Deliverable 3.8:

Report about the screening techniques available for product/supplier targeting

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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 fans and industrial fans. Therefore, the project aims to:

- Support European Member State MSAs deliver compliance for large products (specifically for fans 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
Waide Strategic Efficiency	Europe
Austrian Energy Agency	Austria
Federal Public Service Health, Foodchain, Safety and Environment	Belgium
SEVEn Energy Efficiency Center	Czech Republic
Danish Technological Institute	Denmark
Finnish Safety and Chemicals Agency	Finland
The Polish Foundation for Energy	Poland
Directorate General of Energy and Geology	Portugal
Romanian Regulatory Authority for Energy	Romania
Foundation for the Promotion of Industrial Innovation	Spain
Italian National Agency for New Technologies, Energy and Sustainable Economic Development	Italy
Food and Economic Safety Authority	Portugal

Executive Summary

This report considers the options available to market surveillance authorities (MSAs) to select industrial fans or large power transformers models for Ecodesign conformity verification purposes. It reviews the traditional approaches used for mass produced products and concludes these are of limited applicability for the product types of interest, especially for those products which are customised, as these are engineered to order under B2B commercial arrangements and hence are not placed on the market in manner which is visible to MSAs, nor are samples kept in stock that can be selected for conformity verification. Furthermore, large fans and power transformers are high value products destined for installation in major projects that have significant cost and inconvenience consequences from conformity verification induced delays in their being put into service. As a result, MSAs need to be mindful of conformity verification pathways that are liable to cause the least disruption possible to the supply chain and downstream deadlines.

The report briefly reviews the conformity verification pathway options available to MSAs and clarifies where they sit within the supply chain and as well as assessing their implications and viability. It also distinguishes between actions that provide a definitive conformity verification result (i.e. that can establish that a product does not legally conform to the requirements) and those that help establish the risk of non-conformity and thus support the selection of specific product models for the conformity verification action. The latter approaches may be considered to be useful techniques to apply within a hierarchical non-conformity risk screening process as part of a process design to encourage the greatest level of conformity for the minimum expense.

Prospective product selection screening methodologies are then expounded for the cases of large industrial fans and large power transformers. The different ways these can be deployed are considered as are the ways they could operate with different market surveillance and conformity verification strategies. Potentially viable pathways are presented for both product groups, recognising that in both cases moving towards laboratory verification testing may be a choice of last resort for MSAs. For both product groups the proposed conformity verification screening methodologies enable products which have been placed on the market to be selected for conformity verification prior to being put into service. They allow for conventional product selection screening to support definitive conformity verification actions distinguished in (1) paperwork checks (e.g. documentation inspection), (2) visual inspections (for rating plate information), and (3) laboratory verification testing.

In addition, the screening methodologies permit screening based on levels of non-conformity risk which is either informed by specific relevant technical knowledge about the supplier or by non-definitive but informative risk assessment checks conducted directly on the product. In some cases, these methodologies are not yet ready to be deployed because the risk profiling stage is not yet sufficiently mature (as is currently the case for the plausibility checks for both fans and transformers). However, as this situation is anticipated to evolve, provisions for their use are included in this report.

In practice it is recognised that conventional conformity verification procedure applied post placing the product on the market is problematic and more an option of last resort for both large fans and large transformers. For large fans, risk assessment based on interceding with the manufacturer (many if not most of whom will be in the same jurisdiction as the MSA in many countries) and checking design software and product records is likely to be an important part of the process. For some select end-use markets witnessing factory acceptance tests will have a role. In consequence, the proposed screening methodologies allow for these eventualities, while recognising that their value is to inform the decision of whether to move towards laboratory verification testing or not.

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1. Introduction

To be able to conduct conformity verification MSAs need to develop product selection processes which can be used to pick which products will be subject to which conformity verification checks under what circumstances.

Large industrial products such as industrial fans and power transformers are likely to be poorly suited to the product selection techniques that MSAs established and deployed for Ecodesign conformity verification targeted for smaller mass-produced products. For a variety of reasons, discussed in the main body of the report, the most viable compliance verification pathways are likely to be different for large fans and transformers and hence the product selection screening processes need to reflect this.

Furthermore, it is essential for the sake of an effective use of MSA budget that appropriate screening mechanisms are devised to support the most effective targeting of products for further compliance verification.

This report therefore sets about establishing product targeting frameworks that are suited to maximising conformity impact by using the most viable information gathering processes to identify when products will be, or have been, placed on the market; to establish levels of non-conformity risk, and to apply this knowledge at distinct points within a structured conformity verification hierarchy for the selection of products for conformity verification actions.

As with the INTAS project in general, the subject of the investigation is focused on large industrial fans and power transformers, and especially those products which are customised i.e. are engineered to order as a tailor-made product that is not part of a series.

The sub-categories of fans and transformers based on size are summarized in Figures 1 and 2 below.

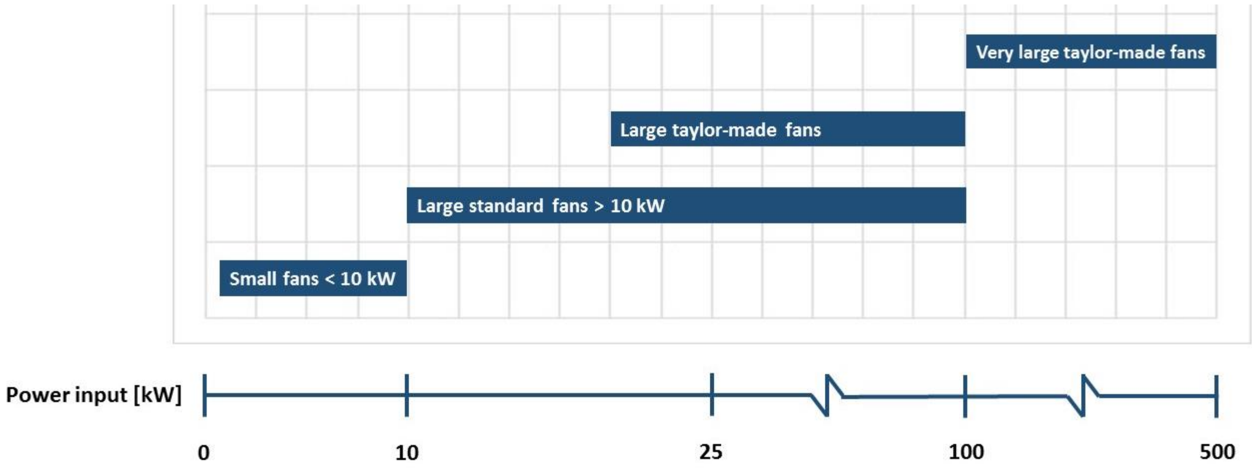

Figure 1. Indicative fan size categories

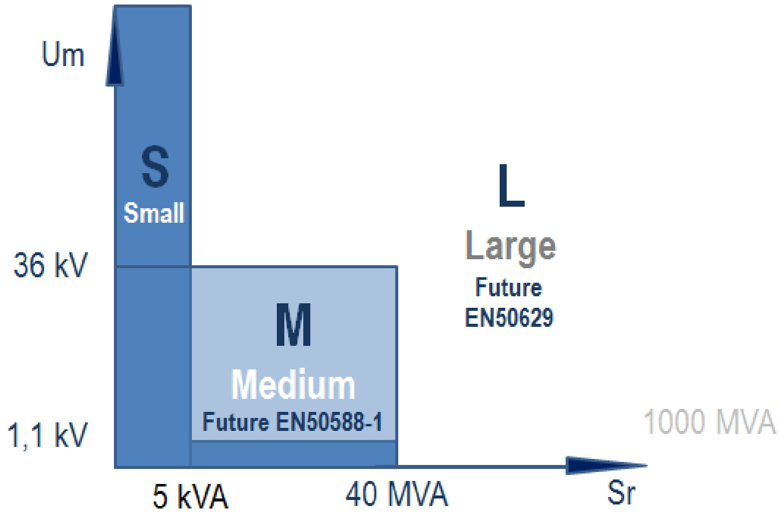

Figure 2. Power transformer categories recognised in EU Regulation 548/2014

2. Market surveillance practices and challenges

2.1 Summary of issues for conformity verification of large products

Throughout the conduct of the INTAS project a number of challenges have been identified for the conformity verification of large products. These may be summarised as follows:

- products are engineered to order in B2B procurement processes and not advertised in catalogues, thus it is not possible for MSAs to identify that they have been placed on the market and take samples for conformity verification in the usual way applied for mass series produced products and described in product specific Ecodesign Regulations
- large products are often an element within a larger project involving many actors and having high costs – as they are frequently installed at the end of these projects the overall project completion date and contractual overrun risk can be sensitive to the prompt supply of the products, which affects the decision of when and how to conduct conformity verification – thus supply chain and logistical factors should inform conformity verification processes
- MSAs may suffer from limited resources, both financially and in staffing to conduct costly and complex conformity verification actions associated with large products
- there are only a limited number of commercial independent test laboratories available for MSAs to conduct verification testing and verification testing is costly
- in the case of large industrial fans there are many product sub-types, each with their own specificities and it can be challenging to identify whether the product is within scope, which requirements apply to it and how it should be set up and its state of assembly for verification testing
- there is a lack of knowhow such that training is needed to improve the capacity of MSAs and their inspectors
- cooperation between MSAs is currently rather limited.

The reports on *Best practice and experiences of both MSAs and industry regarding conformity assessment of fans/transformers* (INTAS Deliverables 3.6 and 3.7 respectively) discuss these issues in more depth and consider the implications they may have for conformity verification.

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2.2 Commercial testing and documentation

In the current market situation, the energy performance characteristics of fans and power transformers is predominantly reliant on the self-declaration and data provided by the manufacturers about the compliance assessment they have performed. Hence importers/distributors and purchasers[1] need to trust that they are receiving correct data documentation from their established manufacturers and the trustworthiness of their commercial relationship. Although usually commercial relations for these products are based on a number of tests/checks during the production phase to demonstrate the compliance to the requested technical specifications, and contracts contain safeguard clauses for non-conformity cases.

During the INTAS project's screening of existing testing avenues only a few independent laboratories were identified within the EEA that are capable of performing tests on large fans. The situation is similar for large power transformers.

Usually, independent laboratories are accredited by internationally recognized accreditation bodies (ILAC members), which provide evidence of capability, experience, quality and good practices of the laboratories for the accredited tests and activities according the international standard ISO/EN 17025. Testing capacities of independent labs are in general lower compared to major manufacturers' laboratories mainly due to economic constraints caused by limited market demand.

As part of normal commercial practice, manufacturers issue product labels, datasheets and technical catalogues for each product type, including relevant performance parameters like airflow and pressure, motor data and power consumption for fans, and Peak Efficiency Index (PEI) for large power transformers.

2.2.1 Practices for industrial fans

The individual fan performance curves and detailed calculation sheets are based on the manufacturer's proprietary software calculation tools, that are based on algorithms developed in international standards.

Representative samples of each fan type/ family may be tested on manufacturers' test rigs, and in those cases a test report is edited and available. The manufacturer's test facilities are usually not accredited by national accreditation bodies and only very few are certified against AMCA standards.

Test performance for variations of a similar fan design are thus extrapolated and calculated based on the manufacturers real test data from the sample fan and their software tools.

Sometimes, the customer assists during the manufacturer tests as a "witness", or sends a commissioned expert on their behalf; however, this practice is only common for large industrial fans destined for some specific end-use sectors (e.g. oil & gas, tunnels, power plants).

Witness testing seems more prevalent in cases of very large (50 kW and above) and purely customized fans for heavy industrial applications where the capital investment per unit represents a significant amount.

[1] For fans these can be both OEMs using fans to integrate into their own products and systems, as well as larger industrial end-users buying a stand-alone fan for their final purposes. For power transformers they can be electricity generators, TSOs, DSOs, industrial clients, or EPCs operating on their behalf.

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Depending on the fan size and conditions, either of the following are conducted:

- testing of the fan to be purchased by the customer under full load conditions (including full range testing)
- testing of a scaled-down model of the fan which is to be purchased by the customer.

With Ecodesign requirements in place, the performance of fans is no longer just a private contractual matter between the supplier and purchaser. The supplier must also establish technical documentation on their products' compliance before they are placed on the market and this documentation is subject to market surveillance checks. To support this, the European Commission has given a mandate to CEN to prepare a harmonized European standard that will include among other subjects the identification of the fan types, measurement categories, test methods and very importantly, the definition of the fan boundaries (what elements are included in the fan sample to be tested). The proposed methods under consideration to do this include the application of scale-rules and testing at modified speeds for large fans. Until the European harmonized standard is published useful supporting information can be found in the FAQ accompanying the fan regulation No 327/2011 [1].

2.2.2 Practices for power transformers

The practices applied for large power transformers have some similarities and some differences.

Manufacturer proprietary software is used to design the transformer and predict its energy performance. Clients may request this information prior or post the manufacturer starting production as part of a design review process.

Witness testing at factory acceptance tests (FATs) conducted in the manufacturers testing facilities is always done for large power transformers. The manufacturer's test facilities are usually not accredited by national accreditation bodies.

The supplier must also establish technical documentation on their products' compliance before they are placed on the market and this documentation is subject to market surveillance checks. Additional useful supporting information can be found in the FAQ accompanying the transformer regulation No 548/2014[2].

2.3 Conventional Ecodesign conformity verification process

The conventional Ecodesign conformity verification process would involve selecting products for conformity verification of:

- technical documentation including the declaration of conformity, the technical data sheets, the CE marking and performance test reports
- the information presented on the rating plate
- the energy and other mandated performance requirements of the product via laboratory verification testing.

