs have a clearer picture of their fans market, INTAS supports the Commission proposal COM(2017)795, whereby a product can only be made available on the market if a ‘person responsible for compliance information’ is established in the Union and can be a direct interlocutor for market surveillance authorities. This person could be the manufacturer, the importer or any other economic operator mandated by the manufacturer. The tasks of the person responsible for compliance information would essentially be to provide information on the product to market surveillance authorities and to cooperate with the authorities.

In addition to that general requirement, INTAS partners consider that an additional, transformers-specific, mandatory notification would be needed in order to ensure that MSAs have a complete picture of what medium and large transformers will be placed on the market or put into service in their jurisdiction; and to be able to effectively carry out verification procedure on products for which traditional verification procedures is impossible or challenging.

The request for a “Mandatory notification to MSAs” could therefore be inserted in Regulation (EU) No 548/2014, under “Article 3: Ecodesign requirements”. The new provision would specify

²¹ <http://www.europarl.europa.eu/news/en/press-room/20180903IPR11612/safer-products-stepping-up-checks-and-inspections-to-protect-consumers>

²² Factory acceptance testing (FAT) is common in the transformers industry.

that, for transformers for which “traditional verification procedures” are impossible, or extremely difficult and/or costly, then the ‘person responsible for compliance information within the Union’ shall inform the MSA of the country where the transformer will be put into service, or the MSA of the country where the product will be placed on the market if the place of putting into service is unknown, of the expected sale of the transformer. This notification should include all the necessary documents for verifying the compliance with Ecodesign requirements, making use as much as possible of the “communication and information system between Member States and the Commission” suggested by the Commission under proposal COM(2017)795, which INTAS partners imagine as an improved version of the existing ICSMS²³ and/or the EPREL²⁴ database. The notification would remain within the protected area of the database, and would not contain any commercially sensitive information. Finally, the notification should happen “as early as possible, and in any case no later than six weeks prior to the conformity assessment”.

The ‘person responsible for compliance information’ should be encouraged to notify the MSAs as early as possible of the planned placing on the market/putting into service of a transformer. This will ensure that delays and disturbances can be minimised in the event verification procedures take place.

It is in the manufacturer’s own interest to notify the MSA, and to do it as early as possible. Indeed, if the MSA were to conduct verification procedures once the product is placed on the market, it would be very costly for the client in terms of lost operational time or delays. Manufacturers will not wish to develop a reputation of putting their clients at risk due to their failing to cooperate with MSAs.

EU vs non-EU manufacturers

The “mutual assistance” provisions of proposal COM(2017)795 make it possible for an MSA from an EU country to request information and enforcement to another MSA of an EU country, but not to non-EU MSAs. It also provides for a system for product related pre-export controls carried out by a third country on products, before they are exported to the Union. Such pre-exports controls will however depend on the ability of the European Commission and the third country to conclude appropriate agreements.

In other words, it seems likely that the standard approach for doing inspection campaigns, and even the new mandatory notification proposed in the paragraphs above, will miss medium and large transformers that are imported. Requesting information from customs and other national stakeholders should thus complement the MSA approach to the market surveillance of medium and large transformers. See section 2.2.3. just below for more information on this.

2.2.3 Foster cooperation with national stakeholders

JUSTIFICATION



In order to complete the market picture provided by the European task force on transformers (section 2.2.1) and the mandatory notification by manufacturers (section 2.2.2), market surveillance authorities should establish cooperation agreements with national market actors such as the end-users of transformers and the customs authorities. Collaboration with these stakeholders will allow to spot products that would have otherwise been “invisible” to market surveillance authorities, e.g. products sold by manufacturers that were not aware of the mandatory product notification.

An evaluation of Regulation (EC) No 765/2008 shows that border controls on imported products are insufficient, and that compliance controls need to be enforced in a more uniform manner. However, and despite the trend towards more European integration and exchange of information, market surveillance activities still fall and will continue to fall within competence of Member States. This means that better border and compliance controls can only be achieved through systematic cooper-

²³ ICSMS is “the internet-supported information and communication system for the pan-European market surveillance.” <https://webgate.ec.europa.eu/icsms/>

²⁴ EU Product Database for Energy Labelling

ation between national MSAs and the authorities in charge of checking products at the EU's external borders (i.e. customs). Effective cooperation of MSAs with customs in all European countries is therefore essential to ensure a level playing field and avoid "soft spots" along the Union's borders.

In addition, establishing collaboration with national market actors will allow the MSAs to share information and make these stakeholders aware of Ecodesign requirements. INTAS consultations with national stakeholders show indeed that lack of basic information on Ecodesign is a key enforcement problem.

