Deliverable 3.6:

Best practice and experiences of both MSAs and industry regarding testing of fans

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About the INTAS project

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

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Executive Summary

This report considers best practice and experiences of both MSAs and industry regarding conformity verification of large fans. Specifically, it presents the Ecodesign requirements pertaining to large fans and discusses factors relevant to their conformity verification and related market surveillance. It sets out the conformity assessment requirements, the legal framework that governs market surveillance, the different ways authorised market surveillance authorities (MSAs) can conduct conformity verification market surveillance and summarises their experiences to date with regard to large fans.

It also describes the business practices employed in the procurement, production, approval, supply and installation of large fans that have a bearing on the viability of different market surveillance approaches and analyses the implications of these factors on the prospective approaches that MSAs may opt to use to conduct conformity verification.

It is found that the standard Ecodesign market surveillance conformity verification approach based on selecting a product for 3rd party verification testing is not very well adapted to large fans because:

- Large fans are customised made-to-order products that are procured under private B2B commercial arrangements and hence they are not produced in series, are not ordinarily available at a manufacturers premises for sampling, and are not advertised – which means that MSAs cannot employ usual market research methods to establish whether a product is placed on the market or not, and to sample and test the product

- even when it is established that a product is placed on the market, conducting 3rd party testing once a product has left the factory premises is costly to conduct and is liable to be disruptive and costly (mostly due to the delay it would cause in finalising the larger project the fan is a part of, but also in terms of lost operational value) to the business who has procured the product.

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

- the difficulty of an MSA knowing that a product order has been placed and hence being able to request a witness test

- the fact that MSAs may not have the authority to insist on being present and to impose conditions on the FATs (critically the current Regulation 327/2011 has no provisions mandating this activity, unlike the equivalent regulation No 548/2014 for power transformers)

- the fact that FATs are only currently requested for some products by clients

- challenges MSAs face in securing expert 3rd party technical assistance to conduct this form of conformity verification

- the potential for manipulation of test results by manufacturers

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- possible limits on the legal powers that can be exercised in the event an MSA rejects a product following a witness test.

Prospective alternative approaches including 3rd party testing prior to commissioning (i.e. putting into service on site), in situ testing and conformity verification of environmental management systems were also considered but are found to be unviable as a means for making a final compliance determination; they, could however, be used to establish non-conformity risk as a prelude to 3rd party testing or to alert industrial fan clients to potential non-conformity risk.

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

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

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

- all enterprises likely to procure large fans – including process industries, mining, infrastructure sectors responsible for tunnels and metros, electricity generators, transportation sector, etc.
- the system integration contractors likely to manage projects involving the installation of fans
- the authorities responsible for granting permission to move large loads on the road network

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

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1. Introduction

The material presented in this report aims to simplify and improve relations between national authorities, manufacturers and end users of products. Whilst some Member State authorities have better working knowledge and relations with particular industries, others lack expertise and experience. The activities conducted for this task seek to better inform MSAs and manufacturers about each others' needs and build an understanding of how and when large and medium fans are produced, particularly looking at how customised and unique products are procured and delivered.

Specifically, for manufacturers this task aims to:

- increase understanding of the regulatory process and how they can influence this process
- increase understanding of the formation and application of harmonised standards
- increase understanding of the needs for the MSA and their rights and responsibility to conduct monitoring, verification, and enforcement actions
- increase understanding of the 'level playing field'.

While for MSAs it aims to:

- increase understanding the administrative burden of market surveillance checks on industry and how this can be reduced through agreed upon inspection methods
- increase understanding of the nature of commissioning and purchasing large units, particularly unique and custom-built units
- increase understanding of transportation and logistical issues with large products.

The material it presents was assembled through a process of extensive consultation with both MSAs and businesses involved in the supply of large fans. It also benefited from the experience of project partners, as well as input received from the INTAS national focal points.

As with the INTAS project in general the subject of the investigation is focused on large and medium fans, and especially those products which are customised i.e. are made to order and not as part of a series. The sub-categories based on size are summarized in Figure 1 below.

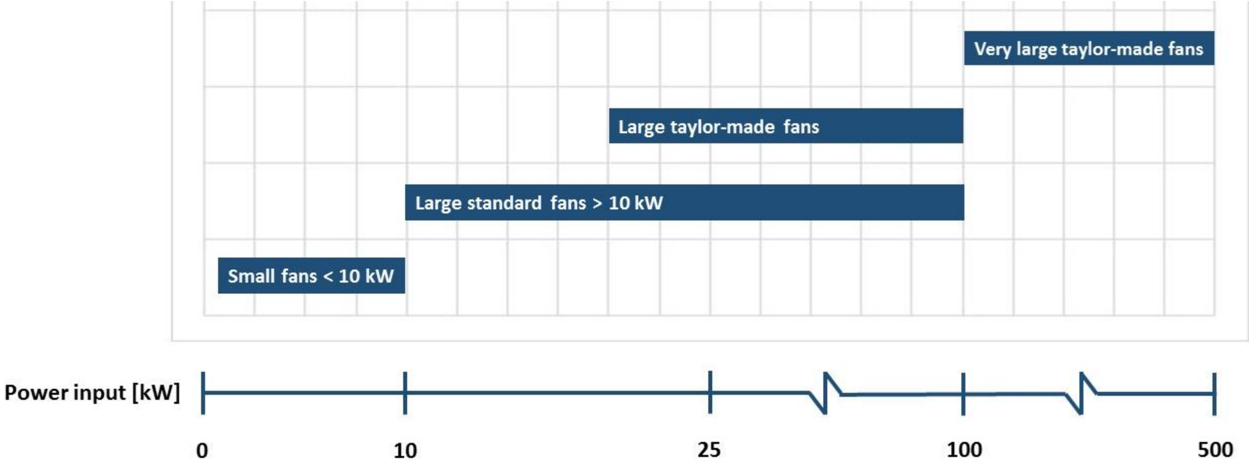

Figure 1. Indicative fan size categories

2. Ecodesign regulatory requirements and standardisation

2.1 New Approach Directives, New Legislative Framework and the Ecodesign Directive

The relationship between standardization and legislation at European level has been developed in accordance with the so-called 'New Approach' to technical harmonization and standards, which was introduced in 1985.

According to the New Approach:

- the European Union adopts legislation (EU Directives) that define essential requirements - in relation to safety and other aspects of public interest - which should be satisfied by products and services being sold in the Single Market

- the European Commission issues standardization requests (Mandates) to the European Standardization Organizations (CEN, CENELEC and ETSI), which are responsible for preparing technical standards and specifications that facilitate compliance with these essential requirements

- public authorities must recognize that all products manufactured (and services provided) in accordance with harmonized standards are presumed to conform to the essential requirements as defined by the relevant EU legislation

- European Standards remain voluntary and there is no legal obligation to apply them. Any producer (or service provider) who chooses not to follow a harmonized standard is obliged to prove that their products (or services) conform to the essential requirements

- around 25% of European Standards published by CEN have been developed in response to standardization requests (Mandates) issued by the European Commission

- business, consumers and other stakeholders benefit from the ongoing cooperation between the European regulatory authorities (i.e. the EU institutions and EFTA) and the European Standardization System, which can be seen as a kind of public-private partnership.

Nonetheless, when businesses make use of harmonized standards, they benefit from a 'presumption of conformity' with the requirements set out in the relevant European legislation. This means that they can sell their products or services throughout the Single Market – reaching a potential 600 million consumers in at least 34 countries. Meanwhile, when European Standards are correctly applied, consumers benefit from safe and environmentally-friendly products and services.

The New Legislative Framework (NLF) was set in 2008 on the basis of the long standing experience of the New Approach to technical harmonisation. NLF is a flexible regulatory framework for the marketing of products that sets essential requirements to be fulfilled in order to meet policy objectives, such as health and safety, and allows manufacturers to decide how the requirements can be technically achieved at product level. The conformity assessment procedure is facilitated through the use of harmonised standards that provide a presumption of conformity to the law for many engineering products. This compliance is declared through the affixing of the CE-marking on the product or its packaging.

The New Legislative Framework consists of a Regulation setting out the requirements for accreditation and market surveillance relating to the marketing of products (765/2008/EC) and a Decision which is used as a cast for all future product harmonisation legislation. This set of rules built on the innovative 'New Approach' in two ways:

Regulation EU 765/2008 improved the legal framework for the services offered by accredited third-party conformity assessment bodies (known as notified bodies), sets the wording of administrative requirements, describes the different conformity assessment modules and specifies what technical documentation is necessary to show the compliance of a product.

Decision 768/2008 EU described in detail the possible modules of conformity assessment and a single set of administrative requirements that products covered by harmonised legislation should comply with. Thereby, manufacturers know that they have to comply with these regardless of the piece of harmonisation legislation that may apply to their products. Such requirements describe which elements can be used for the product's traceability and technical documentation. They also foresee when corrective measures need to be taken or when authorities should be informed.

The manufacturer's self-declaration of conformity under module 'A' for electric equipment and most machines is a cornerstone of European manufacturing's competitiveness at global level. It reduces the cost for placing a product on the EU Internal Market, but more importantly it offers flexibility to manufacturers. Moreover, the alignment of all administrative requirements across EU product legislation simplifies the production lines of manufacturers and helps them to streamline documentation and labelling for each product category.

Finally, the New Legislative Framework should largely facilitate the work of market surveillance authorities as it establishes obligations for all economic operators in the supply chain and sets strict traceability requirements for products.[1]

The Ecodesign Directive is one of a suite of so called "New approach directives" that are all produced in line with the approach described above. Table 1 presents a complete listing of these Directives.

[1] Source: ORGALIME, reworked, see http://www.orgalime.org/page/new-legislative-framework-nlf

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Table 1. New Approach Directives or Regulations and related standards

Reference of directive/regulation	Subject of directive/regulation	Info about directive/regulation	Info on European standards	Harmonised standards cited in the Official Journal
2000/9/EC	Cableway installations	▶	▶	▶
(EC) 1907/2006	Chemical substances (REACH)	▶	▶	▶
89/106/EEC	Construction products (CPD)	▶	▶	▶
(EU) 305/2011	Construction products (CPR)	▶	-	▶
(EC) 1223/2009	Cosmetics	▶	▶	▶
92/42/EEC	Ecodesign – hot-water boilers	▶	▶	▶
2010/30/EU	Ecodesign and energy labelling	▶	-	▶
2009/125/EC	Ecodesign and energy labelling	▶	-	▶
(EC) 1221/2009	Eco-management and audit scheme (EMAS)	▶	-	▶
2014/30/EU	Electromagnetic compatibility (EMC)	▶	-	▶
2014/34/EU	Equipment for explosive atmospheres (ATEX)	▶	-	▶
2014/28/EU	Explosives for civil uses	▶	-	▶
2009/142/EC	Gas appliances (GAD)	▶	▶	▶
2014/28/EU	Inspection of pesticide application equipment	▶	-	▶
2014/33/EU	Lifts	▶	-	▶
2014/35/EU	Low Voltage (LVD)	▶	-	▶
2006/42/EC	Machinery (MD)	▶	▶	▶
2014/32/EU	Measuring instruments (MID)	▶	-	▶
93/42/EEC	Medical devices (MDD)	▶	▶	▶
90/385/EEC	Medical devices: active implantable	▶	▶	▶
98/79/EC	Medical devices: in vitro diagnostic	▶	▶	▶
(EC) 765/2008	New legislative framework (NLF)	▶	-	▶
2014/31/EU	Non-automatic weighing instruments (NAWI)	▶	-	▶
94/62/EC	Packaging and packaging waste	▶	▶	▶
89/686/EEC	Personal protective equipment (PPE)	▶	▶	▶
2014/68/EU	Pressure equipment (PED)	▶	-	▶
2013/29/EU	Pyrotechnic articles	▶	-	▶
2014/53/EU	Radio and telecommunications terminal equipment (RTTE)	▶	-	▶

Reference of directive/regulation	Subject of directive/regulation	Info about directive/regulation	Info on European standards	Harmonised standards cited in the Official Journal
2008/57/EC	Rail system: interoperability	▶	▶	▶
2013/53/EU	Recreational craft	▶	-	▶

2011/65/EU	Restriction of the use of certain hazardous substances (RoHS)	▶	-	▶
2014/29/EU	Simple Pressure Vessels	▶	-	▶
2009/48/EC	Toys safety	▶	▶	▶

How to read the table

Directive number	▶	texts of directives and regulations available on the website of the European Union (*)
Information about directive	▶	information on directives and regulations available on the website of the European Commission's Enterprise Directorate-General
Info on European standards	▶	information on standards and standards activities available on the websites of the European Standards Organisations
Harmonised standards cited in the Official Journal	▶	lists of references of harmonised standards published in the Official Journal of the European Union, are available on the website of the European Commission's Entreprise Directorate-General

(*)The text of the corresponding directives are available in all official Community languages at **http://eur-lex.europa.eu** on the EUR-Lex site. For legal purposes, please refer to the texts published in the 'Official Journal of the European Union'. Only European Union legislation published in the paper editions of the Official Journal is deemed authentic.
Source: www.newapproach.org/directives/directiveList.asp

2.1.1 Ecodesign of Energy Related Products Directive

The Ecodesign Directive 2009/125/EC[2] of the European Parliament established a framework for the setting of eco-design requirements for energy-related products. Its goal is to encourage manufacturers to design products with the environmental impacts in mind throughout their entire life cycle. Published in the Official Journal of the European Union (L 285 31.10.2009), this framework directive defines the principles, conditions and criteria for setting environmental requirements for energy-related appliances. The Directive also sets out the process and governance by which Ecodesign measures of either a mandatory or voluntary nature can be established for energy-related products within the EU.