[2] See http://ec.europa.eu/DocsRoom/documents/4701/attachments/1/translations/en/renditions/native

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The actions of documentation checks, rating plate checks and laboratory verification testing are each capable of producing a definitive conformity verification ruling meaning that if a product model fails any of these it is not in conformity with the relevant requirement(s) and thus with the regulation. Verification testing in a laboratory is clearly a more onerous and costly undertaking than the other checks and hence is used more sparingly; however, it is the ultimate way of establishing whether a product's performance really does conform to the regulatory requirements and hence is an essential part of the process.

Usually, market surveillance authorities have a number of tools they use for compliance verification, see Figure 3 for the case for fans. First, a screening of products (1) is required to identify specific products and suppliers relevant for market surveillance activities. The authority can then choose to perform laboratory testing (3) on specific products or to request and check technical documentation (2) or to perform both verification action. If technical documentation is checked and the result is approved as 'OK', the authority can close the case or can go anyway for laboratory verification testing; an authority can also decide since the beginning to perform both documental inspection and laboratory testing in parallel to have a clearer picture of the product. In case a documental non-compliance is found the market surveillance authorities will take appropriate actions to make the product compliant, which finally could include requiring the manufacturer (or its authorized representative) to recall non-compliant products from the market. Laboratory testing (3) is focused on the satisfaction of Ecodesign minimum requirements, which for fans is the overall fan efficiency. If the product does not comply the market surveillance authorities will take appropriate actions which finally could include requiring the manufacturer (or its authorized representative) to recall non-compliant products from the market. Finally, a further verification action is to check the conformity assessment procedures (4) which may include the manufacturer's management system. It is not current practice to do so, but some market surveillance authorities have expressed an interest in investigating this option further.

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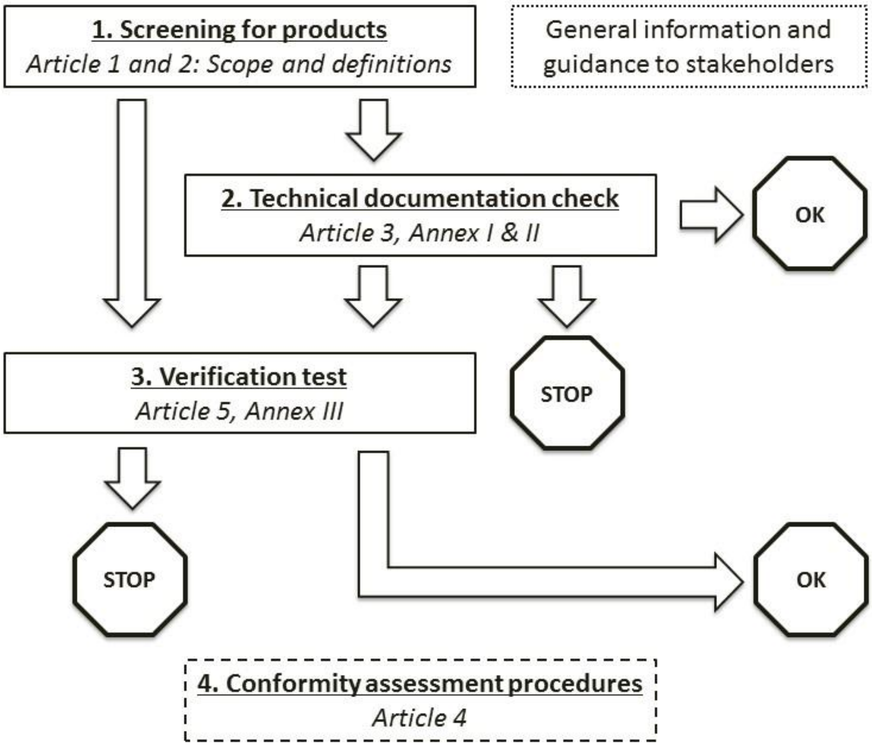


Figure 3. Activities and procedures of market surveillance authorities – the articles and annexes refer to those in the Ecodesign of fans Regulation No. 327/2011 [2], as amended by Annex X of Regulation 2282/2016 [3]

2.4 Hierarchy of risk and plausibility screening

As input into thinking about the conformity verification process and options for MSAs INTAS partners have entered into dialogues with the fan and transformer industries. The European fan manufacturers association, EVIA, has proposed that MSAs should consider applying a hierarchy of risk when conducting conformity verification processes. They have presented their vision of a seven-tiered approach to market surveillance, see Figure 4. The approach starts with a simple review of the product label/name plate of the fan (first tier) and then step-by-step increases the analyses through to a full independent measurement by laboratory verification testing (seventh tier). The approach introduces 'Plausibility checks' (Tier 3) which are design or application characteristics that can be inspected in-situ to determine if further analysis would be needed.

1. **Review of the product label**
2. **An audit of the manufacturer's ecodesign documentation**
3. **A plausibility check**
4. **An audit of the manufacturer's design, measurement and production management system**
5. **A review of the product testing documentation and type testing results**
6. **A physical verification by witness testing at the manufacturer's facility**
7. **Purchase a product and third party assess**

Figure 4. Seven-tiered approach to market surveillance suggested by EVIA

A similar dialogue has been held with the European transformer association, T&D Europe. In this case the approach advocated by T&D Europe is a little different because:

- large power transformers are extremely heavy and particularly difficult and costly to transport to and test in MSA test facilities
- respecting installation dates can be very critical for the scheduled operation of power networks and delays in this risk incurring unacceptable inconvenience and costs for third parties
- all large power transformers are subject to factory acceptance tests (FATs) arranged between the commercial parties prior to the product being granted approval for shipping
- Regulation 548/2014 has a clause in it that empowers MSAs to witness FATs
- in practice essentially all large power transformers used within the EEA are produced within the EEA.

Thus, for practical reasons T&D Europe has proposed that witness testing of FATs at the manufacturer's facilities be applied in preference to MSA verification testing for large power transformers.

2.4.1 Plausibility checks

As alluded to above, in between the conformity verification levels of documentation checks/rating plate checks at one end and laboratory verification testing at the other there are a number of other potential options that could be applied to establish the risk of non-conformity and thus support the decision of MSA to go for laboratory verification testing only when necessary and for specific models. These include plausibility checks and in situ checks.

2.4.1.1 Plausibility checks for industrial fans

Potential plausibility checks for fans include:

- visual inspections
- inspections of fan design software tools and data files

EVIA is in the process of developing guidance for MSAs on what to look for when checking the plausibility of fan energy performance declarations via visual inspection. It includes a number of aspects such as checking the impeller blade tip clearance, see Figure 5.

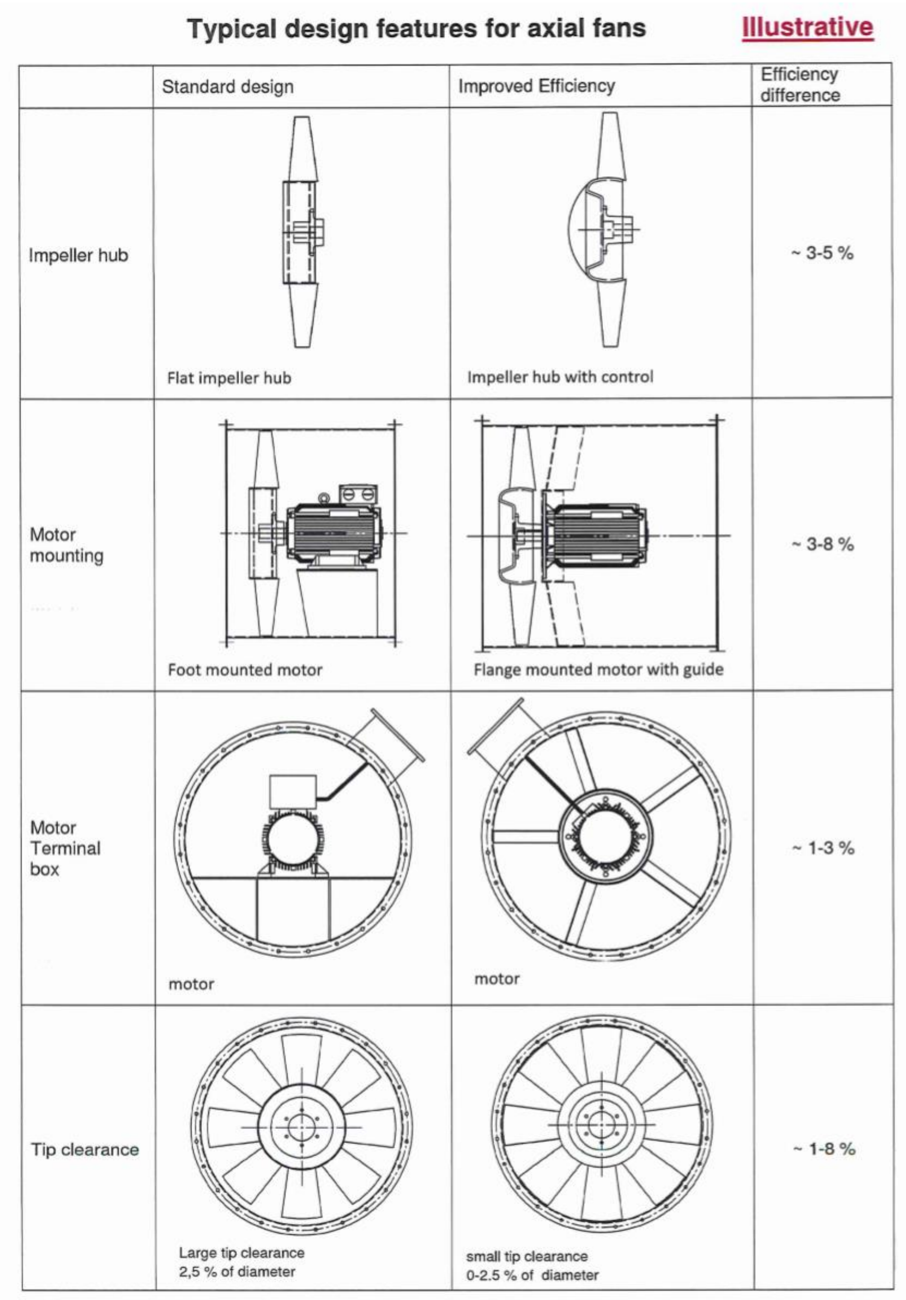
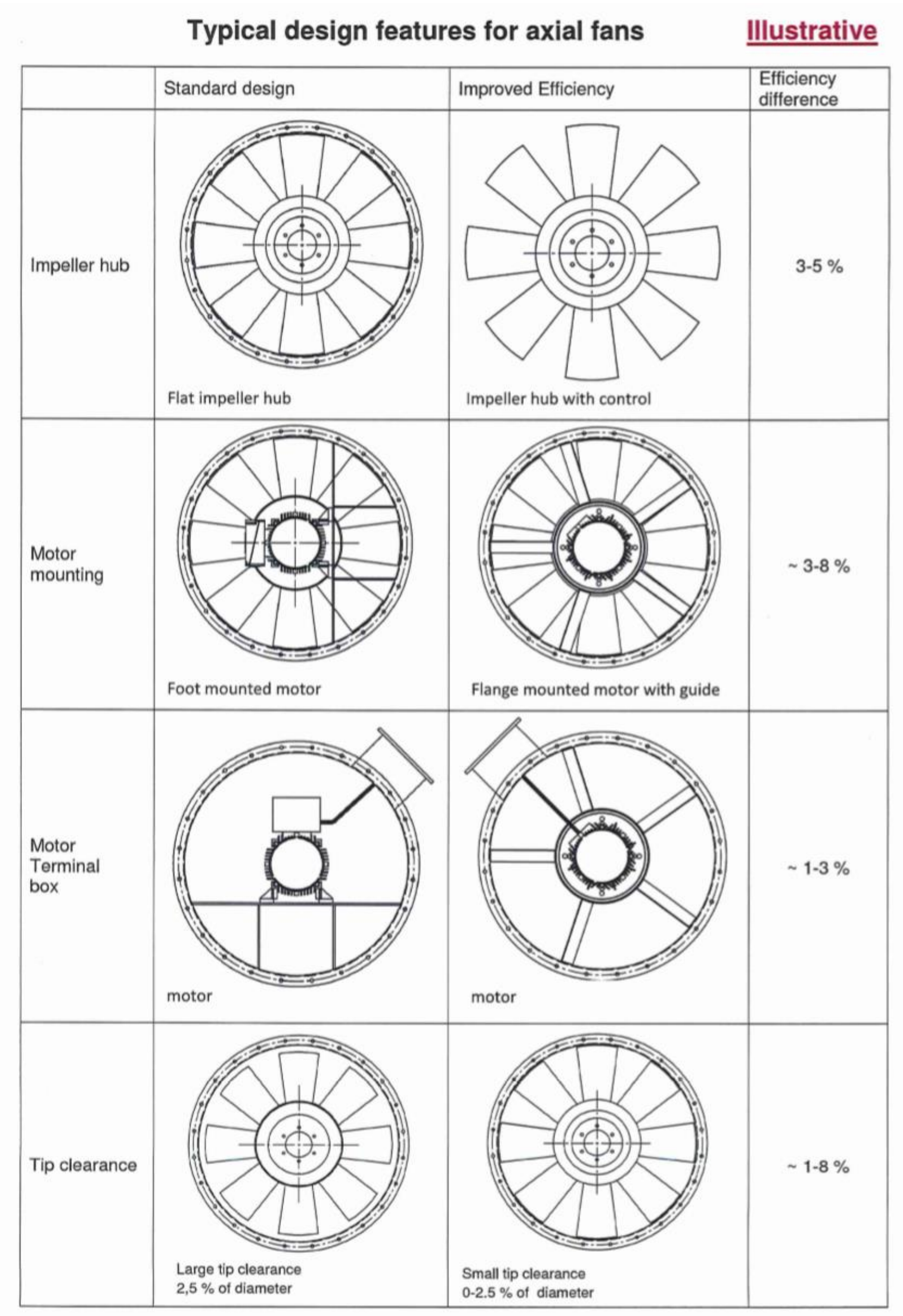