EXPLANATION



Regulation (EC) No 765/2008 already foresees the obligation for cooperation between customs officers and market surveillance officers. Obligations for cooperation are also included in Article 13 of the Community Customs Code²⁵ which establishes that controls performed with customs and other authorities are undertaken in close cooperation between each other. In addition, the principles of cooperation between the Member States and the Commission established in Article 24 of the Regulation are extended to authorities in charge of external controls, when relevant (Article 27(5)). This should be enough of a legal basis for MSAs and customs to exchange the necessary information to identify medium and large transformers coming into their jurisdiction. In particular, it should allow MSAs to collaborate with customs to develop a method to identify medium and large transformers starting from available freight information (e.g. TARIC codes transformers and weight).

In addition to the collaboration between MSAs and customs, Article 3 of proposal COM(2017)795 encourages "compliance partnerships arrangements" with economic operators, as well as "memoranda of understanding with stakeholders":

"A market surveillance authority may enter into a partnership arrangement with an economic operator established in its territory under which the authority agrees to provide the economic operator with advice and guidance in relation to the Union harmonisation legislation applicable to the products for which the economic operator is responsible."

and

"MSAs should be able to build on the existing cooperation with stakeholders and be permitted to conclude memoranda of understanding with stakeholders, with a view to promoting compliance or identifying non-compliance with regard to categories of product within a given geographical area."

INTAS supports these proposals, as its application to the transformers market will allow MSAs to both increase awareness and understanding of Ecodesign requirements, and allow a better market picture and ultimately better market surveillance of transformers.

In more concrete terms, MSAs could, under the partnership arrangements described above, work with end-users to help them include in their procurement documents the necessary tests and specifications which will follow the Ecodesign requirements. All manufacturers, including non-EU ones, are reminded of the obligation to comply with Ecodesign rules if they wish to sell in the EU. This would provide an additional layer of guarantee to protect EU companies from unfair competition.

2.2.4 Allow MSAs to witness-test FATs

JUSTIFICATION



Conducting verification procedures at manufacturers', and in particular the witness-testing of any eventual FAT, is considered the least disruptive option for both manufacturers and end-users. Market surveillance authorities should count explicit powers to undertake such verification procedures.

²⁵ Regulation (EU) No 952/2013 of the European Parliament and of the Council of 9 October 2013 laying down the Union Customs Code



As a first step, INTAS supports recital 23 of the proposal COM(2017)795, which reads:

“Market surveillance authorities should be able to carry out the necessary on-site inspections, and should have the power to enter any premises, land or means of transport, that the economic operator uses for purposes relating to his trade, business, craft or profession.”

While recitals have no independent legal value, they state the rationale for the legislation that they precede.

Unlike for fans, ‘Annex III: Verification procedures’ of Regulation 548/2014 already includes the following text:

“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.”

Annex III should also ensure that in-situ verification procedures at the end-user premises are fully viable. While INTAS fully acknowledges that this is the least desirable option for all economic operators, it still needs to be legally possible as a last resort option, and to deter unethical behaviour from unscrupulous manufacturers.

INTAS partners recommend that Annex III should also include a clause for MSAs to witness FATs:

“If Factory Acceptance Tests (FATs) are planned, which test minimum requirements set out in Annex I of this Regulation, the competent authorities may decide to use witnessed testing during these FATs to assess compliance of the transformer under investigation or have an independent test house carry out such assessment on their behalf. The authorities may request a manufacturer to disclose information on any planned FATs relevant for witnessed testing.”

The following definitions will therefore need to be added in ‘Article 2: Definitions’ of Regulation 548/2014:

“‘Witnessed testing’ means conducting a product verification test by examining all product and testing documentation, and actively observing the physical testing of the product under investigation by another party, to independently draw up conclusions on the validity of the parameters being tested. This may include conclusions on the compliance of testing and calculations methods used with applicable standards and legislation;”

and

“‘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 at the premises of the manufacturers, before they are accepted or put into service in their final destination;”

and

“‘Test house’ means a governmental or non-governmental third-party organisation independent from the manufacturer, possessing the necessary competence and responsibility to carry out product verification in accordance with this Regulation;”

2.2.5 Improve standards for in-situ and witness testing

JUSTIFICATION



There is currently lack of clarity as to the standard to be followed for testing in-situ. While there is an existing mandate from the European commission to develop a standard for evaluating the power performance of transformers, such mandate does not include an explicit mention of in-situ testing.

Indeed, a testing standard is needed for those cases that cannot be solved with the manufacturer collaboration, or when manufacturer facilities and other laboratories are not a possible option.

More generally, there is a need to improve consistency between the development of Ecodesign measures and the standardisation agenda, in order to ensure availability of unequivocal and appropriate measurement and assessment methods.

EXPLANATION



INTAS recommendations with regards to standards for transformers is twofold:

- The Commission should issue a mandate for standardisation bodies to develop the methodology to recognize the validity of the in-situ tests for the evaluation of product compliance.
- The Commission should include in the Regulation 548/2014 specific verification tolerances for verification procedures for this particular test method.