The production, distribution, use and end-of-life management of consumer products and commercial equipment is associated with a number of environmental impacts. However, it is estimated that on average over 80% of all product-related environmental impacts are determined during the design phase of a product. Taking this into consideration, the Ecodesign Directive aims to improve the environmental performance of products throughout their full life-cycle by systematically considering environmental aspects early in the product design phase.

Ecodesign requirements are established under the Directive through a set of implementing measures which are published as product specific regulations or as negotiated voluntary agreements with industry. The measures set minimum requirements that aim to reduce the environmental impact of products, including the energy consumption throughout their entire life cycle. The Ecodesign measures help to remove the worst performing products from the market and hence provide market "push".

This is complemented by energy labelling and eco-labels that provide information on the relative energy and environmental performance of products and hence provide market "pull". Collectively, the Ecodesign and labelling

[2] DIRECTIVE 2009/125/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (recast)

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policies work to create a continuous market transformation effect towards products with lower energy and environmental impacts. Additional the EU and individual EU Member States also deploy policy instruments to encourage green public procurement, raise user awareness of how to save energy and provide incentives for lower energy and environmental impact behaviour. Collectively these policies constitute a so called integrated product policy (IPP) which the Commission intends will accelerate the market shift toward improving the environmental performance of products and appliances.

Ecodesign implementing measures are not set for all energy-related products. Rather, they are established in the cases where there is a significant volume of trade within the EU's internal market, the product has a substantial environmental impact and there is a clear improvement potential. In the case of energy performance the guiding principle applied in the Ecodesign Directive is that minimum requirements should be set at the energy performance level which results in the least life cycle cost to the average EU end-user over the product lifecycle. Ecodesign differs from the minimum energy performance standards or Top Runner requirements set in many other economies as it is not confined acting upon energy consumption in the use phase. Instead it also encompasses energy in the production stage and all environmental impacts of products. Ecodesign implementing measures may therefore set requirements addressing many other environmental factors than just the energy in use phase, albeit that this is often the most important and the greatest focus of regulatory effort.

Implementing measures that establish mandatory minimum performance requirements are considered when no valid self-regulatory initiative has been taken by industry. Self-regulation by industry, including voluntary and unilateral commitments, may produce quick progress, due to rapid and cost-effective implementation, and allows flexible and appropriate adaptation to technological solutions and market sensitivities. Thus, when appropriate criteria have been met the Commission has been willing to accept a negotiated agreement with industry in place of establishing a mandatory regulation.

The priority products to be considered for implementing measures under the Directive are put forward in a series of Working Plans.

The different stages in the process of developing Ecodesign and energy labelling implementing measures are summarised in Figure 2.

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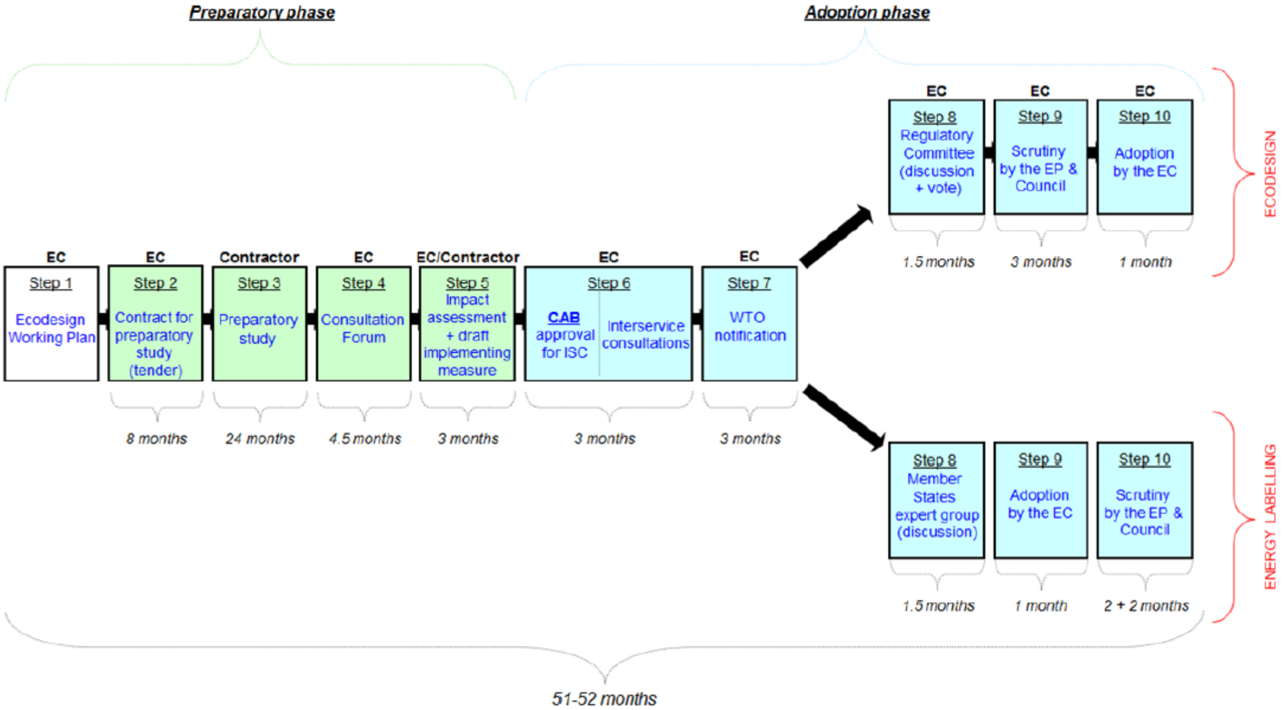

Figure 2. Diagram showing stages and timescales for Ecodesign and energy labelling regulations (source: http://www.energylabelevaluation.eu/eu/home/welcome)

Each implementing measure is preceded by a preparatory study and an impact assessment conducted by external experts and the Commission with the aim of identifying cost-effective solutions to improve the overall environmental performance of products and incorporates participatory and delegated decision-making processes. Implementing measures are eventually adopted by the Commission under the regulatory procedure with scrutiny, meaning the European Parliament and Council have veto authority.

Methodology for Ecodesign of Energy-related Products

The aim of the underlying Methodology study for Ecodesign of Energy-related Products (MEErP)[3] is to evaluate whether and to which extent various energy-related products fulfil certain criteria that make them eligible for implementing measures under the Ecodesign Directive (2009/125/EC). These criteria are specified in Article 15 and Annexes I and II of the Directive. The Commission is required, when preparing a draft implementing measure, to conduct a series of analyses and assessments referred to as a “preparatory study”.

The generic process flow diagram depicted in Figure 2 shows the various tasks which are conducted over a timeline of approximately two years. The analytical teams conducting the research on these products and equipment may modify the task structure slightly, as appropriate for products and their respective stakeholder groups.

[3] Methodology for Ecodesign of Energy-related Products, MEErP 2011, Methodology Report; COWI Belgium sprl -in association with- Van Holsteijn en Kemna B.V. (VHK), Brussels/Delft, November 2011.

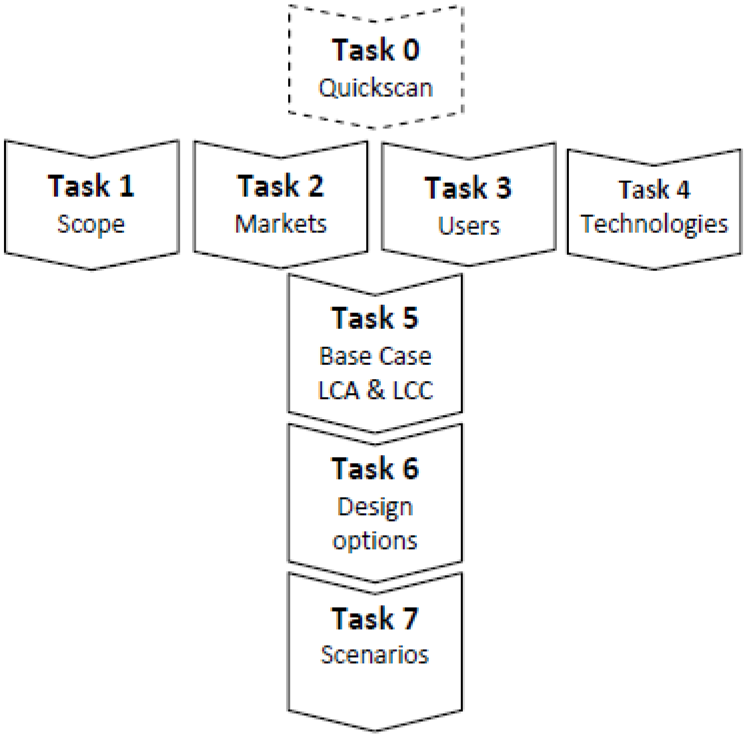

Figure 3. Methodology flow diagram for analysis of products under the Ecodesign Directive

Task 0 is an optional step that may be conducted on large or diverse product groups, where it would be advantageous to conduct a first product screening, considering environmental impacts and potential for improvement of those products following Article 15 of the Ecodesign Directive. The purpose of Task 0 is to re-group or narrow the scope, to enable the subsequent analysis to be manageable.

Task 1 discusses the scope of the product being considered, including the product category and system boundaries. This task includes a review of any implementing legislation or measures that may apply to the product, including both the EU and any pre-existing national legislation in the Member States. The task also looks at the test standards and metrics used for measuring performance. Finally, it provides a brief review of the international context, looking at measures that may have been adopted on the same product or equipment in other economies.

Task 2 focuses on quantifying the European market for the product, including the total EU industry and trade. The task seeks to provide insight into the latest trends in the market, including any product design innovations that are being implemented. The task also seeks to provide a set of baseline prices and cost-related information that can be used in subsequent analyses such as the life-cycle cost assessment. The analyst team will use both data from the EU's PRODCOM database for more generic trade and production data that are consistent with official statistics, as well as specialist market data sources to generate sales and stock data from industry sources.

Task 3 looks at how the product is used, to try and identify any barriers or restrictions that may prevent Ecodesign measures from being applied due to social, cultural or other factors. This task also seeks to quantify the typical and important end-user parameters that influence the environmental impacts over the life of the product which can be different from the quantification of the test standards in Task 1.

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Task 4 involves conducting a general analysis of products currently on the European market and provide general input for the base-case (Task 5) and potential improvement options (Task 6). This task takes into consideration the full range of reporting, from current products through to best available technology (BAT) and best not yet available technology (BNAT).

Task 5 seeks to establish a representative category that is considered the “base-case” for the whole European market. This base-case becomes the reference against which the environmental and economic analyses will be conducted in subsequent parts of the study. The base-case is an abstraction of reality, and is limited to one case for practical reasons. The base-case is derived from the synthesis of the information gathered through Tasks 1 to 4, and becomes the baseline against which Task 6 (improvement potential) and Task 7 (policy, scenario and impact analysis) are applied.

Task 6 considers the design options that can be applied to reduce environmental impacts, and the associated cost implications. The assessment of these options is carried out through a life-cycle cost assessment, to determine whether the design options may have a positive or negative impact on the cost of ownership. This cost takes into account the purchase and running cost, and disposal costs, if applicable. The minimum life-cycle cost option is the target value, and the Best Available Technology (BAT) represents a medium-term target level. The Best Not Available Technology (BNAT) offers a long-term potential level, i.e. is an assessment of the performance that could be expected by advanced future technologies that are not yet commercialised but are conceptually viable, and helps to define the full range of measures that could be considered.

Task 7, the final part of the preparatory study, summarises and considers the outcomes of all previous tasks, looking at appropriate policy measures for the product or equipment. This task prepares scenarios that quantify the improvements that can be achieved against a business-as-usual scenario and compares the outcomes in the context of European environmental targets, including CO2 emissions reductions. This Task considers the impact on consumers (first cost) and industry (increased costs, employment, profitability, competitiveness) as discussed in Annex II of the Ecodesign Directive. Finally, this task includes a sensitivity analysis which is applied to the primary parameters it uses to study the robustness of the results, varying some of those key inputs.

In following the MEErP methodology, there is a distinction drawn between Tasks 1 through 4, which are primarily about data retrieval and the initial analysis and Tasks 5 through 7 which are more about modelling and developing policy options for consideration. Ideally, after reading Tasks 1 through 4, policy makers and stakeholders should have enough understanding to discuss the issues and have an understanding of any issues or constraints. Tasks 5 through 7 provide analysis of which requirements could be established for Ecodesign. This is the first step in the process of considering Ecodesign measures for products.

Throughout the preparatory study stakeholders are asked to contribute data and opinions to make the results more robust and fit for purpose. Draft reports of the different tasks are generally published on a dedicated product-specific web site. The studies generally include two or three stakeholder meetings, open to all, to present results and gather feedback.

Following the publication of the preparatory study report, the Commission prepares a first draft of the implementing measure which is called a “working document”. In conjunction with the working document, the Commission prepares an Impact Assessment which is primarily an internal document but is published at the end of the process with the final implementing measure (if one is adopted). The working document undergoes review and comment through bilateral

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stakeholder consultations and in one or more Consultation Forum meetings. The Consultation Forum[4] is a group of experts consisting of business organisations, environmental protection groups and consumer organisations and Member State representatives.