Figure 5. Provisional visual plausibility check methods under development by EVIA



Typical design features for axial fans Illustrative

	Standard design	Improved Efficiency	Efficiency difference
Impeller hub	Flat impeller hub	Impeller hub with control	3-5 %
Motor mounting	Foot mounted motor	Flange mounted motor with guide	~ 3-8 %
Motor Terminal box	motor	motor	~ 1-3 %
Tip clearance	Large tip clearance 2,5 % of diameter	Small tip clearance 0-2.5 % of diameter	~ 1-8 %

Figure 5 continued. Provisional visual plausibility check methods under development by EVIA

Typical design features for centrifugal fans **Illustrative**

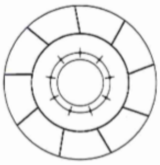
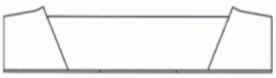
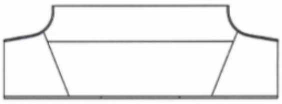
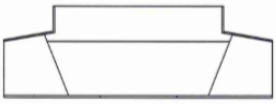
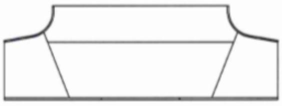
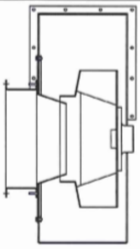
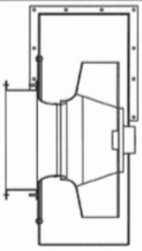
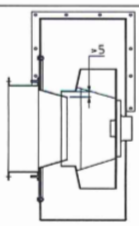
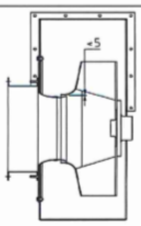
	Standard design	Improved Efficiency	Efficiency difference
Impeller design	1  Straight or forward curved hub	2  Backward inclined	10-20 %
Impeller shroud	3  Open impeller	4  With impeller shroud	10-20 %
Impeller inlet shroud	5  Straight	6  With optimized shroud	3-8 %
Casing inlet cone	7  With straight inlet	8  With shaped inlet	3-8 %
Airgap	 With shaped inlet	 With shaped inlet	5-10 %

Figure 5 continued. Provisional visual plausibility check methods under development by EVIA

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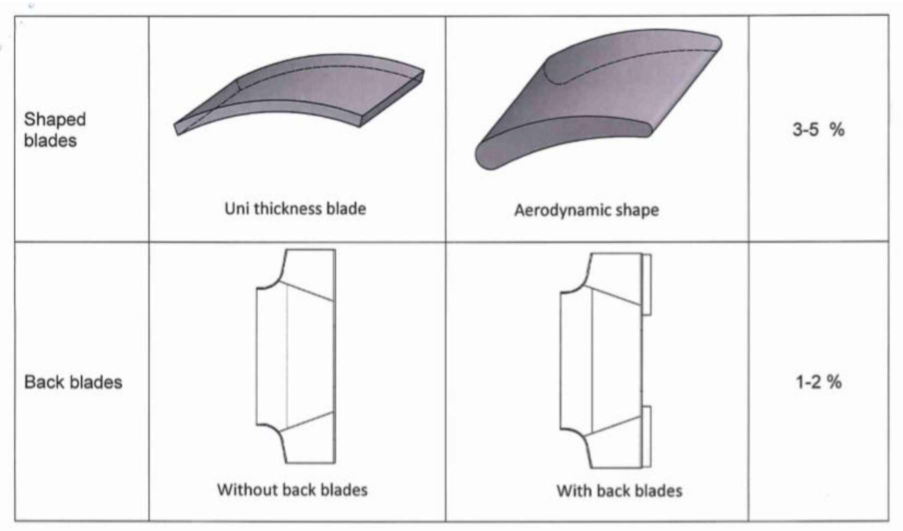

Figure 5 continued. Provisional visual plausibility check methods under development by EVIA

Inspections of fan design software tools and data files is a very different plausibility check and one that is much closer to a definitive conformity verification check. Were an MSA to request and be granted access to a manufacturer's design software and data files (presumably granted under an NDA agreement) they could rapidly assess whether the data shows that the product should conform to the Ecodesign performance requirements or not. In practice this process is likely to be undertaken as part of a factory site visit, but as a large part of the European industrial fan market is supplied by local producers who are likely to be based in the same territory as the MSA, this could be a viable conformity verification pathway. Indeed, industry operatives have proposed it as a preferential pathway to conducting laboratory testing after the product is placed on the market.

In principle, once sufficiently mature, these plausibility check processes could offer a means for an MSA to determine whether a product is at low or high risk of complying and hence be used for product selection screening within an MSA's conformity verification process.

2.4.1.2 Plausibility checks for power transformers

In the case of power transformers the following plausibility checks may be possible:

- inspections of bills of materials (BOM), weight and dimensions to provide inputs to simplified plausibility screening software
- inspections of transformer design software tools and data files.

Transformer losses are strongly constrained by the basics of the design, the quantity and quality of materials used and some basic dimensions. In particular the performance is sensitive to the amount of copper used relative to aluminium for the conductors, and the quantity and quality of electrical steel used in the core. In principle, easy to use simplified software tools could take a simple set of these inputs and make a provisional plausibility assessment with a certain level of tolerance in the outcome. The inputs could be determined through requesting the BOM and basic dimensions (the latter could be visually inspected, as could the former although less accurately).

Much work has already been done in these areas and all industrial parties and electrical performance contractors involved in transformer specifications, design and assessment have access to such tools, which would only require minor amendment to be used for this purpose. They can be readily operated on standard spreadsheet platforms such as Excel. However, before they could be applied for these purposes work would be needed to gauge their likely level of accuracy to establish risk tolerances as a function of the discrepancy between the declared performance and the simplified calculation. Note, the purpose of such a check is only for use when screening products for potential inclusion in conformity verification checks and is not a conformity verification action in its own right.

Inspections of a manufacturer's transformer design software tools and data files is a very different plausibility check and one that is much closer to a definitive conformity verification check. Were an MSA to request and be granted access to a manufacturer's design software and data files (presumably granted under an NDA agreement) they could rapidly assess whether the data shows that the product should conform to the Ecodesign performance requirements or not. In practice this process is only likely to be undertaken as part of a factory site visit, but as the European large transformer market is supplied by producers based within the EEA and as Regulation 548/2014 already grants MSAs the option to conduct witness tests this option may be negotiable with a manufacturer, especially if the alternative is laboratory testing after the product is placed on the market.

2.4.2 In situ tests

In the case of industrial fans in situ tests are unlikely to produce very definitive results for conformity verification and certainly would not provide valid non-conformity evidence in a court of law, thus they are not deemed to be a viable method for compliance verification but can be a screening procedure to assess the non-conformity risk to support MSA selection of models for further compliance verification checks. The reason is two-fold: a) because the fans are unlikely to be operating at Best Efficiency Point as specified in Regulation 327/2011, and b) because there are so many local installation factors that are likely to affect the air flow conditions that the results are unlikely to be representative of those that would be produced under test lab conditions.

For power transformers the situation is quite different. Mobile testing apparatus is available and used on the market and could produce high quality energy efficiency results; however, such equipment is not widely used (and hence available), is costly and again does not produce a measurement that could be used to prove non-conformity within a court of law. For these reasons this is really only an option for non-conformity risk screening of a product that is about to be put into service.

2.5 Product selection screening methodologies

As the costs and challenges of conducting laboratory verification testing for large fans are considerable there is interest in the application of risk screening processes within market surveillance processes to ensure the maximum market surveillance benefit is achieved at least cost. MSAs already have considerable and growing experience of non-conformity risk screening from the product safety but also the environmental and energy performance conformity domains, however, only limited experience thus far in applying this to large products (which reflects that Ecodesign requirements for such products are comparatively new). Unlike the mass product market MSAs are not always going to be aware if a large industrial product has been placed on the market or not (especially if no customs borders have been crossed) because of the direct B2B nature of the procurement, manufacture and placing on the market process and this presents an additional special challenge to even initiate market surveillance.

In the mass product market a variety of screening techniques have been trialled and implemented successfully. They can include processes to establish non-conformity risk profiles.

The types of factors used in screening methods to decide whether to select a product for conformity verification include:

- intelligence from other MSAs
- intelligence from consumer groups and/or individuals
- complaints from competitors
- brands with a history of non-compliance
- new brands
- product categories with comparatively high levels of non-compliance
- new product categories
- models supported by test laboratories with a past history of failing verification tests
- product categories with the highest energy consumption/greenhouse gas emissions
- models with a high market share

Identification of the products would entail selecting products from a supplier's catalogue (often accessed on line) or from the port of entry (if done in conjunction with customs checks). It may entail purchasing samples of the products.

Appendix A provides high level vignettes of EU MSA experience in this process and Appendix B details of the approaches followed in Australia/New Zealand and the USA.

While the basic principles of focusing non-conformity verification preferentially, but not exclusively, on products with higher risk of non-conformity is applicable for both mass products and engineered industrial products, many of the other practices are not. For example, as each product is a one-off there are no models with a "high market share" although there are brands/producers with higher or lower market shares. Intelligence from consumer groups will not apply, nor is testing of competitors' products very common. Most critically, the large industrial products covered by INTAS are not manufactured as a series and stocked prior to sale and therefore selecting samples of products already placed on the market is a completely different process; not least because the "sample" is the only example of the product ever manufactured and because once it is placed on the market it is immediately on route to the client prior to being put into service.

As a result, both alternative conformity verification pathways and procedures need to be developed and alternative procedures for selecting products for conformity verification. A major difference is that, as the burden of conformity verification is so much greater for large industrial products, it is not sufficient for screening to be used to select products for conformity verification, it also needs to be used to determine the frequency of the kind of conformity verification. The next two chapters expound options for such screening methodologies for large industrial fans and large power transformers respectively.

3. Screening options for large fans

This chapter considers the practical factors affecting the viability of MSA screening practice as applied to Ecodesign conformity verification for large fans and proposes methodologies which could be used for this purpose.

3.1 Identifying that a product is placed on the market

3.1.1 Industrial fan sector considerations

Given that the industrial fan sector has the following characteristics:

- large number of small & medium sized producers that mostly serve the national market
- very limited competition from suppliers from outside the EU (although there is for smaller fans)
- products are made to order in one-off batches via B2B procurement processes that are opaque to external actors
- their large size means that special road transport permission is routinely sought for delivery
- FATs are only done for some industrial fans and for OEM ordered products
- limited accreditation of manufacturer labs
- catalogues are only used for smaller fans[3]
- checks after placing products on the market risk incurring significant costs in project completion delays for much larger projects of which fans may be the last component to be installed.

Then:

a) Product identification prior to products being placed on the market can only be done by:
   i) agreement with procurers within the MSAs territory to inform the MSA when they place an order for a large fan
   ii) agreement with the fans suppliers to inform the MSA when an order is placed (note, they will often be in the same country as the MSA)

b) Product identification post products being placed on the market and before they are put into service can only be done by
   i) notifications from the following authorities – road network special transport permit providers, customs, ports and rail
   ii) agreement with procurers within the MSAs territory to inform the MSA when the product is about to be transported
   iii) agreement with the fans suppliers to inform the MSA when a product is being placed on the market.

Compared to the case for standard mass-produced products these potential notification pathways are very constrained. MSAs should already have relationships with customs that they can exploit but as the great majority of the products will be produced or shipped without crossing a hard trade border (especially within the Schengen area) then this route is only likely to provide notification for a small part of the trade volume.

[3] for larger, documentation on an associated fan series with basic design and parameters is available for potential customers upon request

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3.1.2 Working with other authorities and economic operators

In theory striking an agreement with the road-network authorities responsible for granting licenses for large objects to be moved via road might provide the best opportunity for MSAs to gain visibility on large fans being placed on the market. Again, in theory this could be used in conjunction with seeking commitments from nationally based producers to inform the MSA when the product is going to be placed on the market, and/or from nationally based procurers of large fans (industry/infra-structure sectors) to do likewise. However, all these routes would currently require voluntary cooperation with the MSA and in some cases (such as supplier notification of every product to be placed on the market) could incur appreciable bureaucratic costs which economic operators may not be prepared to sustain.

3.1.3 Working with economic operators immediately pre-putting into service

Potentially it would be possible for the MSA to reach agreement with the most prevalent clients for industrial fans, especially the end-clients, that they would be notified prior to a fan being put into service so they could potentially do conformity risk assessment screening on site. This could entail checking the technical documentation and rating plate information and doing a visual plausibility inspection (see section 2.4.1). If these are passed then the product would be put into service, but if there are non-conformity suspicions the MSA could decide (potentially through liaison with the end client) as to whether they should remove the fan for verification testing. In this case the end client economic operator has an incentive to work with the MSA because it provides and extra safeguarding service against the risk that they may be buying a substandard product.

3.1.4 Post-putting into service

The above discussion is highly relevant to the application of screening practices because before any product selection screening can be applied it is necessary to know whether the product has been either placed on the market or put into service. In the case of industrial fans conformity verification post putting into service would very much be an option of last resort, because it would certainly necessitate disruption to the operations of the party that procured the fan (which could be considerably more expensive than the value of the fan), and could be technically difficult and costly to conduct in their own right.