In addition, the European surveillance task force on transformers described on point 2.2.1. should produce, with the help of technical experts, a reference guide for MSAs which compiles all of the existing standards and other relevant documents regarding the verification procedures for transformers.

2.2.6 Insert clauses to deter circumvention

JUSTIFICATION



Last but not least, circumvention of Ecodesign regulations should be avoided as it results in an uneven playing field and loss of energy savings and money for society.

The relevant provisions on circumvention and defeat devices included in the revised energy labelling Regulation (EU) 2017/1369²⁶ have prompted debates and led to initiatives with the view to address it. However, moving from the provisions in the horizontal regulation to their implementation in product-specific regulations and standards merits systematic consideration.

Following the latest developments within the revision of Ecodesign measures for other products (e.g. fridges, washing machines, dishwashers, etc.), the upcoming regulations on industrial products should also include an article on circumvention.

EXPLANATION



A new article should be included in Commission Regulation (EU) No 548/2014 which mirrors that included in other Ecodesign regulations:

*“Article X
Circumvention*

The manufacturer or importer shall not place on the market products designed in such a way that a model's performance is automatically altered under test conditions with the aim of reaching a more favourable level for any of the parameters declared by the manufacturer in the technical documentation or included in any of the documentation provided with the product.”

²⁶ Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU (Text with EEA relevance.)

3. Evaluation of costs, benefits and new methods of compliance verification for fans and transformers

COSTS & BENEFITS



In Deliverable 4.3²⁷, INTAS assembled best estimates of the costs and benefits from conducting performance verification or risk assessment actions on power transformers and large industrial fans. In the case of power transformers it established that in most instances the societal value (expressed in terms of the value of product lifetime energy savings to end-users) of conformity verification actions is greater than the cost that would be incurred by the MSA, even if the deterrent effect of having a product fail a verification check is ignored. Estimates of the broader scale of this deterrent effect will be made in the work to be reported under INTAS Deliverable 5.2²⁸; however, inclusion of the deterrence benefit would be expected to increase the overall benefit-cost ratios by several orders of magnitude. Similar findings are projected for industrial fans, but for this product group there is currently less evidence of the current levels of non-compliance and hence more speculation with regard to the magnitude of benefits expected from conformity verification actions. There are also more constraints with independent laboratory testing of very large fans (which is not possible at full load in current independent laboratory testing facilities) and less potential to routinely use FAT witness testing (due to it only being done under commercial contracts for the more sensitive end-use applications, and not all manufacturers having testing capability).

Broadly speaking it has been established that:

- Documentation checks and rating plate inspections are highly cost-effective at producing legally enforceable compliance verification outcomes and (at least initially) are likely to rapidly identify non-compliance with Ecodesign requirements; however, as they cannot fully verify the accuracy of declared energy performance they are only a partially effective solution at deterring non-compliance.
- If it can be presumed that there is a correlation between supplier non-compliance rates in documentation or rating plate inspections and the non-compliance of the supplier's products with the Ecodesign energy-performance limit requirements, then such checks would also provide a cost-effective means of determining product energy-performance non-compliance risk for screening purposes.
- Energy performance verification procedures in independent labs is viable and societally cost-effective for all products which are small enough to be tested in existing facilities (noting the issues identified earlier for large fans) providing an MSA can receive notification of a product being placed on the market in time to minimise supply arrangements.
- Witness testing of FATs is a significantly cheaper option than independent lab energy performance verification procedures whenever such testing was already going to be undertaken for commercial reasons, as is universally the case for large power transformers.

²⁷ The document can be found on : <http://www.intas-testing.eu/project-documents>

²⁸ The document can be found on : <http://www.intas-testing.eu/project-documents>

- Expert checks of manufacturers' product energy performance simulations would be likely to provide a cost-effective means of determining non-compliance risk (and possibly actual non-compliance) if the practical limitations on arranging such checks can be overcome.
- For very large products, especially industrial fans, it would probably be cost-effective to conduct energy performance verification via part-load or scale-model testing if the accepted test methods and Ecodesign regulations were amended to permit this as a legally enforceable compliance verification option. See section 1.2.6. above for further detail.

The broader macro-economic cost-benefits from MSA conformity verification actions for power transformers and large industrial fans will be assessed in Deliverable 5.2, which will also include an analysis of the impact of targeted screening techniques.



4. Conclusions

CONCLUSIONS



Market surveillance of large industrial products covered by the Ecodesign Directive is a particularly challenging endeavour. This is due to the size and power of the products, the costs of transport and testing, but also the fact that they are mostly sold Business-to-Business (B2B), and therefore largely “invisible” to Market Surveillance Authorities (MSAs).