Implementing measures are ultimately approved by Cabinet through an Inter Service Consultation and are voted on by the Ecodesign Regulatory Committee, made up of representatives from the Member States. Finally, they undergo approval by the European Parliament and Council, and are published in the Official Journal of the European Union (OJEU).

2.1.2 Ecodesign Directive requirements on Member States

The Ecodesign Directive contains a range of different requirements and instructions for Member States, manufacturers and other stakeholders involved in the process. Table 2 presents the requirements placed on Member States associated with market surveillance and penalties within the Ecodesign Directive.

Table 2. Select requirements on Member States specified in the Ecodesign Directive

Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of Ecodesign requirements for energy-related products	
Article 3	Placing on the market and/or putting into service 1. Member States shall take all appropriate measures to ensure that products covered by implementing measures may be placed on the market and/or put into service only if they comply with those measures and bear the CE marking in accordance with Article 5. 2. Member States shall designate the authorities responsible for market surveillance. They shall arrange for such authorities to have and use the necessary powers to take the appropriate measures incumbent upon them under this Directive. Member States shall define the tasks, powers and organisational arrangements of the competent authorities which shall be entitled to: (a) organise appropriate checks on product compliance, on an adequate scale, and oblige the manufacturer or its authorised representative to recall non-compliant products from the market in accordance with Article 7; (b) require the parties concerned to provide all necessary information, as specified in the implementing measures; (c) take samples of products and subject them to compliance checks. 3. Member States shall keep the Commission informed about the results of the market surveillance, and where appropriate, the Commission shall pass on such information to the other Member States. 4. Member States shall ensure that consumers and other interested parties are given an opportunity to submit observations on product compliance to the competent authorities.
Article 20	Penalties The Member States shall lay down the rules applicable to infringements of the national provisions adopted pursuant to this Directive and shall take all measures necessary to ensure that they are implemented. The penalties provided for shall be effective, proportionate and dissuasive, taking into account the extent of non-compliance and the number of units of non-complying products placed on the Community market. The Member States shall notify those provisions to the Commission by 20 November 2010 and shall notify it without delay of any subsequent amendment affecting them.

[4] See http://ec.europa.eu/energy/efficiency/ecodesign/forum_en.htm

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Collectively the first two sections of Article 3 place an obligation on Member States to develop and mandate a body responsible for product energy efficiency market surveillance and compliance and for that body to carry out compliance testing of a sample of products on the market. The size and frequency of the sample to be tested is left open to the Member State authorities to determine although the provisions in Article 3(1) imply that these should be sufficient to ensure that products placed on the market do comply with EU energy efficiency regulations.

Article 3(3) requires that Member States communicate with the Commission about the work they're conducting on market surveillance and Article 3(4) directs Member States to provide a mechanism by which consumers and other interested parties are able to provide their observations on product compliance to the designated competent authority in that Member State.

Article 20 of the Directive places an obligation on each Member State to establish the procedures and penalties to be followed in the event of non-compliance. While the nature of these is left open for the Member States to determine the Directive requires that the penalty shall be "effective, proportionate and dissuasive" and takes into account the degree of compliance observed in the market.

2.1.3 Conformity assessment under Ecodesign

Article 8 of the Ecodesign Directive specifies the following requirements with regard to conformity assessment:

> 1. Before placing a product covered by implementing measures on the market and/or putting such a product into service, the manufacturer or its authorised representative shall ensure that an assessment of the product's conformity with all the relevant requirements of the applicable implementing measure is carried out.
>
> 2. The conformity assessment procedures shall be specified by the implementing measures and shall leave to manufacturers the choice between the internal design control set out in Annex IV *(see below)* to this Directive and the management system set out in Annex V *(see below)* to this Directive. Where duly justified and proportionate to the risk, the conformity assessment procedure shall be specified among relevant modules as described in Annex II to Decision No 768/2008/EC[5].
>
> Where a Member State has strong indications of probable non-compliance of a product, that Member State shall as soon as possible publish a substantiated assessment of the product's compliance which may be conducted by a competent body in order to allow, if appropriate, for timely corrective action.
>
> Where a product covered by implementing measures is designed by an organisation registered in accordance with Regulation (EC) No 761/2001 of the European Parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) (1) and the design function is included within the scope of that registration, the management system of that organisation shall be presumed to comply with the requirements of Annex V to this Directive.
>
> If a product covered by implementing measures is designed by an organisation having a management system which includes the product design function and which is implemented in accordance with harmonised

[5] DECISION No 768/2008/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC

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standards, the reference numbers of which have been published in the Official Journal of the European Union, that management system shall be presumed to comply with the corresponding requirements of Annex V.

3. After placing a product covered by implementing measures on the market and/or putting it into service, the manufacturer or its authorised representative shall keep relevant documents relating to the conformity assessment performed and declarations of conformity issued available for inspection by Member States for a period of 10 years after the last of that product has been manufactured.

The relevant documents shall be made available within 10 days of receipt of a request by the competent authority of a Member State.

4. Documents relating to the conformity assessment and the EC declaration of conformity referred to in Article 5 shall be drawn up in one of the official languages of the institutions of the European Union.

Annex IV

Internal design control

(referred to in Article 8(2))

1. This Annex describes the procedure whereby the manufacturer or its authorised representative who carries out the obligations laid down in point 2 ensures and declares that the product satisfies the relevant requirements of the applicable implementing measure. The EC declaration of conformity may cover one or more products and must be kept by the manufacturer.

2. A technical documentation file making possible an assessment of the conformity of the product with the requirements of the applicable implementing measure must be compiled by the manufacturer.

The documentation must contain, in particular:

(a) a general description of the product and of its intended use;

(b) the results of relevant environmental assessment studies carried out by the manufacturer, and/or references to environmental assessment literature or case studies, which are used by the manufacturer in evaluating, documenting and determining product design solutions;

(c) the ecological profile, where required by the implementing measure;

(d) elements of the product design specification relating to environmental design aspects of the product;

(e) a list of the appropriate standards referred to in Article 10, applied in full or in part, and a description of the solutions adopted to meet the requirements of the applicable implementing measure where the standards referred to in Article 10 have not been applied or where those standards do not cover entirely the requirements of the applicable implementing measure;

(f) a copy of the information concerning the environmental design aspects of the product provided in accordance with the requirements specified in Annex I, Part 2; and

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(g) the results of measurements on the ecodesign requirements carried out, including details of the conformity of these measurements as compared with the ecodesign requirements set out in the applicable implementing measure.

3. The manufacturer must take all measures necessary to ensure that the product is manufactured in compliance with the design specifications referred to in point 2 and with the requirements of the measure which apply to it.

ANNEX V

Management system for assessing conformity

(referred to in Article 8(2))

1. This Annex describes the procedure whereby the manufacturer who satisfies the obligations of point 2 ensures and declares that the product satisfies the requirements of the applicable implementing measure. The EC declaration of conformity may cover one or more products and must be kept by the manufacturer.

2. A management system may be used for the conformity assessment of a product provided that the manufacturer implements the environmental elements specified in point 3.

3. Environmental elements of the management system

This point specifies the elements of a management system and the procedures by which the manufacturer can demonstrate that the product complies with the requirements of the applicable implementing measure.

3.1. The environmental product performance policy

The manufacturer must be able to demonstrate conformity with the requirements of the applicable implementing measure. The manufacturer must also be able to provide a framework for setting and reviewing environmental product performance objectives and indicators with a view to improving the overall environmental product performance.

All the measures adopted by the manufacturer to improve the overall environmental performance of, and to establish the ecological profile of, a product, if required by the implementing measure, through design and manufacturing, must be documented in a systematic and orderly manner in the form of written procedures and instructions.

These procedures and instructions must contain, in particular, an adequate description of:

(a) the list of documents that must be prepared to demonstrate the product's conformity, and, if relevant, that have to be made available;

(b) the environmental product performance objectives and indicators and the organisational structure, responsibilities, powers of the management and the allocation of resources with regard to their implementation and maintenance;

(c) the checks and tests to be carried out after manufacture to verify product performance against environmental performance indicators;

(d) the procedures for controlling the required documentation and ensuring that it is kept up-to-date; and

(e) the method of verifying the implementation and effectiveness of the environmental elements of the management system.

3.2. Planning

The manufacturer must establish and maintain:

(a) procedures for establishing the ecological profile of the product;

(b) environmental product performance objectives and indicators, which consider technological options, taking

into account technical and economic requirements; and

(c) a programme for achieving these objectives.

3.3. Implementation and documentation

3.3.1. The documentation concerning the management system must, in particular, comply with the following:

(a) responsibilities and authorities must be defined and documented in order to ensure effective environmental product performance and reporting on its operation for review and improvement;

(b) documents must be established indicating the design control and verification techniques implemented and processes and systematic measures used when designing the product; and

(c) the manufacturer must establish and maintain information to describe the core environmental elements of the management system and the procedures for controlling all documents required.

3.3.2. The documentation concerning the product must contain, in particular:

(a) a general description of the product and of its intended use;

(b) the results of relevant environmental assessment studies carried out by the manufacturer, and/or references to environmental assessment literature or case studies, which are used by the manufacturer in evaluating, documenting and determining product design solutions;

(c) the ecological profile, where required by the implementing measure;

(d) documents describing the results of measurements on the ecodesign requirements carried out including details of the conformity of these measurements as compared with the ecodesign requirements set out in the applicable implementing measure;

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(e) the manufacturer must establish specifications indicating, in particular, standards which have been applied; where standards referred to in Article 10 are not applied or where they do not cover entirely the requirements of the relevant implementing measure, the means used to ensure compliance; and

(f) copy of the information concerning the environmental design aspects of the product provided in accordance with the requirements specified in Annex I, Part 2.

3.4. Checking and corrective action

3.4.1. The manufacturer must:

(a) take all measures necessary to ensure that the product is manufactured in compliance with its design specification and with the requirements of the implementing measure which applies to it;

(b) establish and maintain procedures to investigate and respond to non-conformity, and implement changes in the documented procedures resulting from corrective action; and

(c) carry out at least every three years a full internal audit of the management system with regard to its environmental elements.

Thus, the Ecodesign Directive establishes that the conformity assessment procedures shall be specified by the implementing measures (e.g. Regulation No 327/2011 in the case of fans – see section 2.2 and Appendix A) and shall leave to manufacturers the choice of conformity pathway between the internal design control set out in Annex IV and the management system set out in Annex V.

2.2 Regulation No 327/2011 on Ecodesign of fans

2.2.1 Regulation No 327/2011

Commission Regulation (EU) No 327/2011 establishes Ecodesign requirements for fans. In the case of medium and large fans these include minimum efficiency requirements and mandatory product information requirements.

The full regulation is presented in Annex A.

2.2.2 Review and revision process

Every Ecodesign regulation stipulates a maximum period within which the regulation much be reviewed and potentially revised in accordance with the overarching process specified in the Directive. In the case of Regulation (EU) No 327/2011 for fans article 7 states:

— The Commission shall review this Regulation no later than 4 years after its entry into force and present the result of this review to the Ecodesign Consultation Forum. The review shall in particular assess the feasibility of reducing the number of fan types in order to reinforce competition on grounds of energy efficiency for fans which can fulfil a comparable function. The review shall also assess whether the scope of exemptions can be reduced, including allowances for dual use fans.

While clause 14 of the preamble states:

— A review of this Regulation is foreseen no later than 4 years after its entry into force. The review process may be initiated earlier if evidence reaches the Commission that warrants this. The review should in particular assess the setting of technology independent requirements, the potential of the use of variable speed drives (VSD) and the necessity of the number and scope of exemptions as well as the inclusion of fans below 125 W electric input power.

A preparatory study to support this review was launched in April 2014 and concluded in March 2015, see http://www.fanreview.eu. This review examined the issues set out above as well as whether, or not, the Tier 2 requirements were still appropriate. The preparatory study was conducted by VHK and included extensive consultation with stakeholders including representatives of the large fan manufacturing sector.

The study revealed numerous problems with the practical implementation of the regulation including:

The fact that there is practically no market surveillance and that the volume-segments of the fan market continue to be invaded by low-cost imports does not really help.

Over the past four years, while the industry was busy transforming large parts of its catalogue to meet the requirements of the regulation, there have been no major developments in the metric underlying that regulation. The 'extended product approach' for part load testing, which is part of several other Ecodesign-regulated products, has hardly been explored by the sector. The change from the geometry based categories to a functional pressure/volume flow approach is still in its infancy. A universal way to work noise requirements into the efficiency metric has not been touched.

In short, the definition of fan categories in test standards is almost the same making it very difficult to 'reduce the number of categories' or 'reduce the scope of the exemptions' as suggested in the review article (Art. 7) of the regulation. Instead, there have been numerous requests by stakeholders to vastly extend the number and nature of exemptions and make important changes with respect to spare parts, nonfinal assembly and the general scope.

Producers of specialty industrial fans, produced in small series or tailor-made, are struggling to meet the minimum requirements and stay within the verification tolerances.

Since the study was completed the Commission developed a Working Document[6] (a draft revised regulation) with an accompanying explanatory document[7]. These were discussed at the Ecodesign Consultation Forum meeting in April 2015. Although not then adopted (i.e. converted into a revised regulation) this Working Document remains active and it is understood that once the standardisation mandate has led to the adoption of a harmonised standard (see section 2.3.3 below) that the topic of revising the regulation will be revisited.