3.2 Screening a product for initiating conformity verification

Given the very specific nature of the industrial fan sector MSAs are likely to need to apply a bespoke screening methodology for the selection of such fans for conformity verification. This could entail:

a) a broader selection for technical documentation checks
b) a, potentially, slightly narrower selection for visual inspection checks
c) a smaller sample for laboratory verification testing.

3.2.1 Market intelligence

Prior to systematically doing any of these steps the MSA will need to develop their knowledge of the market and begin to use this to establish profiles of the market actors and their importance. This can be done by conducting web-searches to find suppliers to the local market including local and international manufacturers of industrial fans. As, in practice much of this product will be procured by EPCs acting on behalf of industrial and infrastructure sector clients it is also sensible to compile a similar list of local and international EPCs that are likely to be engaged as contractors by end-clients to install such fans. These EPCs can then be contacted to request that they indicate the suppliers they are likely to use in the course of their projects. A good starting point would be to identify trade associations to request that they supply lists of their members who are economically active in this area. Attendance at trade fairs is another useful practice that MSAs report is helpful in establishing the market actors and their profiles. For imported products crossing hard trade barriers it will suffice to liaise with customs to gain insights into the market. Lastly, it may also be appropriate to purchase commercially available market intelligence reports.

3.2.2 Establishing market profiles

The initial profiling process should aim to identify the following:

- local manufacturers, the main characteristics of their product offer, revenues and market shares (on the local market)
- importers/traders
- the EPCs that install fans, the sectors they work with, their size and importance
- the end-use sectors with some approximate data on their likely levels of use of industrial fans.

Once this has been done it should be possible to liaise with the economic operators (especially the principal ones) and take steps to better understand their business, competences and practices with regard to industrial fans.

3.2.3 Compliance strengthening measures and establishing non-conformity risk profiles of economic operators

Once sufficient details regarding market operators have been established MSAs can begin to simultaneously take steps which will establish risk of non-conformity profiles and help to increase compliance among economic operatives.

As large fans are very often locally produced and supplied this process is likely to begin with site visits to the local producers (see 3.2.3.1). In addition, it will entail measures to address imported products from either within the EEA or from outside.

3.2.3.1 Site visits of local producers

At this stage an MSA could also choose to make site visits of local producers, noting that these often dominate industrial fans markets. Such site visits could be used to any of the following:

- clarify information on the producer's products and markets
- ensure that the producer is familiar with the Ecodesign requirements
- gain understanding of and appraise the conformity management systems and procedures that the producer is using for conformity assessment of its products.

Additionally, such site visits could be used as a first form of informal conformity verification via:

- provisional screening of conformity assessment records for products previously placed on the market, including review of their technical documentation
- assessment of the quality of the testing facilities and calibration procedures being used
- conduct of visual inspections of available finished products for plausibility and rating plate requirements

- assessment of the design software used and checking whether the fan curve data from randomly selected finished products within the finished product database is likely to be in line with the Ecodesign requirements.

Most probably, it would be important for the MSA to assure the economic operator that these checks are not going to be used, at least in the first instance, for formal conformity verification checks, but rather are intended to understand the likelihood that the economic operator's products do conform to the requirements. If issues and non-conformity risks are identified via these checks then the MSA could alert the economic operator to these deficiencies and agree a process wherein they would remedy them prior to a future site visit and check.

Note, in many countries MSAs are likely to have the authority they need to oblige economic operators within their territory to cooperate with them; however, in some jurisdictions that may not be the case. If an economic operator does not wish to cooperate with an MSA, especially if the offer of a non-disclosure agreement is in place, then it could be indicative of bad-faith and imply that there is an elevated risk of non-conformity. This could be explained to the economic operator and if they still wish not to cooperate the MSA could set their risk profile at high and consider taking more proactive measures to sample their products for conformity verification purposes.

3.2.3.2 Addressing products from elsewhere within the EEA

In this case the MSA may not have any direct access to the producers and hence it may be unviable to conduct site visits. Rather the MSA could contact the MSA(s) with direct jurisdiction over the site(s) where the products are produced and could ask them to either conduct the same type of checks they would have done and/or to supply them with information on what they know about the operations and likely conformity of the producer in question. If this information is not forthcoming the requesting MSA may consider requesting the same access to that producer as they would for a locally based one or raising the risk profile of the producer in question.

3.2.3.3 Addressing products made outside the EEA

At present this is not thought to be a significant issue for industrial fans although Brexit may change this situation for some EEA markets. Products imported from outside the EEA will all be passed through a hard trade border at customs and thus MSAs should have the opportunity to be informed by customs that they have been placed on the market and to deploy conformity verification actions prior to them being put into service. The risk profiling of these products could be informed by market intelligence but also by plausibility checks based on documentation and visual inspection.

3.2.4 Selecting products for conformity verification checks

Based on the risk profiling activities set out above it should be possible for MSAs to progressively establish risk profiles for the economic actors serving the local market. In a simple risk profiling system there could be 4 classes of non-conformity risk per economic operator:

- low
- medium
- high
- unknown.

As more information on the economic operators becomes available the share of unknowns would decrease. Also, as higher risk economic operators are seen to take measures to address the sources of non-conformity their risk status could be amended downwards. Risk profile status of economic operators would also be adjusted in the light of outcomes from any conformity verification processes undertaken on their products.

When the MSA becomes aware that a product has been placed on the market and the supplier is known they can match it to their risk profile database to ascribe a risk status (with unknown being the default when the supplier is unknown or has no risk profile).

Based on this simple set of risk profiles the MSA can then apply a sampling algorithm to decide which products to select from a sample of potential candidates, and/or to decide whether to conduct conformity verification on a product which has just come to their attention. The weightings applied in the algorithm could take into account:

- the relative risk
- the desire to ensure there is a possibility that any product could be selected, not just the highest risk ones
- any pre-set intention to do conformity verification on a minimum or maximum number of the product type in question within a given period or given conformity verification budget envelope.

A simple approach could be to conduct, say: 11 initial conformity verifications of high risk products for every 3 medium risk products and every 1 for low risk products among those that have an established risk profile.

For example, should an MSA decide that they wish to do conformity verification of 5% of the large fans that they will be informed are placed on the market and that of these they expect the proportion of low/medium/high risk products to be equal, then were they to apply the (arbitrary) 11/3/1 weighting it would mean that:

- for low risk status the proportion of cases selected = 1%
- for medium risk status the proportion of cases selected = 3%
- for high risk status the proportion of cases selected = 11%
- for unknown risk status the proportion of cases selected = 5%

In practice, the share of known and unknown risk cases will not be clearly known in advance and neither will the relative preponderance of the high, medium and low risk products; therefore, the MSA may choose to front load the process so that products encountered earlier in the overall assessment period have a higher chance of being selected than those occurring towards the end of an assessment period. This also allows budgets to be allocated and spent in accordance with the overall conformity verification priorities.

The above illustration is just an example of the kind of approach that MSAs could apply to screening. The weightings by risk could be informed by actual non-conformity to risk profile ratios established from the assessment of other products until such time that enough is known about the industrial fan sector to have confidence in dedicated weightings for this product group. Similarly, it is possible to have more than just the 3 risk levels described above. Allocating risk scores on a numerical scale would be another valid option.

3.3 Screening a product for laboratory verification testing

Once a screening has been applied to select a product for conformity verification documentation checks will be done. Although documentation and rating plate inspection tests are definitive if a product is found to fail them they do not prove conformity has necessarily been respected if they are passed, or on the contrary that technical non-conformity does exist if they are not passed. The only way this can be established is to take the product through to laboratory verification testing. As laboratory verification testing is expensive for the MSA and can also incur costs due to delay for the contractor/EPC and final client another screening rationale can be applied post documentation checks on whether or not it should be done for the product in question.

3.3.1 Selecting products for visual inspection and plausibility checks and potential laboratory verification testing

After documentation checks a decision can then be made as to whether or not to also conduct visual inspection checks including plausibility checks and after that whether or not to go onto laboratory verification testing.
Screening processes can also be applied in these determinations too in order to maximise the conformity outcome per unit spend.

In the case of industrial fans there are at least 3 potential conformity verification steps an MSA could take prior to deciding whether or not to do laboratory verification testing as follows:

- visual inspection of the rating plate information
- visual inspections for conformity plausibility (see 2.4.1)
- inspections of fan design software and related files supplied by the manufacturer.

The two visual-inspection checks would be done simultaneously and so the real determination is whether to undertake a visual inspection or not. This is easier and cheaper to do when the MSA inspector has the product in front of them, as would routinely occur for inspections made at customs but not necessarily otherwise (documentation checks can be done remotely). The visual plausibility inspections described in 2.4.1 would normally be made in person too, but a less robust variant would be to demand copies of the design technical drawings and these could be done at a distance. This may, or may not, be a more involved process than making visual inspections but the decision of whether it should be done could be decided in a similar fashion.

At the stage where a product has passed the documentation checks, the decision of whether or not to undertake additional visual or software/data inspections could be decided using exactly the same screening method as previously described. For instance suppose an MSA were to decide that 25% of products should also undergo a visual or software/data inspection check after passing a documentation check. Then were the MSA to apply the (arbitrary) 1/3/11 ratio weighting to the same risk profiles previously used it would mean that:

- for low risk status the proportion of cases selected = 5%
- for medium risk status the proportion of cases selected = 15%
- for high risk status the proportion of cases selected = 55%
- for unknown risk status the proportion of cases selected = 25%

Depending on the finding of these additional conformity risk assessments a pre-verification test non-conformity risk screening process could be developed. A product which has no issues could again be ascribed low risk, one with some doubts associated medium risk, and one with major doubts to high risk. At this stage the MSA may feel that the visual inspection information gives them enough additional information to override the initial risk profiles based on the supplier/product type combination. Thus, the MSA could apply a simpler process such as:

- for new low risk status the proportion of cases selected = 2%
- for new medium risk status the proportion of cases selected = 50%
- for new high risk status the proportion of cases selected = 100%.

However, the actual weightings would depend on the willingness of the MSA to incur the additional costs associated with laboratory verification testing and with the expected benefits of pursuing checks based on the post visual/software inspection risk profiles.

3.3.2 Selecting products for laboratory verification testing without visual inspection and plausibility checks

As the visual/software inspection plausibility tests proposed are still undergoing development and have not been adopted by MSAs thus far (apart from rating plate checks which are different because they produce a definitive pass/fail outcome) then the default position of many MSAs will be to skip the plausibility check option. In this case, the process for selecting products for laboratory verification testing would occur immediately post documentation and rating plate checks. Again this applies screening based on the profile risk. For example, should an MSA decide that they wish to do laboratory verification testing of 5% of the large fans that have passed documentation/rating plate inspection and that of these they expect the proportion of low/medium/high risk products to be equal, then were they to apply the (arbitrary) 11/3/1 weighting it would mean that:

- for low risk status the proportion of cases selected = 1%
- for medium risk status the proportion of cases selected = 3%
- for high risk status the proportion of cases selected = 11%
- for unknown risk status the proportion of cases selected = 5%

Again, the above illustration is simply an example of the kind of approach that MSAs could apply to screening. The weightings by risk could be informed by actual non-conformity to risk profile ratios established from the assessment of other products until such time that enough is known about the industrial fan sector to have confidence in dedicated weightings for this product group. Similarly, it is possible to allocate risk scores on a numerical scale and apply these rather than the simpler low/medium/high classification applied above.

3.4 Additional screening options

3.4.1 Screening at the immediate pre-putting into service stage

As discussed in INTAS deliverable D3.6 due to the difficulties of determining when an industrial fan has been placed on the market, but also to the possibility of establishing that it has been prior to it being put into service, it may be necessary for MSAs to consider undertaking conformity verification of products that have arrived on the final site but have not yet been installed. In this case the screening process would essentially be identical to that described in section 3.2 for initiating compliance verification. When deciding whether or not to send the product on for additional conformity checks after documentation inspection has been passed the MSA could also essentially follow the process outlined in section 3.3, with the caveat that due to the product already being on site and the higher risk of delay in project completion that greater weighting might be given to plausibility tests, while the proportion of products sent on for laboratory verification tests might be reduced to zero for those with low risk status post the plausibility check. If plausibility checks are not sufficiently mature to be used, then again a lower proportion of product could be sent for laboratory verification tests than if the conventional conformity verification post placing on the market is followed.

3.4.2 Site visits of local producers

As an alternative option MSAs could choose to invert the process set out above and use the outcomes of product conformity checks as a trigger to conduct supplier conformity appraisals. For example, if a supplier's product is found to breach a conformity verification process then the MSA may decide to consider conducting a site visit to the place of production and do a conformity audit of the manufacturer's production management system and related QA processes as described in section 3.2.3.1, i.e. where site visits could be used as a form of conformity verification via:

- scrutinising conformity assessment records for products previously placed on the market, including review of their technical documentation
- assessment of the quality of the testing facilities and calibration procedures being used
- conduct of visual inspections of available finished products for plausibility and rating plate requirements
- assessment of the design software used and checking whether the fan curve data from randomly selected finished products within the finished product database is likely to be in line with the Ecodesign requirements.

Once again MSAs could employ screening algorithms to decide whether or not to conduct such assessments based on the nature of the product non-conformity identified.

3.4.3 Overview

An overview of some of the key screening elements for large industrial fans is given in Table 1 below.