In the previous pages, the main findings of the 3-year INTAS project were summarised. Over that period, INTAS analysed current market surveillance practices for large industrial products, and explored a number of ideas that would facilitate the job of MSAs in conducting market surveillance of large industrial products.

The **analysis of best practices and experiences in testing** found that the standard Ecodesign market surveillance conformity verification approach based on selecting a product for independent laboratory testing is not very well adapted to fans and transformers, and that market surveillance conformity verification based on witnessing factory acceptance tests could be much less costly and disruptive for cases where factory acceptance tests (FATs) are ordered by the client.

It also found that the biggest gap needing to be addressed is the limited means that MSAs have of knowing if a product has been placed on the market, in time to conduct verification procedures without causing costly disruptions to the businesses downstream of the product in the supply chain. A key fundamental need is therefore to ensure that mechanisms are put in place to maximise the likelihood that an MSA will be informed that a large fan will be placed on the market and put into service.

The **policy recommendations developed above** address these and other gaps identified by the INTAS analysis. They develop a number of concrete, pragmatic policy recommendations which aim to provide MSAs with the full suite of verification options needed to adequately tackle non-compliance of large industrial products. While INTAS focus is mainly on fans and power transformers, these recommendations can by and large be extrapolated to other large industrial products.

A large part of the policy recommendations aim at making the least disruptive verification options viable. That is for example the spirit of the recommendations on a “Mandatory Notification”; and of the “Cooperation at the national and international levels”; it is also why INTAS suggests requirements to explicitly allow “Witness testing of FATs and testing at manufacturers’ premises” as verification procedure for market surveillance. These are ‘the carrots’ of INTAS proposed policy strategy.

A different set of recommendations described above aim at ensuring that, should it not be possible to use non-disruptive options, MSAs still have the ability to conduct verification procedures. This is the why INTAS recommends clarifying the use of “alternative verification options” and their related “standards”. These recommendations are what we may call ‘the sticks’ of the INTAS proposed policy strategy. INTAS fully acknowledges that some of these verification options (e.g. in-situ testing) are much more disruptive/challenging/costly than others and should therefore only be used as a last resort option.

INTAS also assembled best estimates of the costs and benefits from conducting performance verification or risk assessment actions on power transformers and large industrial fans. In the case of power transformers it established that in most instances the societal value (expressed in terms of the value of product lifetime energy savings to end-users) of conformity verification actions is greater than the cost that would be incurred by the MSA, even if the deterrent effect of having a product fail a verification check (i.e. the discouragement of non-compliance for other products produced by the same or other suppliers) is ignored.

Similar findings are projected for industrial fans, albeit for this product group there is currently less evidence of the current levels of non-compliance and hence more speculation with regard to the magnitude of benefits expected from conformity verification actions. There are also more constraints with independent laboratory testing of very large fans (which is not possible at full load in current independent laboratories testing facilities) and less potential to routinely use FAT witness testing (due to it only being done under commercial contracts for the more sensitive end-use applications, and not all manufacturers having testing capability).

Finally, INTAS carried out an **analysis of testing facilities for fans and transformers**, in Europe and overseas. Because of a relatively low sample of laboratories analysed, the data can therefore only provide some qualitative directions but cannot be considered for extrapolating towards the entire universe of fan and transformer labs in the EU. It is however possible to extract some conclusions:

- For fans laboratories, there are important differences in capacity, accreditation and costs.
- For transformers, survey results suggest that the possibility for the MSA to find a well-experienced and accredited lab which can perform the desired test is good, with both independent and manufacturer labs.



Analysis of Test Laboratories (Fans)

This annex contains the most relevant data to select the most suitable test laboratory when testing a fan depending on its characteristics. The analysis of findings is classified according to whether the laboratories are independent, manufacturer or extra European, since their choice for certain market inspection activities may be conditioned by their status for legal or operational reasons.

The most significant conclusions of the survey answers are the following:

LABORATORIES	EXPERIENCE IN TESTING SERVICE	TEST POSSIBILITIES	ACCREDITED TESTING SERVICE
Independent labs (n = 8)	> 20 years = 5 11–15 yaers = 2 < 5 years = 1	Routine test = 7 Ad-hoc test = 7 Customised test = 6 Inside appliances or system = 1 ATEX test = 1	Accredited = 8 Accredited by national accreditation body = 7 Accredited by AMCA = 1
Manufacturers labs (n = 14)	> 20 years = 12 11–15 yaers = 1	Routine test = 11 Ad-hoc test = 8 Customised test = 10 Other kinds of test = 3	Accredited = 8 Accredited by AMCA = 6 Accredited by TÜV SÜD = 2
Extra-EU labs (n = 1)	> 20 years	Routine test	Accredited

The majority of the labs (74%) indicate that they have more than 20 years of experience of activity in providing testing services. It is almost the case for all the manufacturers' labs (86%). One has less than 5 years of experience and two have between 11 and 15 years of experience. The probability for the MSA to find a well-experienced lab is therefore good.