2.2.3 Conformity assessment

The conformity assessment requirements set out in Regulation No 327/2011 leave it open to fan manufacturers whether or not they will opt for the internal design control set out in Annex IV and the management system set out in Annex V of Directive 2009/125/EC.

[6] https://www.eceee.org/static/media/uploads/site-2/ecodesign/products/ventilation-fans/fansreviewdraftwd20150430.docx
[7] https://www.eceee.org/static/media/uploads/site-2/ecodesign/products/ventilation-fans/explnotefanreview20150430.docx

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2.3 Standardisation

2.3.1 Harmonised Standards

All New Approach Directives, such as the Ecodesign Directive, make use of harmonised standards to provide the technical and performance measurement basis for the requirements specified in the Directives.

A harmonised standard is a European standard developed by a recognised European Standards Organisation: CEN, CENELEC, or ETSI. It is created following a request from the European Commission to one of these organisations. Manufacturers, other economic operators, or conformity assessment bodies can use harmonised standards to demonstrate that products, services, or processes comply with relevant EU legislation.

The references of harmonised standards must be published in the Official Journal of the European Union. Details of harmonised standards applying to all New Approach Directives are provided here:

http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/

Details of harmonised standards applying to all the Ecodesign Directive regulations are provided here:

https://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/ecodesign_en

2.3.2 European Standards bodies: CENELEC, CEN and ETSI

The European Union has three pan-European standardization bodies that are the direct corollary of the international standardization bodies: ISO (CEN), IEC (CENELEC) and ITU (ETSI). The mandate of these bodies was expanded in 1991 to facilitate the development of the European Single Market, and standards adopted through them automatically become national standards in EU and EFTA member countries.

European standardization is organized by and for the stakeholders concerned based on national representation (the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC)) and direct participation (the European Telecommunications Standards Institute (ETSI)), and is founded on the principles recognized by the World Trade Organization (WTO) in the field of standardization, namely coherence, transparency, openness, consensus, voluntary application, independence from special interests and efficiency ('the founding principles'). In accordance with the founding principles, it is important that all relevant interested parties, including public authorities and small and medium-sized enterprises (SMEs), are appropriately involved in the national and European standardization process. National standardization bodies should also encourage and facilitate the participation of stakeholders.

European standards play a very important role within the internal market, for instance through the use of harmonized standards in the presumption of conformity of products to be made available on the market with the essential requirements relating to those products laid down in the relevant Union harmonization legislation. Those requirements should be precisely defined in order to avoid misinterpretation on the part of the European standardization organizations.

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Within the Union, national standards are adopted by national standardization bodies which could lead to conflicting standards and technical impediments in the internal market. Therefore, it is necessary for the internal market and for the effectiveness of standardization within the Union to confirm the existing regular exchange of information between the national standardization bodies, the European standardization organizations and the Commission, about their current and future standardization activities as well as the standstill principle applicable to the national standardization bodies within the framework of the European standardization organizations which provides for the withdrawal of national standards after the publication of a new European standard. The national standardization bodies and European standardization organizations should also observe the provisions on exchange of information in Annex 3 to the Agreement on Technical Barriers to Trade.

2.3.3 Regulatory basis for standardisation and representation of societal interests

Certain regulations govern the operation of the European standards bodies and their relationship with the European Commission and the National Standards Bodies. The most recent is: REGULATION (EU) No 1025/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2012 on *European standardization, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council*.

European standardisation bodies are mandated to ensure there is a representation of societal interests and societal stakeholders in European standardization activities. In practice thus refers to the activities of organizations and parties representing interests of greater societal relevance, for instance environmental, consumer interests or employee interests. However, the representation of social interests and social stakeholders in European standardization activities refers particularly to the activities of organizations and parties representing employees and workers' basic rights, for instance trade unions. The obligation of the European standardization organizations to encourage and facilitate representation and effective participation of all relevant stakeholders does not entail any voting rights for these stakeholders unless such voting rights are prescribed by the internal rules of procedure of the European standardization organizations.

In order to speed up the decision-making process, national standardization bodies and European standardization organizations are required to facilitate accessible information on their activities through the promotion of the use of information and communication technologies (ICT) in their respective standardization systems, for example by providing to all relevant stakeholders an easy-to-use online consultation mechanism for the submission of comments on draft standards and by organising virtual meetings, including by means of web conferencing or video conferencing, of technical committees.

Due to the importance of standardization as a tool to support Union legislation and policies and in order to avoid ex-post objections to and modifications of harmonized standards, it is important that public authorities participate in standardization at all stages of the development of those standards where they may be involved and especially in the areas covered by Union harmonization legislation for products.

Standards should take into account environmental impacts throughout the life cycle of products and services. Important and publicly available tools for evaluating such impacts throughout the life cycle have been developed by the Commission's Joint Research Centre (JRC). The JRC is expected to play an active role in the European standardization system.

The viability of the cooperation between the Commission and the European standardization system depends on careful planning of future requests for the development of standards. REGULATION (EU) No 1025/2012 recognises that this could be improved, in particular through the input of interested parties, including national market surveillance authorities, by introducing mechanisms for collecting opinions and facilitating the exchange of information among all interested parties. Since Directive 98/34/EC already provides for the possibility of the European Commission to request the European standardization organizations to develop European standards, it was deemed appropriate to put in place an improved and more transparent planning process within an annual work programme, which should contain an overview of all requests for standards which the Commission intends to submit to European standardization organizations. It was further deemed necessary to ensure a high level of cooperation between the European standardization organizations and the European stakeholder organizations receiving Union financing. This in accordance with the Regulation and the Commission's establishment of its annual Union work programme for standardization.

REGULATION (EU) No 1025/2012 establishes a committee to manage its implementation. Before bringing a matter regarding requests for European standards or European standardization deliverables, or objections to a harmonized standard before this committee, the Commission should consult experts of the Member States, for instance through the involvement of committees set up by the corresponding Union legislation or by other forms of consultation of sectoral experts, where such committees do not exist.

Several directives harmonising the conditions for the marketing of products specify that the Commission may request the adoption, by the European standardization organizations, of harmonized standards on the basis of which conformity with the applicable essential requirements is presumed.

Decision No 1673/2006/EC establishes the rules concerning the contribution of the Union to the financing of European standardization in order to ensure that European standards and other European standardization deliverables are developed and revised in support of the objectives, legislation and policies of the Union. It was deemed appropriate, for the purpose of administrative and budgetary simplification, to incorporate the provisions of that Decision into Regulation 1025/2012 and to use wherever possible the least burdensome procedures.

In order to achieve the main objectives of the Regulation and to facilitate speedy decision-making procedures as well as reducing the overall development time for standards, use should be made as far as possible of the procedural measures provided for in Regulation (EU) No 182/2011, which enables the chair of the relevant committee to lay down a time limit within which the committee should deliver its opinion, according to the urgency of the matter. Moreover, where justified, it should be possible for the opinion of the committee to be obtained by written procedure, and silence on the part of the committee member should be regarded as tacit agreement.

During the preparation of a harmonized standard or after its approval, national standardization bodies shall not take any action which could prejudice the harmonization intended and, in particular, shall not publish in the field in question a new or revised national standard which is not completely in line with an existing harmonized standard. After publication of a new harmonized standard, all conflicting national standards shall be withdrawn within a reasonable deadline.

CEN is the standardisation body responsible for developing performance standards, including harmonised standards, for fans. Details of its mandate and how it functions are presented in Appendix B, while section 2.3.3. indicates the relevant standards for fans.

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2.3.4 European Standards applying to the Ecodesign assessment of fans

The standards that apply to the Ecodesign performance of fans are shown in Table 3. At present no European harmonised standard has been issued for the Ecodesign performance assessment of fans and rather Ecodesign regulation No. 327/2011 relies upon energy performance as specified in ISO 12759:2010 - *Fans – Efficiency Classification for Fans*

ISO 12759 establishes a classification of fan efficiency for all fan types driven by motors with an electrical input power range from 0.125kW to 500kW and defines a fan as:

> *A rotary bladed machine which receives mechanical energy and utilizes it by means of one or more impellers fitted with blades to maintain continuous flow of air or gas.*

The standard applies to

- Clean Air fans
- Ventilation Fans
- Non Hazardous Area fans
- Extraction Fans

but does not apply to:

- Fans for potentially explosive atmospheres (ATEX)
- Fans for industrial processes
- Fans for smoke and emergency smoke extraction
- Fans for automotive application (trains & planes)
- Box fans, powered roof ventilators and air curtains
- Jet Fans for use in car park and tunnel ventilation
- Fans running at 8000 rpm or above
- Fans operating above 100 °C or below -40 °C
- Fans with Supply voltage greater than 1000V AC or 1500V DC.

The performance testing of industrial fans are treated under ISO 5801:2008 *Industrial fans - Performance testing using standardized airways*

In practice these standards are insufficient to cover all the requirements of the Regulation 327/2011 and thus the Commission issued a mandate[8] to the European Standardisation Organisation in 2012 to develop a new harmonised standard. The main element of the mandate is as follows:

> The Commission requests CEN, CENELEC and ETSI to elaborate reliable, accurate and reproducible measurement methods in the form of a European standard, which take into account the generally recognised state of the art, and/or adopt or adapt existing European and International standards for fans. The European standard(s) produced shall lay down procedures and methods of measuring the energy

[8] http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search.detail&id=503#

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efficiency and associated characteristics of fans, as specified in ISO 12759:2010 Fans – efficiency classification for fans, EN ISO 5801:2008 Industrial fans - Performance testing using standardized airways, and EN ISO 13349:2010 Fans – vocabulary and definitions of categories. The European standard(s) has also to include the necessary definitions of the appliance and the parameters to be measured.

The standardisation work requested must be performed in collaboration with other relevant standardisation processes, such as on motors, variable speed drives or pumps, in particular in collaboration with CLC TC 22 X WG6, in particular as to the second phase on system efficiency.

The standardisation tasks covered by this mandate are as follows.

Procedures and methods for measuring the energy efficiency, for the power range of 125 W – 500 kW, and associated characteristics of electric mains operated fans, including fans with inbuilt motors:

– to ensure that the prospective harmonised standard(s) provides, where appropriate, revised and/or new definitions for at least the fan types and main characteristics, and the parameters to be included in the 'Draft Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans';

– to ensure that the prospective harmonised standard(s) provide(s) procedures and methods to measure at least the energy efficiency, establish energy efficiency classes for fans, if appropriate, as specified in ISO 12759:2010, fans – efficiency classification for fans which references EN ISO 5801:2008, and EN ISO 13349:2010, fans – vocabulary and definitions of categories, and also including fans with inbuilt motors;

– to ensure that the prospective harmonised standard(s) includes a procedure that avoids an appliance being programmed to recognise the test conditions, and reacting specifically to them;

– to ensure that the prospective harmonised standard(s) take(s) into account improved test conditions, test materials and new appliance types to better reflect the user behaviour and the state of the art at European and international level. In particular the following points should be included:

- the definition of energy efficiency classes for new technologies, such as permanent magnet motor technology, if appropriate;
- the definition of efficiency levels, taking particular account of ISO 12759:2010, fans – efficiency classification for fans;
- the definition of test measurement methods and efficiency levels for power ranges 125 W – 500 kW, including static/dynamic/total pressure, as appropriate;

– to ensure that, for the purpose of the 'Draft Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans integrating motors', they can be equipped for operation on low voltage power supplies, as specified in Low Voltage Directive 2006/95/EC, use one and three phase low voltage (below 1,000 V AC, 1,500 DC) etcetera;

– to ensure that the prospective harmonised standard addresses testing of fans with housing that is necessary for the operation of such fans, and in situ testing of large fans (see EN ISO 5802:2008, industrial fans – methods of performance testing in- situ), or reliable alternatives for the testing of such fans, in line with ISO 12759:2010;

- to ensure that the prospective harmonised standard(s) take(s) into due account the definitions and parameters needed to fulfil the scope of the foreseen Draft Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans and the needs of the revision of that Regulation, as far as the extension of the scope of the standard is described above.

Verification procedure for market surveillance purposes:

- to ensure that the prospective harmonised standard(s) identifies and controls the sources of variability to be considered for market surveillance purposes;

- to provide values for measurement uncertainties (see e.g. ISO13348:2007 tolerance, methods of conversion and technical data presentation) for the purposes of the verification procedure for the measured parameters taking into account the different sources of variability to be considered when a specific product is taken from the market and measured for market surveillance purposes;

- to verify if, in order to reduce the impact of variability to the system, the standard(s) should include specific criteria to be met by laboratories involved in the verification of the declared data (e.g. quality management system, qualification system, personnel training…).

Template for test report:

- to define a template for a test report indicating the information to be declared by the manufacturers to fulfil at least the ecodesign requirements set out by Draft Commission Regulation implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for ventilation fans.

Within ESO the mandate to develop this standards was taken up by the CEN Technical Committee (CEN/TC) *156 - Ventilation for buildings* and it currently has the status indicated in Table 3.

Table 3. Standards for fans under development for use in the Ecodesign Directive

Reference	prEN 17166
Title	Fans - Procedures and methods to determine the energy efficiency for the electrical input power range of 125 W up to 500 kW
Work Item Number	00156240
Abstract/Scope	This harmonized European Standard provides procedures and methods for measuring and/or calculating the energy efficiency and associated characteristics of fans when driven by electric motors.
Status	Under Approval
Reference Document	
date of Availability (DAV)	
ICS	23.120 - Ventilators. Fans. Air-conditioners
A-Deviation(s)	
Special National Condition(s)	
Legal basis	
Directive(s)	2009/125/EC
Mandate(s)	M/500
Citation in OJEU	2009/125/EC (Expected)

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3. Ecodesign market surveillance, conformity assessment and verification in EU Member States

Under the New Approach Directives the responsibility and authority to conduct market surveillance for conformity with the Directives resides with the EU Member States.