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Table 1. Summary of some of the key screening elements for large industrial fans

Reference to graphical chart	Task	Categories	Tools	INTAS input
0. General information and guidance to stakeholders				
	Information meetings			
	Webpage			
	Guidelines			
	Stakeholder list			
1. Screening for products				
Article 1 and 2: Scope and definitions	Identify fans	Fan types	prEN17166	D 3.1
		Drive systems	prEN17166	D 3.1
		Types of assembly	prEN17166	D 3.1
		Input power range	Reg. 327	D 3.1
		Dimensions and weight	Reg. 327	D 3.1
		Exempted products	Reg. 327	D 3.1
	Finding fans	B2B		D 3.8
		Retailers		D 3.8
		Contractors		D 3.8
		End-users		D 3.8
		Trade fairs		D 3.8
		Customs		D 3.8
		Web search		D 3.8
	Plausibility checks	Efficiency indicators	EVIA-sketches	D 3.8
		Declaration of conformity		D 3.1
		Product information		D 3.1
		Nameplate(s)		D 3.1

4. Screening options for power transformers

This chapter considers the practical factors affecting the viability of MSA screening practice as applied to Ecodesign conformity verification for large power transformers and proposes methodologies which could be used for this purpose.

4.1 Identifying that a product is placed on the market

4.1.1 Large power transformer sector considerations

Given that the large power transformer sector has the following characteristics:

- relatively small number of producers who often serve the wider EEA market
- very limited competition from suppliers from outside the EU (although there is for smaller transformers)
- products are made to order in one-off batches via B2B procurement processes that are opaque to external actors
- their large size means that special road transport permission is routinely sought for delivery
- Regulation 548/2014 grants MSA power to do witness testing
- FATs are done for all large power transformers
- placing on market knowledge is possible from: safety CAB, customs, road/rail/port authorities, as well as clients (generators, TSOs, DSOs, industry)
- there is limited accreditation of manufacturer labs
- there is limited/negligible testing of competitor's products
- catalogues are only used for transformers produced as a series in small to medium power ranges
- compliance verification checks after placing a large transformer on the market risk incurring significant costs in project completion delays.

Then:

a) Product identification prior to products being placed on the market can be done by:

   i) agreement with procurers within the MSAs territory to inform the MSA when they place an order for a large transformer – these would include generators, TSOs, DSOs and industry

   ii) agreement with the transformer suppliers to inform the MSA when an order is placed (note, these may not be based in the same country as the MSA)

b) Product identification post products being placed on the market and before they are put into service can be done by:

   i) notifications from the following authorities – customs, road network special transport permit providers, ports and rail, safety conformity verification body

   ii) agreement with procurers based within the MSA's territory to inform the MSA when the product is about to be transported

   iii) agreement with the transformer suppliers to inform the MSA when a product is being placed on the market.

Compared to the case for standard mass-produced products these potential notification pathways are quite constrained. MSAs should already have relationships with customs that they can exploit but as a significant share of the product may be produced or shipped without crossing a hard trade border (especially within the Schengen area) then this route will only provide notification for an uncertain part of the trade volume.

4.1.2 Working with economic operators prior to the product being placed on the market

Seeking commitments from producers to inform the MSA when the product is going to be placed on the market should be a viable practice for large power transformers. Annex III of Regulation 548/2014 states:

> "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."

Thus, MSAs have the authority to demand such a verification procedure. Furthermore, the only way this could be conducted is if the producer were to inform the MSA prior to the product's factory acceptance test and thus the producer would have to have notified the MSA. The wording above could be taken to imply an obligation on the producer to inform the MSA; however, the producer has an incentive to inform the MSA in any case, because if the MSA were to conduct conformity verification testing after the product was placed on the market (see options discussed below) it would be very costly for the transformer client in terms of lost operational time. Thus, in general producers would not wish to develop a reputation of putting their clients at risk due to failings in cooperating with Ecodesign MSAs.

For this route to be most effective MSAs should also seek agreement with nationally based procurers of large transformers (generators, TSOs, DSOs and industry) that they will inform the MSA whenever they have placed an order. Again, it is in their interests to do so to avoid the risk of the MSA requesting laboratory verification testing of a product delivered to site. As the procurers are based in the territory of the MSA they are likely to have an additional incentive to cooperate with a government regulatory body. This twin approach of requesting that both producers/suppliers and procurers notify the MSA whenever an order is placed (and in time for the MSA to participate at a FAT – see 2.4) is likely to avoid products slipping through the net and should produce a good level of intelligence of when products are due to be placed on the market.

4.1.3 Working with public authorities to identify products in transit

Large power transformers are moved by water, road and rail. In each case there is an opportunity for the MSA to establish relationships with the relevant authorities to inform them whenever a large power transformer is being moved. Products arriving by water will enter the docks and thus port authorities and customs could inform the MSA. When moved by rail, the rail authorities could inform the MSA. When moved by road, an application will have to be made for a license to move a large object to the road network authorities and thus these could also inform the MSA whenever such transportation concerns a large power transformer.

Deploying such methods would make it very risky for economic operators to attempt to install a transformer in a territory without first informing the MSA. It also gives the MSA the option of having a product sent for laboratory verification testing prior to it arriving on site.

4.1.4 Working with safety authorities immediately pre-putting into service

As all power transformers are required to have an electrical safety check by an authorised body prior to receiving a license for them to be put into service, Ecodesign MSAs could liaise with the CAB doing these checks to ensure that they are notified ahead of time whenever such a check is scheduled. This gives the MSA certainty about all power transformers being installed in their territory and provides a means to verify which economic operators are cooperating with them upstream (see above) as well as to identify any which are not.

Potentially it would also be possible for the MSA to reach agreement with the most prevalent clients for large transformers, especially the end-clients, that they would be notified prior to a transformer being put into service so they could potentially do conformity risk assessment screening on site (if a witnessed FAT had not already occurred). This could entail checking the technical documentation and rating plate information and doing a plausibility inspection (see section 2.4.1). If these are passed then the product would be put into service, but if there are non-conformity suspicions the MSA could decide (potentially through liaison with the end client) as to whether they should remove the product for laboratory verification testing. In this case the end client economic operator has an incentive to work with the MSA because it provides an extra safeguarding service against the risk that they may be procuring a substandard product.

4.1.5 Post-putting into service

The above discussion is highly relevant to the application of product selection screening practices because before any product selection screening can be applied it is necessary to know whether the product has been either placed on the market or put into service. In the case of large power transformers conformity verification post putting into service would very much be an option of last resort, because it would certainly necessitate disruption to the operations of the party that procured the transformer, and could be technically difficult and costly to conduct in their own right.

4.2 Screening a product for initiating conformity verification

Given the very specific nature of the large power transformer sector MSAs are likely to need to apply a bespoke screening methodology for the selection of such transformers for conformity verification.

Before the product is placed on the market this could entail selecting products for the witness of factory acceptance tests.

After the product has been placed on the market this could entail:

a) a broader selection for technical documentation checks
b) a potentially slightly narrower selection for visual inspection checks
c) a smaller sample for laboratory verification testing.

4.2.1 Market intelligence

Prior to systematically doing any of these steps the MSA will need to develop their knowledge of the market and begin to use this to establish profiles of the market actors and their importance. This can be done by conducting web-searches to find suppliers to the local market including local and international manufacturers of large power transformers. As this is a relatively concentrated sector it is not difficult to establish a complete list of producers; however, it is also recommended that the MSA liaise with the safety CAB and the local end-users of large transformers to establish a complete list of who is supplying what to the local market. It could also be relevant to establish a list of the EPCs that are active on procuring and fitting such products on behalf of final clients.

4.2.2 Establishing market profiles

The initial profiling process should aim to identify the following:

- any local manufacturers, the main characteristics of their product offer, revenues and market shares (on the local market)
- ditto for the other manufacturers supplying the local market
- importers/traders
- the EPCs that install transformers, the sectors they work with, their size and importance
- the end-use sectors with some approximate data on their likely levels of use of power transformers by type.

Once this has been done it should be possible to liaise with the economic operators (especially the principal ones) and take steps to better understand their business, competences and practices with regard to transformers.

4.2.3 Compliance strengthening measures and establishing non-conformity risk profiles of economic operators

Once sufficient details regarding economic operators have been established MSAs can begin to simultaneously take steps which will establish risk of non-conformity profiles and help to increase compliance among economic operatives.

As any local producers are likely to be most accessible and also to have an important position in the local market this process is likely to begin with site visits to the local producers (see 4.2.3.1). In addition, it will entail measures to address imported products from either within the EEA or from outside.

4.2.3.1 Site visits of local producers

At this stage an MSA could choose to make site visits of local producers which could be used to serve any of the following purposes:

- clarify information on the producer's products and markets
- ensure that the producer is familiar with the Ecodesign requirements
- gain understanding of and appraise the conformity management systems and procedures that the producer is using for conformity assessment of its products.

Additionally, such site visits could be used as a first form of informal conformity verification via:

- provisional screening of conformity assessment records for products previously placed on the market, including review of their technical documentation
- assessment of the quality of the testing facilities and calibration procedures being used
- conduct of visual inspections of available finished products for plausibility and rating plate requirements
- assessment of the design software used and checking whether the technical data from randomly selected finished products within the finished product database is likely to be in line with the Ecodesign requirements.

Most probably, it would be important for the MSA to assure the economic operator that these checks are not going to be used, at least in the first instance, for formal conformity verification checks, but rather are intended to understand the likelihood that the economic operator's products do conform to the requirements. If issues and non-conformity risks are identified via these checks then the MSA could alert the economic operator to these deficiencies and agree a process wherein they would remedy them prior to a future site visit and check.

Note, in many countries MSAs are likely to have the authority they need to oblige economic operators within their territory to cooperate with them; however, in some jurisdictions this may not be the case. If an economic operator does not wish to cooperate with an MSA, especially if the offer of a non-disclosure agreement is in place, then it could be indicative of bad-faith and imply that there is an elevated risk of non-conformity. This could be explained to the economic operator and if they still wish not to cooperate the MSA could set their risk profile at high and consider taking more proactive measures to sample their products for conformity verification purposes.

4.2.3.2 Addressing products from elsewhere within the EEA

In this case the MSA should still be granted access to the producers due to the clause regarding witness testing specified within Annex III of the regulation providing the producer is known to supply products to the MSA's market. However, it is also an option for the MSA to contact the MSA(s) with direct jurisdiction over the site(s) where these products are produced and ask them to either conduct the same type of checks they would have done and/or to supply them with information on what they know about the operations and likely conformity of the producer in question. If this information is not forthcoming the requesting MSA may consider requesting the same access to that producer as they would for a locally based one or raising the risk profile of the producer in question.

4.2.3.3 Addressing products made outside the EEA

At present this is not thought to be a significant issue for large power transformers although Brexit may change this situation for some EEA markets. Should the MSA's work with local transformer clients, customs and the electrical safety CAB identify suppliers of large power transformers based outside the EEA they could still seek to contact these and proceed in the same manner they would for producers based in the EEA. Furthermore, products imported from outside the EEA will all be passed through a hard trade border at customs and thus MSAs should have the opportunity to be informed by customs that they have been placed on the market and to deploy conformity verification actions prior to them being put into service. The risk profiling of these products could be informed by market intelligence but also by plausibility checks based on documentation and visual inspection.

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4.2.4 Selecting products for conformity verification checks

Based on the risk profiling activities set out above it should be possible for MSAs to progressively establish risk profiles for the economic actors serving the local market. In a simple risk profiling system there could be 4 classes of non-conformity risk per economic operator:

- low
- medium
- high
- unknown.

As more information on the economic operators becomes available the share of unknowns would decrease. Also, as higher risk economic operators are seen to take measures to improve their conformity their risk status could be amended downwards. Risk profile status of economic operators would also be adjusted in the light of outcomes from any conformity verification processes undertaken on their products.

When the MSA becomes aware that a product has been placed on the market and the supplier is known they can match it to their risk profile database to ascribe a risk status (with unknown being the default when the supplier is unknown or has no risk profile).

Based on this simple set of risk profiles the MSA can then apply a sampling algorithm to decide which products to select from a sample of potential candidates, and/or to decide whether to conduct conformity verification on a product which has just come to their attention. The weightings applied in the algorithm could take into account:

- the relative risk
- the desire to ensure there is a possibility that any product could be selected, not just the highest risk ones
- any pre-set intention to do conformity verification on a minimum or maximum number of the product type in question within a given period or given conformity verification budget envelope.

A simple approach could be to conduct, say: 11 initial conformity verifications of high risk products for every 3 medium risk products and every 1 for low risk products among those that have an established risk profile.

For example, should an MSA decide that they wish to do conformity verification of 5% of the large transformers that they have intelligence will be/or have been placed on the market and that of these they expect the proportion of low/medium/high risk products to be equal, then were they to apply the (arbitrary) 11/3/1 weighting it would mean that:

- for low risk status products the proportion of cases selected = 1%
- for medium risk status products the proportion of cases selected = 3%
- for high risk status products the proportion of cases selected = 11%
- for unknown risk products status the proportion of cases selected = 5%.

In practice, the share of known and unknown risk cases will not be clearly known in advance and neither will the relative preponderance of the high, medium and low risk products; therefore, the MSA may choose to front load the process so that products encountered earlier in the overall assessment period have a

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higher chance of being selected than those occurring towards the end of an assessment period. This also allows budgets to be allocated and spent in accordance with the overall conformity verification priorities.

The above illustration is just an example of the kind of approach that MSAs could apply to screening. The weightings by risk could be informed by actual non-conformity to risk profile ratios established from the assessment of other products until such time that enough is known about the large transformer sector to have confidence in dedicated weightings for this product group. Similarly, it is possible to have more than just the 3 risk levels described above. Allocating risk scores on a numerical scale would be another valid option.