The majority of the labs (78%) can make routine (standardized) tests and fifteen (65%) of them can make ad-hoc (standardized) test for fans. Sixteen (70%) of the labs can make special (customized) tests for fans. Furthermore, one of them can make test of fans inside appliances or systems and one can make ATEX tests. Three of the labs can make other kinds of test, e.g. test for product development, catalogue data and benchmarking and research and Development testing. The probability for the MSA to find a lab, which can perform the desired test, is therefore good.

The majority of the labs (70%) indicate that their fan testing services are accredited.

All of the independent labs indicate that one or more of their fan testing services are accredited. Seven of them are accredited by their national accreditation body, while the last one is accredited by AMCA (the Air Movement and Control Association International, Inc.).

Eight of the manufacturers labs indicate that one or more of their fan testing services are accredited. Six of them indicate that they are accredited by AMCA (the Air Movement and Control Association International, Inc.) while two are accredited by TÜV SÜD (the international service corporation focusing on consulting, testing, certification and training).

It is important to note, that AMCA is not a traditional accreditation body (state recognition of a companies' competence and impartiality) but a certification body which gives an assurance of consistent quality regarding measurements and documentation. This is a matter, which the MSA has to consider before choosing a laboratory.

LABORATORIES	STANDARDS AS PART OF ACCREDITATION	TEST WITH SPECIFIC REFERENCE TO STANDARDS	ABILITY TO TEST ON-SITE (customers/manufacturers premises)
Independent labs (n = 8)	ISO 5801 = 7 AMCA 210 = 1	ISO 5801, cat. A, B, C and D = 7 IEC 60034-1, IEC 60034-2 and IEC 60034-30-1 = 2 DIN EN 13141 = 1	3 labs
Manufacturers labs (n = 14)	ISO 5801 = 4 AMCA 210 = 4 Both ISO 5801 and AMCA 210 = 2 AMCA certified = 1	ISO 5801, cat. A, B, C and D = 7 ISO 5801, cat. A, C and D = 2 ISO 5801, cat. A, B and D = 1 IEC 60034-1, IEC 60034-2 and IEC 60034-30-1 = 2	3 labs
Extra-EU labs (n = 1)	AMCA 210	No answer	No answer

The majority of the labs (59%) indicate that the standard ISO 5801 (Performance testing using standardized airways) is part of their accreditation in the field of fan performance test. Furthermore, eight labs (36%) answer that AMCA 210 is part of their accreditation (Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating).

Regarding experience in the energy performance field, the majority (64%) of the labs indicate, that they usually carry out tests with specific reference to ISO 5801, Installation category A, B, C and D. The probability for the MSA to find a lab that carry out all for tests (A, B, C and D) is therefore good.

Four of the labs can carry out tests with specific reference to motor efficiency, IEC 60034-1, IEC 60034-2-1 and IEC 60034-30-1. It is surprisingly few as they are the most recognized test standards for motors. It is possible that the people who answered forgot to indicate it.

Six of the labs indicate that they can also carry out tests on-site and on customers/manufacturers' premises. The low number does not come as a big surprise.

	INDEPENDENT LABS (n = 8)	MANUFACTURERS LABS (n = 14)	EXTRA-EU LABS (n = 1)
Maximum airflow (own premises)	8,000–72,000 m ³ /h	8,400–350,000 m ³ /h	150,000 m ³ /h
Maximum pressure (own premises)	2–20 kPa	1–60 kPa	11 kPa
Maximum power input (own premises)	20–300 kW	7–200 kW	56 kW
Maximum airflow (on-site)	No limit (only one lab)	8,400–200,000 m ³ /h	No answer
Maximum pressure (on-site)	10–30 kPa	10–800 kPa	No answer
Maximum power input (on-site)	100 kW (only one lab)	7.4–24 kW	No answer
Uncertainties	1.0–3.2%	1.0–5.0%	Airflow according to AMCA 210 Pressure 0.25% Power input 0.2%
Costs	900–15,000 Euro	200–20,000 Euro	1,000–2,500 Euro

Capacity limits

The independent labs indicate the maximum airflow, pressure and power input that they are able to test in **their own premises**:

- Maximum airflow is between 8,000 and 72,000 m³/h
- Maximum pressure is between 2 and 20 kPa
- Maximum power input is between 20 and 300 kW

It is important to notice that the maximum airflow, maximum pressures and maximum power inputs are not coherent. This e.g. means that the maximum flow of 72,000 m³/h is not coherent with the maximum pressure of 20 kPa. The airflow thus is from one lab and the pressure is from another.