3.1 EU conformity legislation

3.1.1 Compliance and conformity assessment responsibilities

Member States are responsible for market surveillance under the Ecodesign Directive. The national market surveillance authorities must monitor products covered by implementing regulations and placed on the market and/or put into service. These products must bear the CE mark which symbolises the conformity of the product with the applicable Community requirements, regardless of whether these address safety, health, energy-efficiency or other environmental requirements as set out in the applicable product legislation. As mentioned previously, Article 3 of the Ecodesign Directive states that authorities are entitled (1) to organise appropriate checks on compliance with the implementing regulations, (2) to oblige the manufacturer to recall non-compliant products from the market, (3) to require the provision of all necessary information and (4) to take samples of products and subject them to compliance tests.

The Ecodesign Directive stipulates that the conformity assessment procedures shall be specified by the implementing measures. The adopted measures leave to manufacturers the choice between the internal design control and the management system for conformity (self-certification, detailed in technical documentation accompanying the product). Decision No 768/2008/EC on a common framework for the marketing of products defines a full set of conformity assessment procedures, from self-certification with supervised product checks to third party certification (i.e., modules A-H), which the Commission may use in further mandatory measures.

Essentially, the European system is a self-declaration system wherein products which carry the CE mark must comply with all EU legal requirements including for truthful labelling and energy declarations. The Ecodesign Regulations are directly binding in all Member States, and the manufacturers or importers are legally liable for the compliance of their products.

3.1.2 Ecodesign legal frameworks at the Member State level

Table 4 indicates the law used by each EU or EEA Member State to transpose the Ecodesign Directive into national legislation.

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Table 4. National Ecodesign legislation by EU and EEA Member State

Country	Form of national legislation under which the Ecodesign Directive is implemented
Austria	Electrical Engineering Legislation
Belgium	Environmental Law
Bulgaria	Technical Requirements towards Products Act (TRPA)
Croatia	NA
Cyprus	Ecodesign requirements for energy-using products law
Czech Republic	Commercial Law (Energy Act and Energy Management Act)
Denmark	Energy Law
Estonia	Energy Efficiency of Equipment Act
Finland	Act on Ecodesign and Energy Labelling of Products
France	General Environment Law
Germany	Commercial Law
Greece	Presidential Decree 32/2010
Hungary	Consumer Protection Law
Iceland	Law amending law no. 72/1994, labelling and disclosure requirements relating to household appliances energy use
Ireland	European Communities Act 1972
Italy	General Law No. 201
Latvia	Environmental Law
Lithuania	Technical Regulation on establishing a framework for the setting of Ecodesign requirements for energy using products
Luxembourg	Product Surveillance Legislation
Malta	Product Safety Act
The Netherlands	Dutch Law of Environmental Governance
Norway	NA
Poland	Energy Law
Portugal	Consumer Protection Law
Romania	Judgement on Ecodesign Requirements for Energy Using Products and Amending, Supplementing and Repeal of Laws
Slovakia	Acts within Conformity Assessment Law
Slovenia	Energy Law
Spain	Royal Decree 1369/2007, of 19 October on the establishment of Ecodesign requirements for energy-using products
Sweden	Law 2008:112 on Ecodesign.
United Kingdom	Energy Conservation Law

As is evident from this table Member States have used different types of primary legislation to transpose the Directive such that four countries used environmental law, two commercial law, four consumer protection/product safety law, four energy laws, two general law and the remainder laws specifically established for the Ecodesign Directive.

It is unclear whether the nature of primary law used to transpose the directive has any significant implications for the effectiveness of market surveillance and compliance activities, although, it is the case that the nature and magnitude of non-compliance penalties may be constrained by the nature of the primary legislation used for transposition.

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3.2 Organisation of conformity verification at MS level

3.2.1 Compliance institutions and structures

The majority of the countries where officials were interviewed had clearly defined the roles of the institutions and stakeholders involved in monitoring, verification and enforcement (MV&E). The capacity of those institutions to fulfil their functions, however, varied considerably between countries. Broadly speaking, a central government department (often a ministry) is responsible for the transposition of the legislation; a delegated government department sitting beneath the ministry (often referred to as the market surveillance authority) is responsible for compliance activities such as reviewing technical documentation and in most cases the instigation and management of enforcement proceedings; while testing is generally carried out by accredited laboratories under instruction from the market surveillance authority. Figure 4 shows a typical arrangement, but many other configurations are also found among the different countries.

In some federally organised countries (e.g. Germany and Spain) all legal and compliance responsibilities except transposition are delegated to regional state level government.

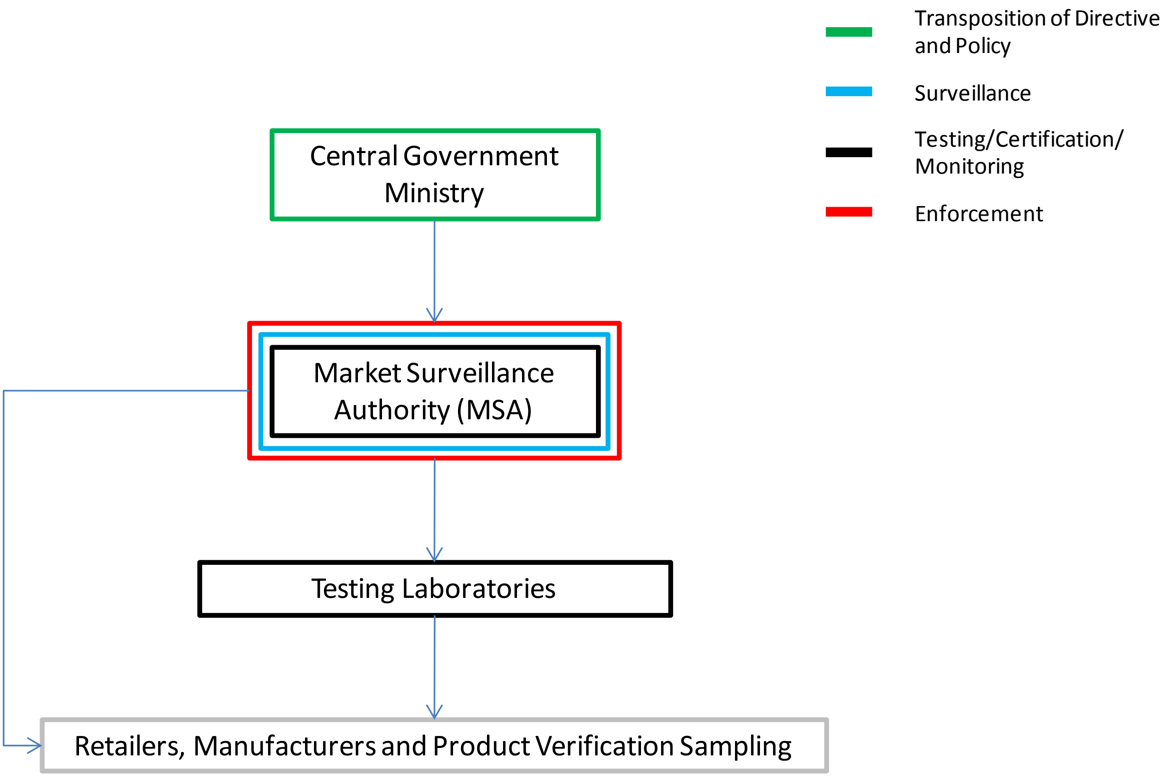

Figure 4. Typical institutional arrangement for market surveillance and conformity verification activities under the Ecodesign Directive

Figure 5 below illustrates the types of institutions responsible for the various activities relating to the Ecodesign Directive: transposition; surveillance, verification testing and enforcement; where the frequency of the institutional type used for the specific MV&E function across the various EU/EEA Member States is expressed as a percentage of the total.

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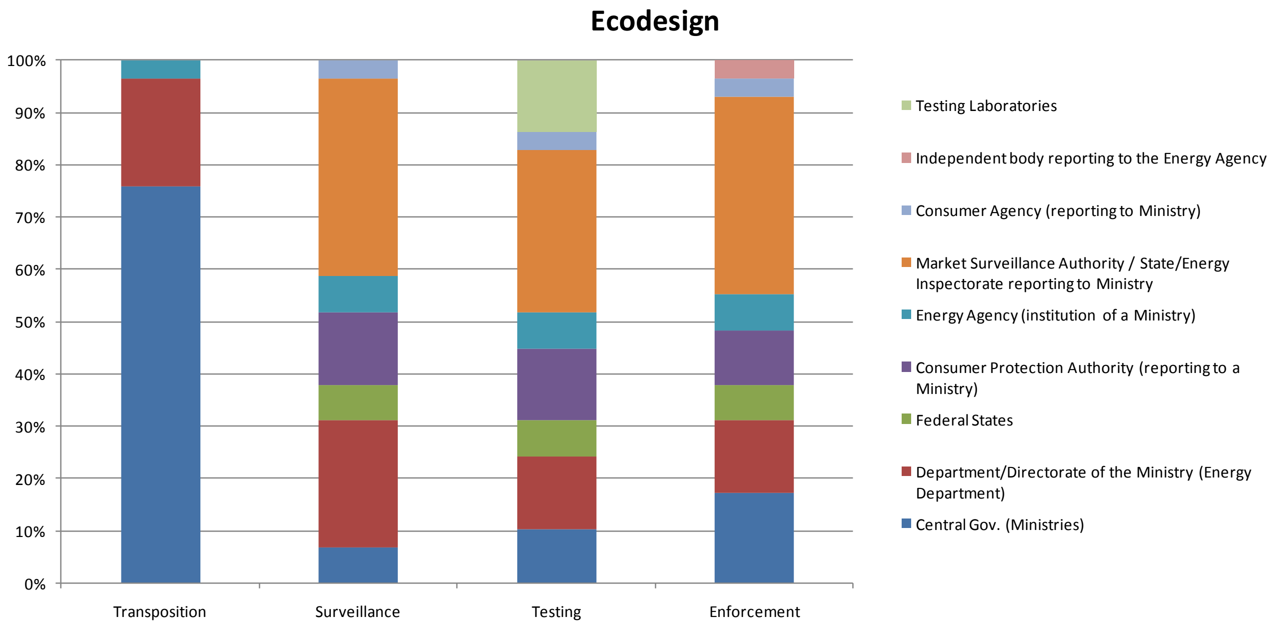

Figure 5. Institutions responsible for MV&E activities for Ecodesign

3.2.2 Energy performance testing agencies and their capabilities

Energy performance verification testing is contingent on the availability of competent accredited laboratories. One or more accredited test lab exists in Europe for each of the energy performance tests required under the Ecodesign Directives, however, no single lab provides testing for all the product types and many countries do not have access to nationally based test facilities. In general, there are far more labs available to test the energy performance of domestic appliances and equipment than there are for some of the less common or more challenging types of industrial and commercial equipment types, thus availability of 3rd party test labs could be a significant constraint to compliance testing for some types of products addressed under the Ecodesign Directive. This is especially the case where there is no or limited previous history of commercial 3rd party energy performance conformity, certification or verification-testing for the product type concerned. Some member states and their MSAs have forged cooperative alliances to overcome these limitations and to share testing facility resources. A good example of this is the cooperation between the MSAs of Nordic countries.

Information on EU testing capacity for fans is compiled in INTAS deliverable D2.2.

3.2.3 Accreditation

MSAs are only likely to instigate compliance conformity verification testing if the results can be legally enforced. In practice this means that the standard procedure is to use accredited 3rd party test laboratories for this purpose. The accreditation of all European testing laboratories is conducted in accordance with European Regulation 765/2008 - *Setting out the requirements for accreditation and market surveillance relating to the marketing of products* and with ISO 17025 - *General requirements for the competence of testing and calibration laboratories*.

Each EU and EEA Member State has a designated national accreditation agency and these adhere to common standards and procedures within the auspices of the European Accreditation cooperative scheme which operates within the broader International Laboratory Accreditation Council (ILAC).

To be accredited to conduct Ecodesign performance verification testing the test facilities need to be accredited for each performance test relevant to the conformity verification of the specific-product type i.e. to conduct a test for each relevant harmonised standard for that product type.

3.2.4 Energy performance verification testing and levels of non-compliance

Since the introduction of the Ecodesign Directive the number of conformity verification tests conducted at the behest of MSAs is reported to have risen considerably over time. Currently it is thought that well over a 1000 such tests are done each year, but the actual figures are not in the public domain. Not surprisingly non-conformity levels tend to be higher when such testing is first initiated and then is frequently found to decline in subsequent years. This tendency can be attributed to two effects. Firstly, whenever a product is first subject to Ecodesign requirements there can be a process for both the suppliers and the MSAs to familiarise themselves with the conformity requirements. This means there can be a lag in the private sector putting into place the necessary modifications to ensure their products comply and to conduct conformity assessment to verify this. Secondly, once MSAs begin to undertake their own conformity verification testing they begin to identify non-compliant products and implement remedial measures to bring the sector into line.