4.2.4.1 Impact of low product trade volumes

When considering the process described above it should be recollected that the number of large transformers being installed in a territory within a given period may be very low. The market intelligence exercise, as previously described, should indicate what types of frequencies have occurred in the past and be a good indicator of those likely in the future, but even better would be liaison with the clients (especially electricity network operators) to establish their future network planning and to use this to gain foresight into the expected level of demand for such products. It may be sufficient for the MSAs to decide to simply do some checks on a small sample of the products expected to be installed in a coming period and use the information so gleaned to decide how frequently to do future checks.

4.3 Screening a product for laboratory verification testing

Once a screening has been applied to select a product for conformity verification documentation checks will be done. Although documentation and rating plate inspection tests are definitive if a product is found to fail them they do not prove conformity has necessarily been respected if they are passed, or on the contrary that technical non-conformity does exist if they are not passed. The only way this can be established is to take the product through to laboratory verification testing (if it has already been placed on the market). As laboratory verification testing is expensive for the MSA and can also incur costs due to delay for the contractor/EPC and final client another screening rationale can be applied post documentation checks on whether or not it should be done for the product in question.

In the case of large power transformers witnessing a factory acceptance test is also a viable conformity verification option that an MSA might choose. By default, this would need to occur before the product is placed on the market. It has the considerable advantages that it is less costly to the MSA than conducting a laboratory verification test and that it is much less disruptive to the product supply chain and the final client. On the other hand, the integrity of a witnessed FAT may not be as high as a laboratory verification test. In both cases the MSA would have the option of preventing the product being placed on the market, unless modified to comply, but it may be difficult to pursue additional sanctions for non-conformity of a producer of a product that fails a witness test, as the product would not formally have been placed on the market at that point.

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4.3.1 Selecting products already placed on the market for visual inspection and plausibility checks and potential laboratory verification testing

After documentation checks a decision can then be made as to whether or not to also conduct visual inspection checks including plausibility checks and after that whether or not to go onto to laboratory verification testing.

Screening processes can also be applied in these determinations in order to maximise the conformity outcome per unit spend.

In the case of large transformers there are at least 3 potential conformity verification steps an MSA could take prior to deciding whether or not to do laboratory verification testing as follows:

- visual inspection of the rating plate information
- visual inspections for conformity plausibility (see 2.4.1)
- inspections of transformer design software and related files supplied by the manufacturer.

The two visual-inspection checks would be done simultaneously and so the real determination is whether to undertake a visual inspection or not. This is easier and cheaper to do when the MSA inspector has the product in front of them, as would routinely occur for inspections made at customs but not necessarily otherwise (documentation checks can be done remotely). The visual plausibility inspections described in 2.4.1 would normally be made in person too, but a variant would be to demand copies of the design technical drawings and specifications and these could be done at a distance. This may, or may not, be a more involved process than making visual inspections but the decision of whether it should be done could be decided in a similar fashion.

At the stage where a product has passed the documentation checks, the decision of whether or not to undertake additional visual or software/data inspections could be decided using exactly the same screening method as previously described. For instance suppose an MSA were to decide that 25% of products should also undergo a visual or software/data inspection check after passing a documentation check, then were the MSA to apply the (arbitrary) 1/3/11 ratio weighting to the same risk profiles previously used it would mean that:

- for low risk status the proportion of cases selected = 5%
- for medium risk status the proportion of cases selected = 15%
- for high risk status the proportion of cases selected = 55%
- for unknown risk status the proportion of cases selected = 25%.

Depending on the finding of these additional conformity risk assessments a pre-verification test non-conformity risk screening process could be developed. A product which has no issues could again be ascribed to low risk, one with some doubts associated to medium risk, and one with major doubts to high risk. At this stage the MSA may feel that the additional information is sufficient to override the initial risk profiles based on the supplier/product type combination. Thus, the MSA could apply a simpler process such as:

- for new low risk status products the proportion of cases selected = 2%
- for new medium risk status products the proportion of cases selected = 50%
- for new high risk status products the proportion of cases selected = 100%.

However, the actual weightings would depend on the willingness of the MSA to incur the additional costs associated with independent laboratory verification testing and with the expected benefits of pursuing checks based on the post visual/software inspection risk profiles.

4.3.2 Selecting products for laboratory verification testing without visual inspection and plausibility checks

As the visual/software inspection plausibility tests proposed are not yet developed and proven and thus have not been adopted by MSAs (apart from rating plate checks which are different because they produce a definitive pass/fail outcome) then the default position of many MSAs will be to skip the plausibility check option. In this case, the process for selecting products for verification testing would occur immediately post documentation and rating plate checks. Again screening based on the profile risk could be applied such that, for example, should an MSA decide that they wish to do laboratory verification testing of 5% of the large transformers that have passed documentation/rating plate inspection, and that of these they expect the proportion of low/medium/high risk products to be equal, then were they to apply the (arbitrary) 11/3/1 weighting it would mean that:

- for low risk status products the proportion of cases selected = 1%
- for medium risk status products the proportion of cases selected = 3%
- for high risk status products the proportion of cases selected = 11%
- for unknown risk status products the proportion of cases selected = 5%.

Again, the above illustration is simply an example of the kind of approach that MSAs could apply to screening. The weightings by risk could be informed by actual non-conformity to risk profile ratios established from the assessment of other products (i.e. using these as proxies) until such time that enough is known about the large transformer sector to have confidence in dedicated weightings for this product group. Similarly, it is possible to allocate risk scores on a numerical scale and apply these rather than the simpler low/medium/high classification applied above.

4.3.3 Selecting products for witness testing of FATs prior to their being placed on the market

The approach to selecting products for witness testing should be essentially identical to that for selecting products for conformity verification as set out in section 4.2.4 except that, as this is a more extensive and costly process than doing documentation checks, the frequency with which a witnessed FAT occurs is likely to be less as a proportion of the number of products being put on the market. The other difference is that the selection process necessarily happens once an MSA has been alerted that an order has been placed and before the product has been placed on the market, so that the MSA and economic operators have enough time to make the arrangement for the witness test.

4.4 Additional screening options

4.4.1 Screening at the immediate pre-putting into service stage

If an MSA is not informed that a product has been placed on the market prior to it arriving at the site for installation then there is an option to do conformity verification checks at site prior to their being put into service. In this case the screening process would essentially be identical to that described in section 4.2 except that the MSA may decide to automatically raise the non-conformity risk profile if they believe that the economic operators concerned should have informed them that the order had been placed prior to the product being placed on the market but chose not to, or did so in a tardy or obstructive manner that precluded the option of attending a witness test.

When deciding whether or not additional conformity checks should be conducted in the event that documentation checks have been passed the MSA could also essentially follow the process outlined in section 4.3, with the caveat that, due to the product already being on site and the higher risk of delay in project completion, greater weighting might be given to plausibility tests, while the proportion of products sent on for laboratory verification tests might be reduced to zero for those with low risk status post the plausibility check. An alternative option is to consider conducting in situ tests done with mobile testing equipment. These have the advantage that they are quick to do (assuming the equipment is available) but the disadvantage that they do not currently produce definitive legally enforceable outcomes, and thus they would serve as a last risk screening exercise prior to removing an apparently non-compliant product for laboratory verification testing.

4.4.2 Overview

Table 2 provides a summary of some of the key screening elements for large power transformers.

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Table 2. Summary of some of the key screening elements for large power transformers

Reference to graphical chart	**Task**	**Categories**	**Tools**	**INTAS input**
0. General information and guidance to stakeholders				
	Information meetings			
	Webpage			
	Guidelines			
	Stakeholder list			
1. Screening for products				
Article 1 and 2: Scope and definitions	Identify transformers	Transformer types	EN 50629:2015	D 3.2
		Input power range	Reg. 548/2011	D 3.2
		Exempted products	Reg. 548/2011	D 3.2
	Finding transformers	Web search		D 3.8
		B2B		D 3.8
		Trade associations		D 3.8
		End-users		D 3.8
		Contractors		D 3.8
		Customs		D 3.8
		Electrical safety CAB		D 3.5
	Plausibility checks	Efficiency indicators		D 3.7
		Declaration of conformity		D 3.7
		Product information		D 3.7
		Nameplate(s)		D 3.7

5. Conclusions

The material assembled in the main body of this report has described the issues confronted and considerations to take into account when selecting large industrial products for Ecodesign conformity verification by MSAs. It has proposed pathways to overcome the biggest conformity verification issue, namely knowing when the products have been placed on the market in time to be able to conduct conformity verification prior to their being out into service. It has also proposed processes to establish non-conformity risk and to use this to guide the product selection process.

For both product groups the proposed conformity verification screening methodologies enable products which have been placed on the market to be selected for conformity verification prior to their being put into service. They allow for conventional product selection screening to support definitive conformity verification actions distinguished in (1) paperwork checks (e.g. documentation inspection), (2) visual inspections (for rating plate information), and (3) laboratory verification checks.

In addition, the screening methodologies permit screening based on levels of non-conformity risk which is either informed by specific relevant technical knowledge about the supplier or by non-definitive but informative risk assessment checks conducted directly on the product. In some cases, these methodologies are not yet ready to be deployed because the risk profiling stage is not yet sufficiently mature (as is currently the case for the plausibility checks for both fans and transformers), however, as this situation is anticipated to evolve provisions for their use are included in this report.

In practice it is recognised that the conventional conformity verification procedure post placing the product on the market is problematic and more an option of last resort for both large fans and large transformers. For large fans, risk assessment based on interceding with the manufacturer (many if not most of whom will be in the same jurisdiction as the MSA in many countries) and checking design software and product records is likely to be an important part of the process. While for some select end-use markets witnessing factory acceptance tests will have a role. In consequence, the proposed screening methodologies allow for these eventualities, while recognising that their value is to inform the decision of whether to move towards laboratory verification testing or not.

In the case of large power transformers, the screening selection methodologies are adapted to enable pre-placing on the market conformity verification via witness tests in accordance with the conformity verification provisions in Annex III of Regulation 548/2014. This is expected to be the most viable form of conformity verification beyond document and rating plate inspection for the majority of cases, although other methods including laboratory verification testing will always remain an option.

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Appendix A: Selection practice examples from within the EU

The text below provides some vignettes of EU MSA product screening selection practice taken from the Ecopliant project (http://eepliant.eu/) and the INTAS D2.6 report. The examples cited generally pertain to mass products – it has not been possible to attain equivalent details of MSA selection practices for industrial products.

United Kingdom

An example of the product selection criteria applied in UK is described in the document "Market Transformation Programme, 2008/2009 Energy Label Market Picture Testing – Domestic Washer/Driers" that describes the results of energy efficiency label tests carried out on 24 domestic washer/driers to provide market intelligence for Defra's Sustainable Consumption and Production (SCP) Programme through the MTP. All tests were carried out between December 2008 and March 2009 in a UKAS accredited test laboratory.

The tested models were selected from ranges of washer/driers available on the UK market and purchased anonymously from the consumer retail market.

The brand selection covered:

- the top selling brands in terms of units sold based on 2007 data. The models were selected from these brands listed in 2007 GFK market data and broadly reflected the range of appliances in that brand in terms of proportion of sales and time on market:
  - the top 21 brands selected cover 91% of the market and each had one sample appliance tested
  - the top three brands represent 62% of the market and had an additional appliance of a different type tested
- to avoid testing the same basic design machines with different fascia's and brand labels, a variety of wash/dry load capacities were selected for brands of common ownership
- some built-in units were also selected to broaden the range of types and avoid duplication some brands with a small share of the market were included to broaden the scope and a trade brand model from John Lewis was also selected
- research was subsequently carried out by visiting on-line purchasing sources to check availability of these models and in some cases they were substituted for newer models to avoid issues with obsolescence or availability. The newer models selected were, where possible, identified as the most popular current seller

In April 2010 the NMO Enforcement Directorate undertook the first test programme project as part of the Ecodesign enforcement work in the sector of domestic refrigerating appliances.

Models selection was based on:

- risk indicators, to ensure that the sample of test appliances was not only a significant sample of the market but also to maximise the efficiency of the test programme by identifying those products most likely to fail by considering factors such as probability of non-compliance and market penetration
- market intelligence was also used to identify probable possible non-compliance
- energy labelling price comparisons and price comparison between freezers; this involved looking at:
- refrigerating appliances that were relatively cheap while claiming high energy classes compared with appliances that had similar volume and claimed to be the same energy class but with large differences in price
- information from consumer advice groups
- internet research targeting only those claiming to be class A or above as to check for compliance to the minimum ecodesign efficiency requirements
- type of refrigerating appliance:
  - — chest freezers as these were an area of high risk
  - — a variety of larder fridges and fridge freezers that have the largest market share
  - — a large American style fridge freezer that use a large amount of energy.

Denmark

On behalf of the Danish Energy Agency, the Secretariat for Ecodesign and Energy Labelling of Products conducts market surveillance activities for energy related products on the Danish market. The secretariat is responsible for all practical enforcement activities related to regulations under the Ecodesign Directive and the Energy Labelling Directive including co-ordinating the laboratory measurements of products selected for testing.

The tasks of the secretariat can be divided into the following main categories:

- inspection of documentation that products comply with requirements
- laboratory measurements of products' compliance with requirements (tests are being conducted at accredited test laboratories). Enforcement vis-a-vis manufacturer/supplier in case the lab tests shows non-compliance.
- Internet and advertisement inspection: Inspection of product information in advertising on the internet and in printed advertisements
- inspection of shops: inspection of whether displayed products are correctly labelled in shops
- guidance of manufacturers/suppliers on how to understand and comply with the legislation, responses to any other enquiries as well as handling of complaints.

Since 2011series of document inspections has been completed before carrying out more expensive laboratory tests. Products for which the manufacturer cannot show compliance with requirements to the technical documentation are handled at this stage and need in general not to be tested in a laboratory.