Measurement equipment limits and economy (cost to enlarge these limits and lack of business) are the reasons for testing capacity limits.

The independent labs indicate the maximum airflow, pressure and power input that they are able to test **on-site**:

- No limit (only one lab)
- Maximum pressure is between 10 and 30 kPa
- Maximum power input is 100 kW (only one lab)

The only independent lab that indicates an airflow stated as on-site test method ISO 5802 using pitot traverse. Therefore, there is no limitation on airflow. The limitation on pressure is linked to the fan definition (turbomachinery limited to 30 kPa).

The manufacturer labs indicate the maximum airflow, pressure and power input that they are able to test in **their own premises**:

- Maximum airflow is between 8,400 and 350,000 m³/h
- Maximum pressure is between 1 and 60 kPa
- Maximum power input is between 7,5 and 200 kW

One manufacturer lab indicates that they have no limits concerning airflow and pressure. The limit for power input of this laboratory is 1 MW.

Again, it is important to notice that the maximum airflow, maximum pressures and maximum power inputs are not coherent. This e.g. means that the maximum flow of 350,000 m³/h is not coherent with the maximum pressure of 60 kPa. The airflow thus is from one lab and the pressure is from another.

Facility size, measurement equipment limits and economy are the reasons for testing capacity limits.

The manufacturer labs indicate the maximum airflow, pressure and power input that they are able to test **on site**:

- Maximum airflow is between 8,400 and 200,000 m³/h
- Maximum pressure is between 10 and 800 kPa
- Maximum power input is between 7,5 and 24 kW

One manufacturer lab indicates that they have no limits concerning airflow, pressure and power input.

The Extra-European test lab indicates the maximum airflow, pressure and power input that it is able to test in **their own premises**:

- Maximum airflow is 150,000 m³/h
- Maximum pressure is between 11 kPa
- Maximum power input is between 56 kW

Uncertainties

The independent labs specify the maximum overall calculated uncertainty for the overall fan efficiency according to Regulation (EU) No. 327/2011. For six of the labs the uncertainty is between 1,0 and 3,2%.

All of the labs indicate that uncertainties for measurements of airflow and pressure are according to ISO 5801 while four labs indicate that the uncertainties for measurements of power input are according to standards IEC 60034-1, IEC 60034-2-1 and IEC 60034-30-1.

The manufacturer labs specify the maximum overall calculated uncertainty for the overall fan efficiency according to Regulation (EU) No. 327/2011. The uncertainty is between 1,0 and 5,0%. One of the labs refers to ISO 13349/50 and another lab refers to ISO 13348.

Ten of the manufacturer labs indicate that uncertainties for measurements of airflow and pressure are according to ISO 5801 while one lab indicates that uncertainties for measurements are according to AMCA210/111.

The Extra-European lab did not specify the maximum overall calculated uncertainty for the overall fan efficiency.

The Extra-European lab indicates that uncertainties for measurements of airflow, pressure and power input is according to AMCA 210. The uncertainty for measurements of pressure is 0,25% and the uncertainty for measurements power input is 0,2%.

Costs

All of the independent labs provide a rough cost estimate to perform fan efficiency test/compliance test according to Regulation (EU) No. 327/2011 and ISO 5801 for a single fan. The minimum cost in Euro is 900.

Euro and the maximum cost is 15,000 Euro. This huge range probably due to completely different products and test settings does not allow to draw general conclusions here.

All of the manufacturer labs provide a rough cost estimate to perform fan efficiency test/compliance test according to Regulation (EU) No. 327/2011 and ISO 5801 for a single fan. The minimum cost in Euro is 200 Euro and the maximum cost is 20,000 Euro.

The Extra-European lab provides a rough cost estimate to perform fan efficiency test/compliance test according to Regulation (EU) No. 327/2011 and ISO 5801 for a single fan. The minimum cost in Euro is 1,000 and the maximum cost is 2,500 Euro.

I.1 Conclusions

From the 83 fan laboratories that were contacted, via the online survey, only 23 answered. That was a hit rate of 28%. The reason to that could be the relatively large number of questions, which were quite time-consuming to respond to.

As the final samples of the survey is below 30 ($n < 30$), there is no statistically evidence, as the standard deviation is too big. The data can therefore only provide some qualitative directions but cannot be considered for extrapolating towards the entire universe of fan labs in EU.

Based on the data (few or not) it is however possible to conclude, that the probability for MSA to find a well-experienced and accredited lab which can perform the desired test is good, with both independent and manufacturer labs.

Many manufacturer labs however are AMCA certified and it is important to note, that AMCA is not a traditional accreditation body (state recognition of a companies' competence and impartiality) but a certification body, which gives an assurance of consistent quality regarding measurements and documentation. This is a matter, which the MSA has to consider before choosing a laboratory.