In the case of fans, the regulatory requirements are both relatively new (with the first tier coming into effect in 2013 and second tier in 2015) and there have been numerous challenges to address (see 3.2.6). As a result, many MSAs are still developing their conformity verification approaches, and there has been rather limited verification testing at the behest of MSAs. It is thus too soon to report on the levels of non-compliance found by MSAs. However, industry parties consulted for this project assert that falsely optimistic energy performance declarations are very widespread.

3.2.4.1 Private sector challenge testing

In additional to officially mandated compliance verification testing private sector testing, including challenge-testing by manufacturers of competitor products, has occurred in some countries and product-type sectors. MSAs take such “whistleblowing” reports quite seriously and will often use them to trigger their own investigations. It is not known the extent to which testing of competitor’s products is undertaken by fan suppliers but it is more likely to occur for the series fans than for the larger engineered-to-order ones.

3.2.5 Cooperation between EU Member States

Although responsibility for ensuring compliance with EU product Ecodesign regulations resides with each Member State’s MSA(s) there is scope to improve effectiveness and reduce costs via cooperative compliance actions among Member States and MSAs. In particular the efficiency of compliance enforcement efforts will benefit from:

- cooperative information exchange on compliance activities, levels and procedures
- mutual sharing and recognition of test results across EU/EEA Member States to avoid duplicative testing
- mapping of accredited test labs and facilitated access to labs within other EU/EEA Member States

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- measures to enhance the reliability of compliance verification testing such as round-robin testing[9].

In recognition of this the European Commission established the Administrative Co-operation Working Group (ADCO) for the Energy Labelling and Ecodesign Directives, which is a group that acts as a forum for discussion and information sharing, chaired on a rotating basis by the Members States. The ADCO is generally attended by the market surveillance authority of the Member State and most of the Member States report that they attend the sessions.

Another working group related to MV&E is the E^{n}R Labelling and Ecodesign Working Group[10]. This group is currently chaired by the UK Energy Savings Trust and establishes cooperation and information sharing in its members, amongst other tasks. There are 22 member agencies for E^{n}R.

Most EU and EEA Member States report that they exchange general information on Ecodesign compliance with other countries. The forums where this exchange occurs include:

- ADCO
- through the course of EU sponsored projects, such as those run by under the auspices of the H2020 programme
- E^{n}R Club – Labelling and Ecodesign Working Group
- regional fora and dialogues (reported to be the case for Eastern EU countries, the Baltic States and Scandinavian countries)
- IEA 4E Implementing Agreement (Efficient Electrical End-use Equipment)
- informal bilateral exchanges
- workshops.

Some examples of existing information sharing and cooperation between Member States follow below.

- The Belgium authorities reported that informal bilateral exchanges occur with other countries, such as France and the Netherlands.
- The regulation adopted in France does not explicitly state that there should be collaboration between Member States, however, it is reported to occur in practice.
- In Germany, cooperation and information exchanges are reported to be necessary to achieve efficiencies and cost-effective testing of the more complex products. The MSAs have suggested that were the testing laboratories across Europe which specialise in certain product groups to be mutually recognised they could be used by the whole of EU (via the principle of mutual recognition). Due to the federal structure of the German administration, representatives interviewed from the central and regional governments confirmed satisfaction at the exchange of information at Member State level and with the role of the German Bundesministerium für

[9] Round-robin testing refers to the situation where the same product samples are tested in multiple test labs in order to see the variance in testing procedures and results and minimise differences.
[10] http://www.enr-network.org/labelling-and-ecodesign.html

Wirtschaft und Technologie in sharing information and creating platforms for permanent information transfer and exchange of experiences in order to accomplish harmonised implementation among the German States.

- In Greece, the Hellenic Accreditation System S.A. and test laboratory Labor S.A. indicated that Greece seeks to provide open communication of results with laboratories and other enforcement authorities from other countries. It is in fact, a pre-requisite in the Greek accreditation process for laboratories to ensure they have the necessary provisions to provide open communication of test results in order to achieve accreditation.

- Through the participation of Dutch MSA authorities in the ADCO, the Netherlands is helping to stimulate pan-EU cooperation by running an intranet that facilitates data sharing; this assists other countries with their compliance activities and also helps in creating a more level playing field across Europe. Testing laboratories do not generally share test results within the Netherlands unless the testing forms part of a programme. There is some pooling of testing resources and "Round-Robin Testing" where test laboratories conduct tests on the same models to ensure accuracy between laboratories (N.B. this is required by the testing laboratory standard ISO 17025).

- Spain is reported to have shared energy performance verification tests on products with enforcement authorities from other countries. These activities are reported to assist with coordination and cooperation between countries and enforcement agencies monitoring the markets.

- MSAs in the Nordic countries report they cooperate so that the verification tests which models undergo are similar regardless of the country they are tested in and so their constituent parts are not adversely influenced by a difference in the supply chain.

- The UK market surveillance authorities report they are participating in voluntary and informal efforts with EU partners to collaborate on the findings and share data on the monitoring and verification of the Ecodesign Directive. The UK recognises that through the sharing of data, the costs of market monitoring and verification testing can be reduced, and the effectiveness of policing the market can increase.

- The CIRCABC database[11] has been identified as an efficient tool to share information between countries.

- In a similar vein, the ICSMS (Information Communication System for Market Surveillance)[12] tool has been created at the behest of the European Commission and is used to share product health and safety market surveillance data and information between MSAs. ICSMS is reported to be the most comprehensive Europe-wide database of consumer and professional products, which have been tested as non-compliant by market surveillance authorities. It aims to promote co-operation between its members and facilitate their MV&E tasks. It gathers test results and relevant product data on thousands of products and lists authorities in all EU/EEA countries for 22 Directives. Initially these only addressed health and safety issues but more recently the Ecodesign Directive has been added to the list of directives included in the database and it is now possible for EEA Member States to share product non-compliance information via this route. Data sharing under this cooperative arrangement, which is part financed by the European Union, is managed via a secure internet database and can readily incorporate energy performance compliance data.

[11] CIRCABC is an extranet tool, developed under the European Commission IDA programme, and tuned towards the needs of Public Administration. It enables a given community (e.g. committee, working group, project group etc.) geographically spread across Europe (and beyond) to maintain a private space on the Internet where they can share information, documents, participate in discussion fora and benefit from various other functionalities. http://circabc.europa.eu
[12] https://www.icsms.org

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3.2.6 Ecodesign market surveillance experience for fans

The 2015 Ecodesign preparatory study to review Regulation 327/2011 made the following observations with regard to the then market surveillance experience for fans:

> The study team consulted stakeholders and performed desk research on the topic of market surveillance. The former resulted in a statement that there virtually is no market surveillance by Member States…
>
> …The result was that probably, with some uncertainty on the situation in Denmark, that there has been no compliance testing on industrial fans by market surveillance authorities in the Member States. Some countries like Denmark and Sweden are in preparation, but mainly the activity is limited to document inspection.
>
> The Swedish Energy Agency, who is the surveillance authority in Sweden, reports that 'the issue of responsibility of the fans is of outmost importance for market surveillance. Monitoring and verification of products under any ecodesign regulation, e.g. by testing products, is of very little use if the regulation is not enforceable. For the regulation to be enforceable, it must be perfectly clear in who to address in case on suspected non-compliance, i.e. which economic operator is legally responsible for the non-compliant fan.
>
> Document inspection is a form of market surveillance. This is a procedure we often use as a first step. Based on document inspections alone, MSAs can take legal action against a product, including sales ban. The document inspection will also often serve as an input for the MSA on which brands or models to target for testing. When performing document inspection, it is not unusual to find products that are out of scope of a regulation. Also uncertainties with the regulation will surface in this first step. As for industrial fans, it was discovered that there is no certainty as to which manufacturer that is responsible for the fan. The Commission FAQ gives guidance, but it is not legally binding. So to "waste" a lot of money on testing fans, when it is not known whom to address if it is discovered that the fan does not comply is not ideal.'
>
> The Swedish Energy Agency is planning to engage in actual fan testing later this year.
>
> The fan industry signals and regrets the lack of market surveillance but offers no real solution to the lack of funding at MS-level that most certainly is one of the causes. The associations are, however, resolute in their statement that third party certification (TPC) is not the answer. It would not, according to them, solve the problem of free-riders but instead would just create a lot of administrative burden.
>
> Manufacturers think that for effective market surveillance also the availability of test facilities is problematic and suggested a collaboration, possibly perhaps the use of their certified laboratories.

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Verification tolerances

For Ventilation Units, a product that incorporates fans and more, the regulation (EU) No. 1253/2014 prescribes verification tolerance of 7%. Following this example and verification of applicable standards, the discussion document proposed to reduce the verification tolerances for industrial fans from the current 10% also to 7% (factor 0.93).

Not everyone of the stakeholders had a problem with that, but several manufacturers of especially bespoke industrial fans (produced one-off or in small series) gave fairly convincing evidence on deviations in tip clearances and rotor-angles that would necessitate to keep the 10% tolerance.

Pragmatically speaking, given that it is unpractical to make a differentiation, it is recommended to keep the 10% tolerance (factor 0.9 of the minimum efficiency value)[13].

Testing practice and costs

Several manufacturers have given an indication of testing costs per fan according to EN ISO 5801, sometimes even differentiated by fan size. On average these costs are around € 3000,- per fan.35 The problem is, that there are so many fans to test. In general, a manufacturer uses a base geometry and then many variations of that geometry with a different diameter. The diameter-series follows a logarithmic scale.

Large fan manufacturers and medium-sized specialty fan manufacturers may thus be able to supply up to 30 000 models in their product range. Even without Ecodesign regulation, the specifications of these fans have anyway to be established for their customers and their catalogue. To avoid huge testing costs the manufacturers do typically test only a few models with different diameters and then inter-/extrapolate for the other models.

The 'scaling' algorithm used for the inter-/extrapolation is typically based only on Reynolds numbers (Ackeret method 1951; Reynolds numbers are based on the amount of turbulence that can be expected). This method is conservative, e.g. predicting only a 3-4% efficiency rise between 10 and 200 kW, and ensures that despite e.g. production tolerances—the efficiency and performance is certainly not overstated.

However, this also creates a possibility of over-dimensioning for a given specification and operation at a suboptimal efficiency point. This comes then on top of the over specification by the customer, due to all sorts of safety factors.

For the legislator striving for best efficiency this practice is also confusing. It may well be that the industry needs to extrapolate the same base geometry over a large power range, but –as some manufacturers also confirm—there is no 'one-geometry-fits-all' solution. In principle, for every operating point there is a technically superior geometry. Usually this does not show too clearly when looking only at one geometry range, but it typically shows when the same medium operating point is covered by a low-to-medium size product range and a medium-to-high product range.

[13] Note, Annex X of Regulation COMMISSION REGULATION (EU) 2016/2282 of 30 November 2016 amending Regulations … No 327/2011 … with regard to the use of tolerances in verification procedures specifies the tolerances to be deployed in Ecodesign verification testing for fans
(

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To improve the situation, i.e. to make the efficiency and performance values closer to reality, an improved scaling-method could be used that not only takes into account Reynolds numbers but also surface smoothness, attack angle, etc. Such a method is proposed by the University of Darmstadt. For more information see the 'References' section of this report.

Since this time at least the Danish, Swedish and Baden-Württemberg MSAs have carried out Ecodesign market surveillance activities for fans, and it is likely that other MSAs have too. A representative of the Baden-Württemberg MSA reported their experiences at a workshop hosted by EVIA in 2017[14]. These may be summarised as follows:

For industrial B2B products in general there are challenges because:

- it is not simple to know what and when products are being placed on the market
- there are technically complex test requirements
- there are less certified independent laboratories able to do conformity measurements
- the regulations have only been in force for a short time and there are unanswered questions concerning implementation and sometimes also a lack of harmonized technical standards (as is the case for fans).

To help identify what products are on the market:

- market research in advance has proved its worth – it is helpful to:
- visit exhibitions/trade fairs
- collaborate with the customs authorities
- collaborate with local economic operators.

The most frequent sources of non-conformity are:

- missing awareness of responsibility as manufacturer
- missing complete address on product (or packaging)
- missing product information – on the type sign, – in the technical documentation (for example required sequence of the information) – on the homepage in the internet

Specifically, for fans the MSAs face problems due to:

- a lack of harmonized test standard and inconsistencies in the other available standards
- difficulties in how to treat fans sold with and without protective grids
- difficulties in determining scope.

[14] "Experiences on market surveillance in the area of the Ecodesign Directive", presented by Dr. Tania Fuchs at the EVIA event on market surveillance for fans, Brussels, May 10, 2017

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4. Ecodesign conformity verification for large fans – business practice and MSA issues

This chapter discusses business practices that are relevant to market surveillance and conformity verification for large fans. It begins by considering business practices, supply chain considerations and factory acceptance testing. It then explores the experiences of MSAs in conducting Ecodesign market surveillance conformity verification for large fans and examines the implications this has on the most appropriate means of conducting such assessments, through the examination of market surveillance approaches. The intention is to inform MSAs of how businesses currently procure and deliver products and the implications that MSA activities may have on their business, and equally to inform business of the realities confronting MSAs. The hope is that by clearly laying out the issues that it will help identify the most promising approaches towards conducting market surveillance conformity verification and help build consensus on how best to address this need.