The selection of products and of the manufacturers is performed according to the following principles:

- substantiated suspicion, i.e. from a previous conducted document inspections
- previous unacceptable test results for the same manufacturer/supplier
- market share
- low price segment (as experience shows higher degree of non-compliance with these products)
- Danish importers of products manufactured outside the EU
- over a period of time products from all producers/importers should be inspected.

The Danish Energy Agency can initiate campaigns on a specific topic, e.g. the refrigerators' use of climate classes 'tropical' and 'subtropical' in order to obtain a higher energy efficiency class. Such campaigns are carried out by the secretariat.

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Sweden

The Swedish Energy Agency is responsible for market surveillance of the Ecodesign Directive, the Energy Labelling Directive and the regulation of tyres.

The Swedish Energy Agency took over the responsibility as the national MSA in 2006.

Up to then, the Swedish Consumer Agency, with its laboratory Testlab, had performed tests on regulated products and also, in its capacity as supervisory authority, inspected the energy labelling in white goods retail outlets in co-operation with the local (municipal) consumer advisors. Testlab now belongs to the Swedish Energy Agency.

The Swedish Energy Agency does in-house testing on the energy performance and other requirements of products, such as white goods, external power supplies, TVs and lightning. Other regulated products are tested at outsourced laboratories. The Swedish Energy Agency also inspects shops, Internet and advertising leaflets according to the directives.

Usually product targeting is based on: best sellers, brands with a history of non- compliance, new entrants on the market and/or complaints. The Swedish Energy Agency now also makes decisions on whether or not to do conformity verification testing on the basis of an assessment of the technical documentation.

Appendix B: Selection practice outside the EU

The text below provides some examples of external-to-EU MSA product screening selection practice taken from the Ecopliant project (http://eepliant.eu/) and the INTAS D2.6 report. The examples cited generally pertain to mass products – it has not been possible to attain equivalent details of MSA selection practices for industrial products.

Selection criteria practice in Australia and New Zealand

The national Equipment Energy Efficiency (E3) Program has existed in some form in Australia for over 20 years with engagement by New Zealand agencies for the last 18 years. For much of this time, the regulatory agencies managing the programme have undertaken verification testing to check if suppliers are complying with mandatory minimum requirements and energy labelling.

On 13 September 2012 the Greenhouse and Energy Minimum Standards Act 2012 (also known as GEMS) was passed by the Australian Parliament, to commence on 1 October 2012. It establishes a national framework for regulating the energy efficiency of products supplied or used within Australia, implementing Australian Government and the Council of Australian Governments commitments to establish national legislation to regulate energy efficiency and labelling requirements for appliances and other products. The national legislation permits the Australian Government to set mandatory minimum efficiency requirements for products. The Act also allows the Australian Government to set nationally-consistent labelling requirements, to increase Australians' awareness of options to improve energy efficiency and reduce energy consumption, energy costs and greenhouse gas emissions. The GEMS replaced seven overlapping State and Territory legislative frameworks, harmonising the regulation of equipment energy efficiency[4].

The Act provides also for enhanced monitoring, verification and enforcement and allows the scope of the E3 Program to be expanded.

The Australian GEMS Regulator, in addition to the continuation of the practice of the State regulators under the previous E3 Program to issue infringement notices or ask businesses to compensate consumers for the cost of products that do not comply with regulations, will also have the power - for more serious breaches of the law - to allow the courts to impose financial penalties. Another novelty will be the requirement for registrants to Australian GEMS Regulator to submit annual data on sales and import/export of each registered model, as already required by the New Zealand Regulator. The data will facilitate the establishment of revised minimum requirements levels and labelling algorithms and will improve the evaluation of the E3 Program.

The E3 Program will no longer set a single registration fee in Australia for all product types, as was the case under Australian State and Territory laws. Product types will be grouped into one of four fee bands. These fees will range from 440 AU$ to 780 AU$ and will cover a five year registration period. The new registration

[4] http://www.energyrating.gov.au/commencement-of-gems-legislation/

fee bands will cover costs associated with processing registration applications and will also go towards the cost of compliance monitoring activities. The funds collected will also enable the E3 Program to deliver improvements in program administration and enforcement.

A transitional period of at least six months is foreseen for suppliers in order to move to the new Australia's national legislation scheme.

Compliance regime and verification testing

Verification testing (also known as "check testing") has been undertaken according to published criteria for many years. Those criteria were often derived from methodology specified by the test standard or protocol.

The national check testing program is just one element of the overall "Compliance Regime" managed by the E3 Committee, in conjunction with state-based regulators. Other compliance activities range across:

a) information and support through education, stakeholder forums and other communication activities

b) in-store surveys to check that the correct labels are being displayed4

c) inspections to ensure that products on the market are registered5

d) administrative settlement actions for matters where a formal penalty or other proceedings are not warranted, including referrals to other enforcement agencies like the Australian Competition and Consumer Commission

e) court and other related proceedings (for example infringement notices) for matters where such action is warranted.

Check testing remains the cornerstone of the compliance activities and provides several important functions with respect to the energy efficiency regulatory programme:

- it confirms appliances are meeting their declared energy efficiency and therefore the projected energy and greenhouse gas savings are actually being delivered
- it safeguards the integrity of program by maintaining consumer and industry confidence in the energy performance labels and minimum requirements
- it protects the investment made by industry producing compliant equipments with their compliance cost structures, from unfair competition by non-compliant products.

Regular check testing6 is undertaken on a range of domestic and commercial product types including white goods, air-conditioners, electric water heaters, ICT, lighting, motors and commercial refrigeration.

The first step – Stage 1 – in the check testing process is the Stage 1 check test (also known as the "screen test") usually performed on one sample of the model randomly sourced and independently purchased (usually through a retail outlet); for some products more than one sample is required. This sample is tested by a laboratory accredited to undertake check testing on behalf of the regulatory Authorities.

Only NATA (National Association of Testing Authorities) accredited laboratories or laboratories accredited by bodies with a mutual recognition agreement with NATA, and with a registration that permits them to issue test reports for the test in question, are approved to undertake check testing. In circumstances where Stage 1 check testing is to be undertaken at a supplier's own Australian located NATA registered laboratory, regulatory agencies will accept the results provided a NATA appointed witness is present throughout the testing. Costs associated with the provision of a NATA appointed witness are borne by the supplier.

Where the Stage 1 check test shows non-compliance with the relevant standard, the supplier can elect to request the cancellation of the registration for the model in question or proceed to Stage 2 check testing. If the supplier elects to cancel the registration of the model in question a letter will be sent to the Regulator in the State the product was registered recommending cancellation of the product's registration. Once the product's registration has been cancelled the supplier is contacted about providing consumer and environment compensation for the additional energy consumed and greenhouse gases produced by the product.

If the supplier chooses to proceed to Stage 2 testing they must provide a list of products, held in stock, from which 2-3 units are randomly selected for testing. Stage 2 check test procedures require that satisfactory test reports from an accredited check testing laboratory on two units (where the failure relates to performance standards) or three units (where failure relates to a 'supplier declaration' e.g. claims on labels) be supplied to the compliance program administrator.

If the products fail the Stage 2 check test the registration is automatically recommended for cancellation by the relevant Regulator, and a process is entered into with the supplier to provide consumer and environment compensation for the additional energy consumed and greenhouse gases produced by the product.

As far as the costs are concerned, Stage 1 check test costs are generally met by the regulatory Agency. Where the supplier decides to undertake Stage 2 check testing, he will be liable for all Stage 2 check testing related costs irrespective of the outcome. Where a unit selected for check testing is demonstrated to be defective in manufacture, the supplier will be liable for all resulting additional costs incurred for check testing.

The selection criteria of the previous E3 Program

The number of tests conducted each year by the E3 Program was due to the available budget and the cost of individual tests. The testing programme has grown up to testing over 300 products per annum, that represent about 2% of the approximately 16.000 approved product registrations.

The selection criteria have been developed to achieve targeted testing of at-risk products. The criteria, described in the Administrative Guidelines, were updated in 2005 and mix two types of factors:

- those intended to indicate a higher likelihood of failure
- those with the greatest potential impact on the energy and greenhouse savings.

The selection criteria were:

- Newer models: because of their potential to remain on the market for a longer period as compared to older models, except where models have been on the market for 3 years or more without being subjected to testing
- Models with high volumes of sales: because of their greater potential to impact on energy usage as compared to models with low sales volumes
- Models with the highest claims for energy efficiency (e.g. high star ratings8): because of the market's higher expectations with respect to the performance of these models as compared to models with low ratings
- Suppliers with a record of check testing non-compliance: because of the likelihood of a continuation of such historical trends
- Models with complaints received from third parties: (competitors, consumers, consumer groups, regulatory agencies, etc.)
- New brands: to the (Australian) market.

With the forthcoming introduction of GEMS it was considered appropriate to review the suitability of the existing selection criteria for the new compliance and enforcement capacities contained in the new legislation.

New E3 Programme under GEMS legislation

With the newer GEMS legislation the process of selecting products for testing has been changed to ensure that there is a spread of testing across all equipment types regulated under the E3 Program. A scoring system has been implemented using the range of selection criteria to identify and rank products that pose the greatest risk to the program. The use of the scoring system is also intended to help improve transparency and disclosure surrounding the use of selection criteria.

While confidentiality continues while investigations are conducted, a more open scheme including public reporting in several forms is a feature of the revised process. This more open system is achieved by documenting reasons for product selection which will be available to suppliers and eventually third-parties. This greater disclosure is intended to permit better analysis by E3 and third parties to determine if the selection process is indeed delivering benefits.

This move to more openness in reporting on equipment selection takes the form of recording the decisions for choosing specific models for testing using the revised criteria. It also takes the form of historical reviews to assess whether the selection criteria, as applied, have delivered a cost-effective check testing regime. The historical reviews assess if the selection criteria continue to focus attention on the areas of most compliance risk to the Program.

The E3 Program applies three key objectives for the revised selection criteria:

- to identify products with a higher than average risk of failure to meet minimum efficiency requirements or energy performance claims by responding to market intelligence
- to identify products which have the greatest potential impact on the energy and greenhouse savings
- to cover each category of appliance and equipment products regulated under the programme.

These objectives were further developed to create selection criteria that pinpoint the individual models for testing to best respond to external intelligence & complaint, risk- based and program-wide selection criteria. The following eleven criteria were developed to assess the need of checking particular models using a weighing system:

- Criteria to identify products with a higher risk of not meeting performance claims, reacting to market intelligence: there are a number of reliable sources of market intelligence that highlight potential non-compliance. These include competitor complaints, intelligence from overseas testing programs and intelligence from consumer groups and individuals:

– complaints from competitors: competitors are well placed to identify non-compliant products and have a commercial interest as well as public interest in bringing this to the attention of regulators. As a result, many energy efficiency programs overseas place considerable reliance upon intelligence provided by market suppliers. Regulatory Agencies, however, must critically assess these competitor complaints to avoid accepting claims with malicious intent or made with little or no substantiation. Therefore, the E3 Committee seeks to strike a reasonable balance between encouraging competitor complaint and requiring some independent substantiation of those complaints. The selection criteria weight the information against the following hierarchy:

→ competitor complaint with evidence supplied that is compelling and free from any suggestion of tampering, where there is willingness to supply a test report from a NATA accredited laboratory and the tested unit to DCCEE as evidence

→ competitor complaint with evidence that goes to establish non-compliance but is from in-house sources or could be questioned on the basis of competitive bias

→ complaint which might be considered expressing a suspicion of non-compliance but without supporting evidence.

The weighting for this criterion is between 5 and 25 points depending on the quality and source of the information.

– Intelligence from overseas testing programs: many of the product categories regulated under the E3 Program are also subject to verification testing by energy efficiency regulators and program managers overseas. It is reasonable to assume that products which have failed to meet the performance criteria in an overseas market may also fail to meet Australian requirements and therefore should be targeted for testing. This intelligence could take the form of detailed test results on particular models that may be sold locally or timely reporting on suppliers under scrutiny in markets where the brand is traded in Australia or New Zealand. The explicit addition of this criterion would be useful in itself as a deterrent. It reinforces the linkages between regulators in Australia and their overseas equivalents in the minds of multi-national suppliers. It would also help legitimise the developing exchange of information between regulatory agencies involved in standards and labelling programs.

The weighting for this criterion is between 5 and 25 depending on the quality of the information.

- Criteria to identify products which have the greatest potential to impact on the energy and greenhouse savings: to target testing products where non-compliance places enhanced risk of failing to meet the energy and greenhouse targets claimed as a result of regulating the equipment type.

— Models with a high market share: in many product categories there are a relatively small number of products that account for a large proportion of the annual sales and are therefore responsible for a high level of energy consumption. As a result, ensuring that the best-selling models within a product category meet energy and performance requirements is important in order to safeguard the overall expected energy and greenhouse emission savings. Where it is not possible to determine the market share of newer product models, for example where sales data is not yet available for that particular model, the use of past sales data for similar models or other independent market data should be used to inform the weighting of this criterion.

This criterion is given a weighting of between 0 and 15.

— Product categories with the highest greenhouse gas emissions: there is considerable variation in the expected energy savings from regulations on different product categories. As a result, the impact of non-compliant models that represent a high market share in those categories responsible for a large proportion of savings will be greater than for equivalent models in categories with lower greenhouse savings estimates. This suggests that greater emphasis should be placed on product categories with the highest savings estimates, particularly where these categories haven't been covered in testing recently, with a focus on products with the largest market share.

The E3 Committee give a weighting for this criterion of 5 for products which have a cumulative impact of greater than 10.000 ktCO2 below BAU by 2030 and 0 for products below that number.