The data indicate that the manufacturer labs have larger capacities regarding airflows and pressures. That is an important information to bear in mind for the MSA.



Analysis of Test Laboratories (Transformers)

This annex contains the most relevant data to select the most suitable test laboratory when testing a transformer depending on its characteristics. The analysis of findings is classified according to whether the laboratories are independent, manufacturer or extra European, since their choice for certain market inspection activities may be conditioned by their status for legal or operational reasons.

The more significant conclusions of the survey answers are the following:

II.1 Independent test labs

Six out of fifteen contacted European independent laboratories answered the survey. It is understood that those laboratories that did not answer have not the required capacity or do not have any interest in being recognized by the Authorities for performing market surveillance activities.

Besides, a utility lab has been included in this clause because although it is not an independent laboratory strictly speaking, it is independent from the manufacturer. Then, the total number of considered laboratories in this clause is seven.

II.1.1 Accreditation

Six out of seven considered laboratories stated to be accredited. This shows a high level of compliance with quality requirements as often occurs in independent laboratories.

II.1.2 Testing capacity

II.1.2.1 In house

Only six out of seven laboratories answered to this question.

II.1.2.1.1 Power

Two laboratories can test transformers up to 10 MVA, two up to 40 MVA, one up to 500 MVA and one up 1,000 MVA.

II.1.2.1.2 Voltage

One laboratory can test transformers up to 50 kV, four up to 500 kV; and one up 1,100 kV.

Regardless of the restrictions due to size, weight and the consequent cost of transformer transport and installation, only two laboratories can perform tests with power higher than 40MVA and five of them can perform tests with voltage higher than 36 kV.

In the regulation 548/2014 a large transformer is defined in the following terms: ‘Large power transformer’ means a power transformer with a highest voltage for equipment exceeding 36 kV and a rated power equal or higher than 5 kVA, or a rated power equal to or higher than 40 MVA regardless of the highest voltage for equipment.

II.1.2.2 On site

Four out of seven independent labs that answered to the questionnaire stated that they can perform tests on site, but only three of them were accredited. Only three out four labs that can perform tests on site stated what their capacity is.

II.1.2.2.1 Power

One laboratory can test transformers up to 40 MVA and two up to 500 MVA.

II.1.2.2.2 Voltage

All the laboratories can perform tests up to 500 kV.

For on-site tests, the problem is the maximum power, bearing in mind that the losses test must be performed at 50% of the rated power. In view of the answers to the survey, the power capacity for testing large transformers is limited although it will be convenient to consider the possibility to perform test at reduced power.

II.1.3 Testing on manufacturers’ premises

Three out of seven laboratories state that they can test on manufacturers’ premises; two of them are accredited for it.

II.1.4 Uncertainty

Three out of seven laboratories provide this data. The uncertainty in all cases is lower or equal to 5% that is the permitted tolerance in the regulation 548/2014 in the verification procedure for market surveillance purposes.

II.1.5 Costs

The price per test in-house can vary between 200 and 2,000 Euro and approximately the double in the case of tests on-site.

II.2 Manufacturer test labs

Nineteen out of seventy one contacted European manufacturer laboratories answered the survey. As in the previous section, it is understood that those laboratories that did not answer do not have the required capacity or have no interest for their results to be considered sufficiently reliable in eventual inspections of their product that Market Surveillance Authorities can carry out in their installations.

II.2.1 Accreditation

Only two out of nineteen considered laboratories stated to be accredited, in contrast to the independent labs situation.

Manufacturers' laboratories are usually not accredited, since the tests they make are for internal use. However, during the visit to the one manufacturer's laboratory that was carried out during the project, it was found that the manufacturers' laboratories are internally evaluated in their quality and capacity by customers who use their facilities (utilities and distributors) for qualification tests.

II.2.2 Testing capacity

II.2.2.1 In house

Only fifteen out of nineteen laboratories answered to this question.

II.2.2.1.1 Power

Four laboratories can test transformers up to 10 MVA, three up to 40 MVA, two up to 100 MVA, two up to 500 MVA, two up 1,000 MVA and two up to 1,600 MVA

II.2.2.1.2 Voltage

One laboratory can test transformers up to 36 kV, three up to 50 kV, three up to 100 kV, 4 up to 500 kV and 3 up to 1,000 kV.

In summary, eight laboratories can perform tests in house with power higher than 40 MVA and thirteen (fourteen) can perform tests in house with voltage higher than 36 kV

II.2.2.2 On site

Five out of nineteen manufacturers' labs that answered to the questionnaire stated that they can perform on-site tests, but only four of them answered what is their voltage capacity.

II.2.2.2.1 Power

One laboratory can test transformers up to 10 MVA, 1 up to 40 MVA and two up to 500 MVA.