4.1 Business practices to establish product performance

4.1.1 Market characteristics and business to business procurement practice

The fan business affected by Regulation 327/2011 is essentially divided into the mass market (in terms of the number of units sold) that is destined for residential and tertiary sector applications, and the industrial fans market. The larger fans are used in the industrial sector and major infrastructure applications. These include industrial process applications (pharma, paint, chemical, drying, ovens, kilns etc.), tunnels, metros, mining, power plants, shipbuilding, etc. The mass market and industrial markets have quite distinct characteristics and are supplied by different operators. These distinctions are very pertinent for the design of effective market surveillance and conformity verification practices.

The mass market is supplied by a relatively limited number of major producers. These producers are mostly European but face stiff competition from suppliers external to the EEA. By contrast the industrial fan market is served by hundreds of manufacturers (no one of which has more than a few percent of the total EU/EEA market value), most of whom specialise in this segment and almost all of whom are based in the EEA (there may be a very modest proportion of imports from Russian and Ukrainian made products into Eastern European EEA countries but otherwise there is thought to be very little). The reasons for this are as follows:

- the industrial fans are customised products that are engineered to order
- they are large and heavy but are also often among the last items to be installed in much larger projects (of which fans are only a small component). As they are among the last items to be installed it is important to the procurers that they are not a source of delay in the completion of the project – this favours locally made product with short transportation times and rapid access to after sales service to address any installation and servicing issues
- shipping from outside the EEA can take several weeks and that delay is not worth any cost differential to a procuring party.

The procurement, production practice and sales channels for the industrial and mass market segments are also quite different.

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When an industrial fan is being procured the process is that the client contractor's consultant issues specifications and a request for a quote, the producer will issue a quote, once a quote is accepted work will begin. At this stage the client may request pre-production documentation/design checks. Once these are approved the producer starts production. At the end of this process the client may request a factory acceptance test (FAT) and following their approval the product is then placed on the market by being transported from the factory to the client.

For industrial fans the quote will always include some kind of technical data sheet, including a fan curve, and some kind of un-certified drawing. On receipt of this the client's representative (often a consultant) may then demand modifications. Alternatively, if it's for a very large fan the producer will develop a design and then send a certified drawing for approval (by the client's representative i.e. a contractor or their consultant). Contractors operating on behalf of a final client usually have the necessary in-house knowledge to issue the product specifications and to assess the proposals and working documents. Sometimes they will hire a consultant to do this on their behalf. Industrial fan producers may be up to four levels removed from the fan end-user, e.g. a project/real estate developer might engage a construction company to produce a building, who will hire a systems-integrator to develop the ventilation systems who will procure the fans from the fan manufacturer. Industrial fans are essentially always sold to an electrical contractor (i.e. the systems integrators) who is generally fulfilling a sub component of a larger project.

Industrial fans can be sold to, in order of prevalence:

a) nationally based contractors

b) large project contractor consortia (especially in the case of large government projects) that may include public private partnerships and international contractors

c) agents who buy from a central supplier and sell onto local companies

d) and theoretically to distributors – but this accounts for only a tiny part of the market because the high heterogeneity[15] of the products means the volume and values for any given fan are insufficient to justify the additional costs of stocking.

By contrast the smaller residential/commercial sector fans can be manufactured and sold in series, which means they can be sold both directly or stocked and sold via distributors. In practice though, the largest channel for such fans are for those which are produced for and sold to Original Equipment Manufacturers (OEMs) who then integrate them into their own equipment before selling them into the market. Thus, for series products there are two types:

a) standard products which can be purchased from a catalogue

b) products developed in conjunction with an OEM for use in products such as AC units, air handling units, textile machines etc.

For the latter case the producer will make modifications to a basic series fan design to match the OEM's needs.

The production process also varies between the two segments:

- an estimated 95% of customised industrial fans are built by modifying an existing fan design that is then scaled up or down according to the project need. The other 5% are designed and built from scratch. Computer simulation

[15] Literally hundreds of combinations are possible due to the wide number of combinations of fan types (centrifugal, axial, jet, etc.), sizes, rated capacities, blade designs, etc.)

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tools are used by all producers. In some cases, the systems integrators procuring the fans will be doing CFD analysis e.g. of ventilation systems and may request fan performance and design data as inputs. Generally, for reputable manufacturers the product performance will be established through testing in their own facilities. Generally, clients do not require any proof of concept and progress evidence, such as a detailed design review[16], during the course of the product development process, but rather have confidence in the manufacturer that they will produce what they have asked for. Often in the pre-final test stage the initial product design will not perform quite as intended and thus modifications are required.

- the industrial fan manufacturers all procure the motors they use from specialised motor manufacturers, whereas many of the mass fan market manufacturers make their own motors.

4.1.2 Proof of quality and factory acceptance testing

Although design reviews are not used in practice for industrial fans, factory acceptance tests (FATs) are, as discussed below. In general, when industrial fan clients wish to see evidence that both a producer and their product will meet their expectations they demand the following:

1) an ISO 9001 certificate to show quality assurance processes are being properly organised,
2) evidence that R&D and fan design is integrated within the QA process – clients want to see this to know that the instruments used to develop the fans are regularly calibrated and checked
3) most times before a FAT is conducted clients request to see pre-documentation of the performance tests – this describes what the performance tests to be conducted will be, includes blank proformas showing how the FAT test result numbers will be presented
4) clients will always demand to see the fan data sheet and the fan curve.

Currently clients do not request design simulation or scale testing evidence.

Factory acceptance testing is becoming progressively more common for industrial fans but is still not done in the majority of cases (it is estimated that clients request FATS in just 20—30% of cases).

The general purpose of a factory acceptance test is to ensure that a new piece of equipment is 'fit for purpose' before releasing the equipment for delivery to site for installation. After agreeing a quality control plan with an equipment supplier as part of contract negotiations, the Factory Acceptance Test is the most significant activity within the overall plan. Once equipment has passed a factory acceptance test, it is ready for shipment to site to be installed.

An industrial fan FAT will entail the client's representatives being present for a witness test of the product's characteristics at the manufacturer's facilities.

In addition, a factory acceptance test might also include a review of the following:

- quality inspection plans
- general arrangement drawings
- bill of material records
- sub-component supply records

[16] A design review is a milestone within a product development process whereby a design is evaluated against its requirements in order to verify the outcomes of previous activities and identify issues before committing to - and if need to be re-prioritise - further work.

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- fabrication records
- equipment critical dimensional checks
- non-destructive testing records
- calibration records of measuring equipment
- suitability of the design for the application
- control and instrumentation systems
- condition-based monitoring tools and systems
- packing list
- packaging plans
- shipment insurance policies.

In some cases, the capability of the manufacturing facilities being used would be investigated to understand quality control procedures and typical tolerance capability of the machinery being used to manufacture components.

It used to be uncommon for clients to request FATS for industrial fans and was only done for the most technically demanding and sensitive projects; however, they are becoming progressively more common. In the past the FATs would be confined to test demonstrations of mechanical function but they now likely to include more tests such as performance, noise, vibration, material testing etc. For the performance tests most clients are satisfied with an electrical run test where they see the performance curve of the motor.

FATs are universally requested for power plant, tunnel, metro, oil & gas sector applications but perhaps for only ~10% of general industrial applications (which account for about 80% of the market), so perhaps 28% of the whole industrial fan market currently has some kind of FAT. When a FAT is requested the supplier will normally do a pre-FAT test just to ensure everything is ok ahead of the customer being there for the actual FAT.

The shortest fan production project cycle for which a FAT will be conducted is 12-14 weeks. It takes the company a minimum of two weeks to set up a FAT to fit it within test lab scheduling etc. There can be multiple parties present at FATs at the behest of the client. Normally the client makes the arrangements with the multiple parties and communicates these to the manufacturer. It is not uncommon for the end-user to send a witness, as well as there being someone from a 3rd party test lab, someone from the contractor and perhaps one or two consultants. If an MSA were also to be present it would not change this situation very much, although clients may not welcome it. Without a change in the regulations the MSA would likely only be accepted into this process under sufferance of the client (who has the contractual power) and if the MSA were to ask for explanations, or for something to be repeated or modified etc. the client could ignore the request.

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4.2 Supply chain considerations

This section considers the supply chain issues that are likely to affect the choice of the most viable market surveillance process.

4.2.1 Actors involved

At its simplest there are two businesses involved in the procurement and placing on the market of a large fan, the manufacturer and the business that placed the order. The business placing the order may be the same as the one that will take delivery of, put into service and use the fan. If this is the case they will have all the required competences in house. Very often though, the final client will hire one or more intermediaries to act on their behalf. Most commonly these are the EPC (electrical engineering performance consultancies) mentioned in section 4.1.1.

Theoretically, it is possible, that the client placing the order is not acting on behalf of the business that will ultimately use the product; however, no supplier mentioned such occurrences and so it is not considered to be a practically relevant issue.

In practice, the final destination of the large fan (i.e. the place where it will enter into service) will always be known when the order to manufacture the fan is placed. Practically, no project developer will take the risk of placing such an order if they have not already secured the approval of the final client. This means there are no business circumstances under when large fans are bought by an intermediary and stored for any significant time prior to shipping to the final destination. This is important because it means that the MSA with authority for the region where the large fan will eventually be installed is knowable at the moment the order is placed. This means that in theory the MSA *could* be notified at that stage that a fan is about to be manufactured that is intended to be installed in the region for which they have authority.

Once the fan leaves the factory it is then considered to be in a state of having been placed on the market, however, it will need to be freighted to its destination, installed and commissioned before it is put into service. The freightage process will involve using the services of one or more haulage companies and, in the event that a product is shipped, would include interaction with port authorities. If a hard trade border is being crossed then customs authorities will also be concerned.

Once the fan arrives at site contractors will take delivery and undertake its installation and commissioning.

4.2.2 Freightage of large fans

Once the large fan has undergone its FAT and is approved by the client, or their representative, it will be transported to the place where it is due to be installed. This will almost universally involve road freightage but also potentially shipping. Typically, the fan will be freighted in one piece as this helps the manufacturer to assert that it was unmodified following final testing and approval and hence reduces their exposure to risk once the product has arrived with the client; however, this is not universal practice and there could be a potential risk for fans shipped in pieces to have it claimed of them that they had not yet been placed on the market to try and circumvent regulatory requirements.

4.2.2.1 Transportation on roads

For regular road transport in Europe vehicles must comply with certain rules with regards to weights and dimensions for road safety reasons and to avoid damaging roads, bridges and tunnels. This is regulated by Directive (EU) 2015/719 and limited to 40 tonnes (incl. trailer), 2.6 meter width, 4 meter height (incl. trailer) and 12 meter length. These limits are designed to allow the transport of standard containers according to the international standard ISO 668, but these are insufficient for large fans. Consequently, regular road transport can only be used for smaller fans.

For larger and heavier products, special road transports have to be used and limits which apply to these depend on local circumstances and permits that vary from one Member State to another. A review of these criteria has found that they are quite heterogeneous, and therefore, road haulage of any very large fan is likely to encounter transportation limits at some point. When products are being moved in accordance to such limits they often require notifying and seeking approval from the local road network authorities, so in principal these authorities could also inform Ecodesign MSAs when such approval is sought for a large fan. This could help alert the MSA to the imminent installation of a very large fan. Figure 6 illustrates the issue.

Figure 6. Road transport of large fans

4.2.2.2 Transportation on railways

As is the case for road transport railways also have transportation dimension and weight limits (e.g. Figure 7 and Table 5). They are not harmonised across Europe nor within any given country because they can depend on the local railway infrastructure such as bridges.

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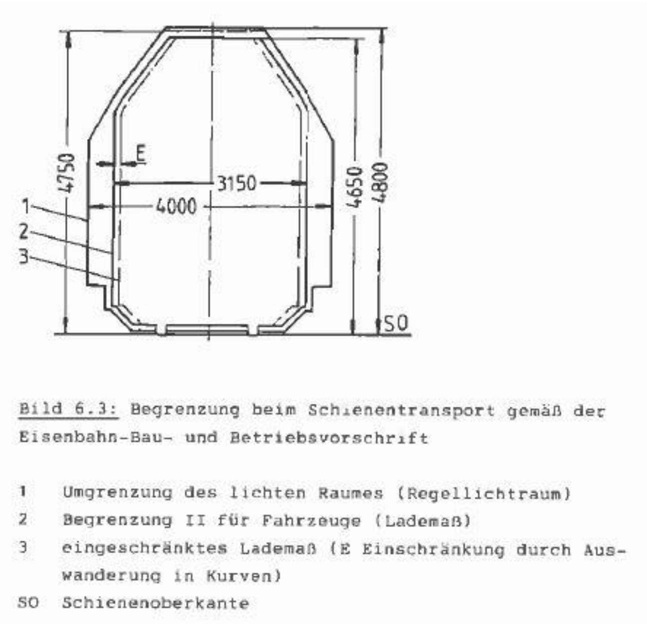

Figure 7. Dimensional limits for railroad transport in Germany (source: Deutsche Bahn)

Table 5. Dimension and weight limits for railway transport in France.

Caractéristiques du convoi	1 ère catégorie	2 ième catégorie	3 ième catégorie
Longueur	L ≤ 20 m	20 m < L ≤ 25 m	L > 25 m
Largeur	l ≤ 3 m	3 m < l ≤ 4 m	l > 4 m
Masse	M ≤ 48 t	48 t < M ≤ 72 t	M > 72 t

4.2.3 Supply chain timing

The process of procuring large fans, from the acceptance of a tender through to the manufacture, delivery and installation of a product will usually take several months to conclude but varies substantially. The lead times for the production of industrial fans are from as little as 8 weeks to as much as 2 years for individual fan delivery projects. The potentially long length of these lead times is because industrial fans are often the last item to go into a project and hence the delivery is contingent on the overall progress of the project.