— Past history criteria: criteria that identify products sold by companies deemed to have a higher probability of failure, based on previous experience. These criteria are used in a simple system prioritising:

→ brands with a history of non-compliance: experience shows that some brands do have an above average level of non-compliance, sometimes in particular product categories and sometimes across several. An examination of the records since check testing commenced shows a number of brands

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which have had two or more registrations cancelled by regulators, indicating that these might be worthwhile targets for future investigation. This criterion is given a weighting of 5.

Models registered by brands for which there is no history within the Program also represent a slightly greater risk of non-compliance since the absence of established compliance gives rise to a presumption that the brand may not have a full understanding of the Program requirements.

This criterion is given a weighting of 5. Brands that have been tested many times and found compliant on numerous occasions will be weighted at -5.

→ Product categories with comparatively higher levels of non-compliance: The proportion of tested products that have failed testing varies considerably by product category, from 41% in the case of air conditioners to 0% for lighting ballasts, distribution transformers and set top boxes. There is no obvious correlation between the length of time that a product has been regulated and compliance rates: regulations have been in force for air conditioners since 2001 and yet non-compliance rates are at 41%, while products such as televisions show better compliance rates even though they have been regulated for a short period of time. This suggests that targeting those product categories with a record of non-compliance should be one of the selection criteria. This would not negate the need to test models from all product categories but would focus testing toward product categories with a more significant failure rate than other categories.

Air conditioners are weighted under this criterion as between 5 and 10 depending on the category, other product types with a failure rate at or above 15% as 5 and products under 15% as 0.

→ Models supported by test laboratories with a past history of failing check tests or without a past history: test laboratory past history or limited history can be a risk factor. The maintenance of high standards by test laboratories underpins the integrity of the E3 Program. Where check testing results indicate a high proportion of failures of models supported by reports from particular test facilities, there is justification to consider that future tests conducted by these laboratories represent an above average risk of failure, especially if they are not in a position to demonstrate remedial action. As the scope of the E3 Program broadens to new products, registrations have been supported by an increasing number of test laboratories. The Australian Government policy is to allow for testing to be undertaken by as wide a range of suppliers and third parties as possible in order to not unduly restrict access, to reduce compliance costs for traded goods and to avoid any capacity limitations of Australian test laboratories. The E3 Program will examine past testing records with a view to establishing a list of test houses with more than 2 failures to be targeted in future check testing.

Australian regulators are not in a position to have full knowledge of the accreditation or ability of all test laboratories to understand and conduct tests according to the requirements of the relevant Australian/New Zealand Standards, particularly those overseas. In order to ensure that laboratories maintain the technical standards of the Program, it is important that laboratories undertaking tests for the first time are checked in a timely fashion. As the risk of problems is unknown for test houses previously untried under the scheme, the risk analysis should be weighted toward facilities with a poor history or without any history of involvement in the Australian or country-of-origin energy efficiency programmes.

Therefore, products registered with test reports from test houses:

- with no history are weighted at 10;

- where a subsequent check test has resulted in a failure at 5; and where subsequent check tests have resulted in multiple failures at 10.

→ New product categories; testing products in newly added product categories serves the highly beneficial function of demonstrating to new industries that compliance is taken seriously and applies to everyone

This would weight newly regulated products (less than 5 years) somewhere between 0-10 with products regulated for longer than 5 years awarded 0.

- Ensuring full coverage of all regulated equipment types: in Australia there are more than 20 categories of regulated products and the largest number of check tests has been conducted on the products that have been regulated for the longest period. This relationship between the length of time a product has been regulated and the number of check-tests completed is not necessarily consistent. There are some product categories where little or no testing has been undertaken. In these cases, insufficient data exists to quantify the risk of non- compliance for that product type which in itself is a risk to the E3 Program. To meet the overall quality assurance aims of the testing program it is important that samples from all regulated product categories are tested. In order to ensure a more even spread of product testing and taking account of financial and resource constraints, the E3 will focus testing on particular product types in each financial year in a cyclic approach, ensuring all products are identified as a priority item at times when they may represent a greater risk.

The described criteria are listed in Table 1 along with their relevant weight. Models are selected for testing against the criteria: products scored at 25 or above will be recommended for check testing, products scored <25 will not be tested, unless there are special circumstances. This minimum threshold may be adjusted on review of the process and with experience. Any future change to the scoring thresholds will be communicated to stakeholders.

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Table A1: Criteria applied for the selection of products for verification testing in Australia

Criteria	Products with a high risk of failure	Products which have the greatest potential impact
1a. Complaints from competitors 1b. Intelligence from consumer groups and individuals 1c. Intelligence from overseas testing programs		
– Supported by independent evidence – Supported by non-independent evidence – Without evidence	25 10 5	
2. Models with a high market share		0-15
3. Brands with a history of non-compliance	5	
4. Product categories with the highest greenhouse gas emissions		0-5
5. New Brands or brands with limited exposure to the Program	5	
6. Brands with a history of passing check testing	-5	
7. Product categories with comparatively high levels of non-compliance	0-10	
8. Models supported by test laboratories with a past history of failing check tests	5-10	
10. Models supported by test laboratories without a past history	10	
11. New product categories. Less than 5 years = 0-10/ longer than 5 years = 0	0-10	

The intention is that this selection process is as transparent as possible. Staff involved in selecting products record the reasons why individual products were selected and make those decisions available to the supplier upon request. This information may also be released in the form of an entry on a publicly accessible register. The information may also be aggregated and used to evaluate the criteria and the selection process.

The criteria are not intended to find models which achieve the highest possible rating but are about requiring staff selecting products for verification testing to undertake a transparent process with sound justification for selecting the models tested. The numerical weighting for each criterion provides an indication of its relative importance in the overall selection process.

Selection criteria practice in the USA

The US energy efficiency legislation is based on three different programmes: minimum efficiency and functional performance requirements set at Federal as well as at the State levels and two labelling programmes: the voluntary ENERGY STAR and the mandatory Energy Guide. Each programme has is own market surveillance Authority and rules.

Surveillance of the ENERGY STAR

ENERGY STAR® is a joint program of the U.S. Department of Energy (DoE) and the U.S. Environmental Protection Agency (EPA). The program has a dual focus on energy and cost savings.

In 2010, DoE launched a pilot program to verify the energy efficiency and water-use characteristics of selected ENERGY STAR products through laboratory testing. The pilot verification program helped ensure that ENERGY STAR products deliver the efficient use of energy and water that consumers expect, while minimizing costs and inconvenience to product manufacturers. DoE is continuing this effort, leveraging experience gained from the pilot program and expanding it to several new product types.

In 2011, EPA launched new requirements for qualifying products as ENERGY STAR. Program partners are now required to have models third-party certified by an EPA-recognized Certification Body (CB) to the ENERGY STAR specifications, based on test data provided by an EPA-recognized laboratory. In addition to certifying products as ENERGY STAR, the Certification Body verifies that a certain percentage of basic models[5] it has certified continue to meet the ENERGY STAR requirements through verification testing on an annual basis.

As consequence, both Certification Bodies and DoE conduct verification testing on ENERGY STAR products.

The Department of Energy approach

DoE manages the ENERGY STAR verification testing program for DoE covered products. Program management includes:

- determining ENERGY STAR product types to test
- selecting ENERGY STAR models for verification testing based on specific programmatic criteria
- securing testing services using third-party test laboratories having the appropriate capabilities and accreditations

[5] basic model means "all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency" (10 FR 430;2)

- procuring all ENERGY STAR models selected for verification testing
- developing and maintaining test report templates
- monitoring test laboratories to ensure adherence to prescribed test procedures and established quality assurance/quality control programs
- approving laboratory test reports
- comparing test results to relevant ENERGY STAR requirements, DOE energy conservation standards and DOE certification requirements;
- notifying the Manufacturer if a model does not meet ENERGY STAR specifications;
- notifying EPA if test results indicate that a product is not in compliance with ENERGY STAR specifications
- notifying the Federal Trade Commission (FTC) if test results indicate that a model is not appropriately rated or labelled
- arranging for re-use or disposal of products after testing.

Model selection criteria include, but are not limited to:

- date of the product listed on ENERGY STAR website, with preference given to newest products
- history of manufacturer not meeting ENERGY STAR specifications
- ratings much higher than ENERGY STAR specification, preferentially selected because market expectations are higher
- product class experience: emphasis on product classes in which previous models were found not to meet ENERGY STAR specifications
- new technology
- products that have requested a waiver from the DoE scheme
- credible information on a specific product's performance from a third party.

DoE or a DoE representative will be responsible for obtaining samples for testing. Units for verification testing will be obtained from retail.

As already said, in 2010, DoE launched a Pilot Program to verify the energy efficiency and water-use characteristics of selected products through laboratory testing. The results helped to identify several issues with product selection and procurement that were remedied in the revised verification program process:

- lack of information regarding manufacturer's basic model9 identification caused difficulty in selecting individual models and may have led to multiple models within the same basic model being tested. DoE has recently published revised certification reporting requirements for products covered by Federal energy conservation standards. Following the compliance date for these requirements, which varies by product, DoE will have access to manufacturer-supplied basic models for all ENERGY STAR products that are also covered by the Department under its Energy Conservation Standards Program. This information, cross-referenced with the ENERGY STAR database, should provide sufficient information to identify ENERGY STAR qualified basic models and their derivative models and prevent the Department from conducting testing of multiple models within a single basic model;

- once models were identified, procurement was often difficult because models were no longer available for sale on the market: the Department will target products that have more recently entered the market, based on certification dates provided to the Department as part of the certification reporting outlined above;

- statistical deficiencies inherent in procuring multiple units of the same model from one vendor: the Department has specified that units should be purchased from multiple vendors, where possible.

The Energy Star Certification Body approach

Among conditions and criteria for recognition of Certification Bodies for the ENERGY STAR Program detailed specifications relate to the verification testing. The CB shall operate an ENERGY STAR partner-funded verification testing procedure that fulfils the verification testing requirements as follows:

(1) ensure products meet all product performance parameters as described in the relevant ENERGY STAR product specification;

(2) number of products:

a) annually test at least 10% of all ENERGY STAR qualified models the CB has certified or for which it has received qualified product data

b) in the case of ENERGY STAR specifications that address multiple product types, the CB will annually test at least 10% of each type

c) when determining the number of models subject to verification testing, the CB shall consider product families as defined in the relevant product specification, and in consultation with EPA

d) in the event of significant product failures, EPA may advise the CB to increase the number of models tested in subsequent years. The minimum number of products tested may differ by product category;

(3) products shall be selected by the CB according to the following general guidelines:

a) the CB shall select models for verification testing from the ENERGY STAR qualified models the CB has certified

b) approximately 50% of models to be tested shall be randomly selected; although the more recently a model has undergone verification or challenge testing the less likely it should be selected in this random selection process; and

c) the remaining models shall comprise referrals from EPA as provided, and models selected in consideration of the following factors:

(i) product classes from ENERGY STAR partners for which previous models failed verification testing

(ii) referrals from third parties such as consumers, consumer groups or regulatory agencies regarding the accuracy of ratings; and

(iii) models with high sales volumes if this data is available to the CB.

Surveillance of the Federal Efficiency Requirements

During 2011 the new provision about market surveillance set in the Final rule “Energy Conservation Program: Certification, Compliance, and Enforcement for Consumer Products and Commercial and Industrial Equipment, entered into force.

The publication of the new Federal rule revised the U.S. Department of Energy existing certification, compliance, and enforcement regulations for certain consumer products and commercial and industrial equipment covered under the Energy Policy and Conservation Act of 1975, as amended.

These regulations provide for sampling plans used in determining compliance with existing standards, manufacturer submission of compliance statements and certification reports to DoE, maintenance of compliance records by manufacturers, and the availability of enforcement actions for improper certification or noncompliance with an applicable standard. Ultimately, the provisions being adopted in this final rule will allow DoE to enforce systematically the applicable energy and water conservation standards for covered products and covered equipment and provide for more accurate, comprehensive information about the energy and water use characteristics of products sold in the United States.

The main modifications introduced in the current rule are:

- removing the current provision requiring DoE to receive a written complaint before it can perform enforcement testing
- allowing the Department to select units from retail, distribution or manufacturer sources, to ensure enforcement test results that are as unbiased, accurate and representative as possible

- recognising that the current regulatory approach, involving DoE selected units and third party testing, may be impracticable for low-volume, custom built products or where adequate laboratory facilities are unavailable;

→ an alternative approach is allowed in such exceptional cases: DoE witnessed testing at the manufacturer's lab and/or reduced sample sizes, to permit effective enforcement testing without imposing unreasonable burdens on manufacturers.

References

[1] 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*.

[2] Christiansen, C., Weiss, I., Jezdinsky, T., Waide, P., & Ruiz Fuente, N., "New Methodologies for Effective Market Surveillance of Large Fans with the INTAS Project", submitted to Fan 2018.

[3] COMMISSION REGULATION (EU) No 2282/2016 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*.

List of abbreviations

ADCO – Administrative Co-operation Working Group

BOM – Bill of Materials

CAB – Conformity Assessment Body

DNO – Distribution Network Operator

EEA – European Economic Area

EMS – Environmental Management System

EPC – Engineering/Electrical Performance Contractor

EU – European Union

FAT – Factory Acceptance Test

ILAC – International Laboratory Accreditation Cooperation

LPT – Large Power Transformer

MS – Member State

MSA – Market Surveillance Authority

MV&E – Monitoring Verification & Enforcement

NDA – Non Disclosure Agreement

QA – Quality Assurance

TNO – Transmission Network Operator

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about the INTAS project activities
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