II.2.2.2.2 Voltage

One laboratory can test transformers up to 36 kV, four up to 500 kV and 1 up to 1,000 kV.

In summary, three laboratories can perform on-site tests with power higher than 40 MVA and five can perform on-site tests with voltage higher than 36 kV

II.2.3 Uncertainty

Eleven out of nineteen laboratories provide this data. The uncertainty in many cases is lower than 1% and in all cases lower than 5%. In the case where the declared uncertainty is very low, it is understood that corresponds only to the measurement equipment and not to the test as a whole.

II.2.4 Costs

In general, the cost declared by these laboratories is much lower than that declared by independent laboratories. It is understood that they reflect only the cost of the tests and not their commercial price.

However, in some cases the cost is more than 10 times that of other manufacturers, even higher than that of independent laboratories.

II.3 Extra-European test labs

Only two out of seventeen contacted extra-European test laboratories answered the survey. One of them was discarded because it declared that it does not have the required capacity. It is understood that those laboratories that did not answer have not the required capacity or do not have any interest in being recognized by the Authorities for performing market surveillance.

II.3.1 Accreditation

The only extra-European laboratory that answered the survey is independent and it is accredited.

II.3.2 Testing capacity

II.3.2.1 In house

This laboratory only performs tests in-house.

II.3.2.1.1 Power

Its capacity is 5 MVA.

II.3.2.1.2 Voltage

Its capacity is 5 kV.

The capacity of this laboratory would not allow to perform tests of large transformers.

II.3.3 Uncertainty

The laboratory does not provide this information.

II.3.4 Costs

The laboratory does not provide this information.

II.4 Conclusions

From the 104 fan laboratories that were contacted, via the online survey, only 29 answered. That was a hit rate of 28%. Some laboratories claimed confidentiality reasons for not answering the questionnaire. In other cases, it is understood that those laboratories that did not answer do not have the required capacity or do not have any interest in being recognized by the Authorities for performing market surveillance activities (in the case of independent labs) or have no interest for their results to be considered sufficiently reliable in eventual inspections of their product that Market Surveillance Authorities can carry out in their installations (in the case of manufacturer labs).

As the final samples of the survey is below 30 ($n < 30$), there is no statistically evidence, as the standard deviation is too big. The data can therefore only provide some qualitative directions but cannot be considered for extrapolating towards the entire universe of power transformer labs in EU.

The data indicate that manufacturer labs have larger testing capacities than independent labs but only 11% of the manufacturer labs that answered the survey are accredited in contrast to independent labs where 88% are accredited.

Regarding costs, there is a great variability in the data provided but, in general, the cost declared by manufacturer laboratories is much lower than that declared by independent laboratories. It is understood that they reflect only the cost of the tests and not their commercial price.



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- Regulation (EU) No 952/2013 of the European Parliament and of the Council of 9 October 2013 laying down the Union Customs Code
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- Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU (Text with EEA relevance.)
- Commission Regulation (EU) No 548/2014 of 21 May 2014 on implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to small, medium and large power transformers

Background references (not directly cited in the report)

- Commission Regulation (EU) 2016/2282 of 30 November 2016 amending Regulations (EC) No 1275/2008, (EC) No 107/2009, (EC) No 278/2009, (EC) No 640/2009, (EC) No 641/2009, (EC) No 642/2009, (EC) No 643/2009, (EU) No 1015/2010, (EU) No 1016/2010, (EU) No 327/2011, (EU) No 206/2012, (EU) No 547/2012, (EU) No 932/2012, (EU) No 617/2013, (EU) No 666/2013, (EU) No 813/2013, (EU) No 814/2013, (EU) No 66/2014, (EU) No 548/2014, (EU) No 1253/2014, (EU) 2015/1095, (EU) 2015/1185, (EU) 2015/1188, (EU) 2015/1189 and (EU) 2016/2281 with regard to the use of tolerances in verification procedures (Text with EEA relevance)
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- European Commission. ‘Blue Guide’ on the implementation of EU product rules

Abbreviations List

AMCA	Air Movement and Control Association International, Inc.
B2B	Business to Business
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
DIN	German Institute for Standardisation
DSO	Distribution System Operator
EC	European Commission
EEA	European Economic Area
EU	European Union
EN	European Norm
ETSI	European Telecommunications Standards Institute
FATs	Factory Acceptance Tests
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardisation
kV	Kilovolt
kVA	Kilovolt-Ampere
kW	KiloWatt
LPT	large power transformer
MSA	Market Surveillance Authority
prEN	Provisional European Norm
R&D	Research and Development
TARIC	Integrated Tariff of the European Community
TC	Technical Committee
TSO	Transmission System Operator
W	Watt



More information

WEBSITE

about the INTAS project activities and all of its results are published on:
www.INTAS-testing.eu

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SUMMARY



TRANSFORMERS



FANS