The time taken to deliver the product obviously depends on the distance to be travelled and modes of transport required. Once at the site the installation and commissioning of the large fan can take quite varying lengths of time depending on the site conditions, the stage the overall project is at and the readiness of the contractors managing the project. It is not common practice for industrial fans to undergo mandated safety checks prior to being put into service although the contractors will do their own checks in a private sector capacity.

4.3 Country level experience

4.3.1 MS conformity verification experience for fans

Regulation No. 327/2011 is a relatively new Ecodesign requirement, being adopted in 2011 and with its first efficiency requirements coming into effect in mid-2013 and its second-tier requirements from 2015. In consequence, there has been rather limited experience among EU MSAs in conducting Ecodesign conformity verification for this product group thus far although more are reported to be planning such actions.

The Ecodesign conformity verification approach undertaken by MSAs involves:

- identifying which products are on the market
- screening for risks of non-compliance
- selecting products for conformity verification actions
- conducting conformity verification actions.

The screening process is optional and is discussed in more depth in INTAS Deliverable 3.8.

The conformity verification actions include:

- checking the CE marking
- document inspection
- rating plate inspection
- conformity verification testing

The conduct of document and rating plate inspections is discussed in INTAS Deliverable 3.2.

In a case of performing an inspection, an MSA will review the product for the presence of the CE mark and will ask for technical documentation – including a declaration of conformity and test reports (showing the results of performance measurements or other type of calculations/extrapolations which the Ecodesign requirements specify the product must respect) - to verify the product's compliance. The results of measurements are part of the modules described in Annex IV and Annex V of Ecodesign Directive 2009/125/EC.

A product will always fail the conformity verification if its technical documentation and/or rating plate are found not to conform to the requirements; however, assuming that they do the next step would be to select some products for conformity verification testing. The methods available to do this are discussed in the next sub section 4.3.2.

4.3.2 MS conformity verification models for fans

The conventional approach used for conformity verification testing of the large majority of products subject to Ecodesign requirements is illustrated in Figure 8. This approach ensures legally enforceable outcomes and for standard products e.g. consumer products and small/medium sized commercial and or industrial products manufactured as part of a series and advertised in catalogues (on line or printed) it is straightforward to identify products which have been placed on the market, is affordable to conduct verification testing, and does not entail undue disruption of the supply chain and hence costs and inconvenience for product procurers.

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This model is certainly appropriate for smaller fans and for any fan produced in series and sold on the open market via advertisement within a catalogue. It is more problematic for series fans sold in B2B relationships for use within an OEM-made product due to the problems of the MSA knowing when the product has been placed on the market and being able to test the product prior to it being incorporated within the OEM equipment in such a way that might significantly alter its performance.

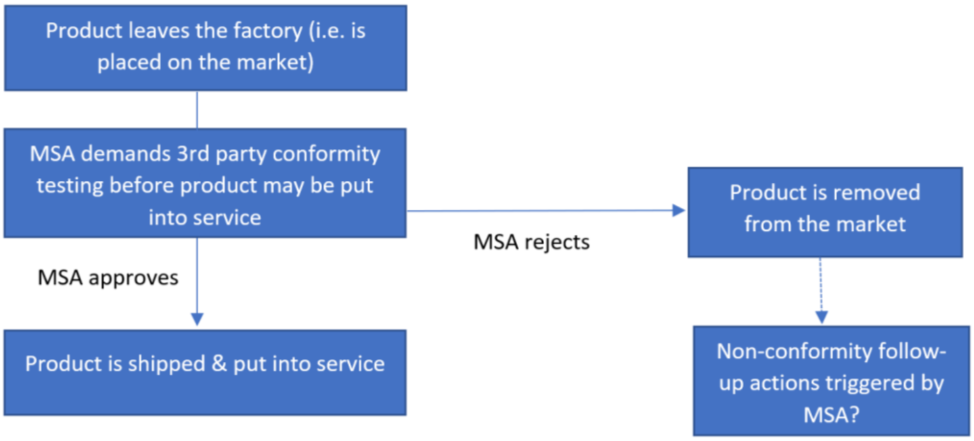

Figure 8. Conventional Ecodesign market surveillance conformity verification testing approach

4.3.2.1 Situation applying to large fans

Conventional conformity verification approach

For large fans, however, the situation is different again. In this case the products are made to order under B2B procurement processes that are invisible to the MSA. Products are not placed in catalogues and are not produced in series, which means that they are not usually advertised (and hence neither are their technical characteristics) and thus MSA's cannot follow conventional market surveillance practices to determine when they have been placed on the market. In addition, even if the MSA can establish when a product has been placed on the market there are major difficulties and burdens to be addressed, as follows.

As the product has already left the factory premises once it has been placed on the market the MSA can either select the product for verification testing when it is in transit, or when it has arrived at the place of installation prior to being put into service. The former is only likely to be viable if the product is passing through customs controls, which does not happen if the product is being transported within a country or a fully frictionless border such as occurs within the Schengen signatories. The latter case would require the MSA to take the product off-site and would cause significant inconvenience and costs to the final client who may have scheduled major business operations based on the delivery date of the product agreed with the supplier.

Thus, if the conventional conformity verification approach is used for large fans it has the following characteristics.

Advantages:

a) the conformity verification tests are fully legally enforceable.

Weaknesses:

a) the MSA needs to be able to intercede before the product is put into service, but will have considerable challenges in knowing that the product is being placed on the market

b) significant costs (from delay and lost service) incurred by the client for the product.

c) potentially high 3rd party testing costs

The first weakness listed above means that MSAs would only be able to intercede if they knew the product has been, or is imminently, being placed on the market and for B2B transactions involving one-off customized products that process is not currently visible to MSAs. In practice, then this means that the most likely point where MSAs would be able to intervene are at customs borders (e.g. docks), or once the fan has arrived at site. An alternative option, is for the MSAs to be notified by the authorities responsible for approving large object haulage that a large industrial fan is being routed via the road network, although this would only cover a proportion of the total market.

Witness testing conformity verification approach

Unlike the case for the power transformer Ecodesign regulation No 548/2014 there are no requirements within the corresponding fan regulation granting MSAs the authority to conduct verification procedures at the manufacturers premises. This is explicable because, unlike the case for large power transformers, FATs are not yet the standards practice for large fans, thus, granting such a right to an MSA could incur additional costs for the manufacturer. Nonetheless, given that FATs are already conducted, and are essentially demanded in 100% of cases for some market segments it could be imagined that MSA's might also be granted this right for industrial fans in a future revision of the regulation providing that the circumstances could be adequately defined. The wording applied from the power transformer regulation is:

> "Given the weight and size limitations in the transportation of medium and large fans, Member States authorities may decide to undertake the verification procedure at the premises of manufacturers, before they are put into service in their final destination".

In theory this provision could be made conditional that it only applies to fans above a certain size and that it either applies to fans destined for use in specific applications (e.g. power stations, tunnels, metros, oild and gas etc.) or that it is conditional on the client requesting a FAT. In all other cases were an MSA to request to participate in a FAT it could be at the manufacturer's discretion and risk.

Figure 9 below illustrates the witness testing approach and the text beneath it summarises its strengths and weaknesses. Overall, the principal benefits of MSA's doing conformity verification via witness testing at the manufacturer's premises are that it avoids placing a burden onto the manufacturer and client (providing they were already intending to do a FAT) because the manufacturer, client and MSA can arrange for the witness test to be carried out when the factory acceptance test is already being conducted. When such FATs are already going to be scheduled there is negligible extra burden incurred from MSAs sending a witness to the test. This also means that the only costs incurred by the MSA are solely those involved with arranging to have an expert witness be present at the test, and hence will be considerably less expensive than conducting 3rd party verification testing, which requires test lab and logistics costs to be covered as well as insurance costs for loss or damage (which could be considerable for such valuable products). FAT witness testing thus allows more MSA conformity verification to be done at less cost.

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On the downside such FATs are only done for a minority of products presently and the MSA needs to be able to intercede before the product is definitively placed on the market, which, at a minimum, requires knowledge that an order has been placed but also requires cooperation from the producer. If the MSA is from the same country as the producer (which is more often the case than not for large industrial fans) they may be able to oblige the producer to inform them when an order has been placed so that they can arrange a witness test should they choose to. If it is not, then they need to find other means of knowing when an order has been placed and hence being able to request a witness test. In addition, witness tests are unlikely to be as robust from an MSA conformity verification perspective as 3rd party testing. The MSA would be reliant on finding a technically qualified independent expert to witness the test. Then the expert has to be technically capable of not only ensuring that: the test facilities and test equipment are capable of doing the test correctly, are properly calibrated and set-up and that the factory testing staff are following correct procedures; but, also of ensuring that there is no manipulation taking place during the testing or reporting of the results. Furthermore, the fact that the tests are not conducted in an accredited 3rd party test lab may render the outcome less legally enforceable. Even more so, because under the current wording in the Ecodesign regulation it is unclear whether a product that undergoes Ecodesign witness testing on a manufacturer's premises has yet been placed on the market. Nonetheless, in practice, were an MSA to find that a FAT witness test was unacceptable they could certainly threaten the producer with immediate 3rd party verification testing if they attempted to ship the product without having made modifications and without having passed a 2nd witness test.

As these 3rd party test costs would be charged to the producer, and the MSA would certainly notify the client of the failed witness test, it is highly unlikely that the producer would attempt to place the product on the market without it being approved by both the MSA and the client (especially, given that it is a made to order customized product). However, this is probably as far as the sanctions imposed by the MSA could go due to the difficulty of independently demonstrating non-compliance. Nonetheless, the threat of a lost order, the reputational damage and significant stranded assets is still a powerful deterrent.

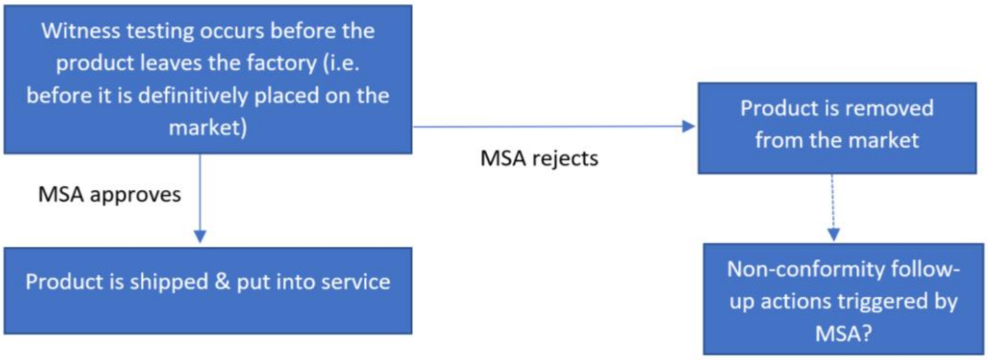

Figure 9. Ecodesign conformity verification through witness testing at place of manufacture approach

Advantages:

a) much cheaper than 3rd party testing providing a FAT is already scheduled and not limited by availability of 3rd party testing facilities,

b) minimises delays and inconvenience for both manufacturer and client

Weaknesses:

a) MSAs currently have no authority to demand such tests, with the potential exception of when the producer is within their own regional jurisdiction; also, FATs are currently conducted on less than 30% of the market

b) the MSA needs to be able to intercede before the product is definitively placed on the market, which, at a minimum, requires knowledge that an order has been placed but also requires cooperation from the producer to access their facilities

c) sanctions in event of non-conformity may not be legally enforceable other than prohibiting the product from being placed on the EEA market

d) testing is not fully independent, which may permit some manipulation

e) testing facilities are not necessarily/likely to be accredited

f) other lab competences, such as proper calibration and procedures, would need to be confirmed.

Conformity verification testing when putting into service approach

Given the inherent problems of knowing when a large customized fan is being placed on the market a 3rd conformity verification testing option could be to conduct testing when the product is being put into service. In principle there are two sub-options that could be applied. One is illustrated in Figure 10 and involves the product being taken from the site where it is due to be put into service and subjected to 3rd party verification testing.

The other is shown in Figure 11 and concerns the product being tested in situ. In theory, it would also be possible to arrange to have a product tested after it has been put into service (by either of the above methods) but this would require it to be taken out of service and would disrupt the service it is providing. In the case of large fans which are mostly used for large industrial applications, tunnels and infrastructure applications this could be a prohibitively disruptive and costly exercise for the fan client and may even be subject to legal challenge; therefore, this is not considered any further.

The only advantage that 3rd party testing when putting into service offers over 3rd party testing when placing on the market is that it is potentially another route by which an Ecodesign MSA could be informed that the product exists and has already been placed on the market. To be actionable it would require agreement that the client would inform the MSA that a product has been placed on the market and the date it is due to be delivered. Were that to happen an MSA could intervene and conduct 3rd party testing once a product has arrived at site; however, very few fans procuring clients are likely to voluntarily engage with such a requirement as it risks imposing unscheduled delays, while the product is removed and sent for testing, which may incur significant operational costs to the client. In practice, such a conformity verification pathway is only likely to be viable if there is a legal obligation on the client to inform the MSA. It is

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possible that some jurisdictions have already given such powers to their MSAs, or that there are other governmental entities that could grant such powers on request; however, in the absence of such powers it would require amendment to the Regulation, and possibly also the Ecodesign Directive, for such a requirement to become mandatory.

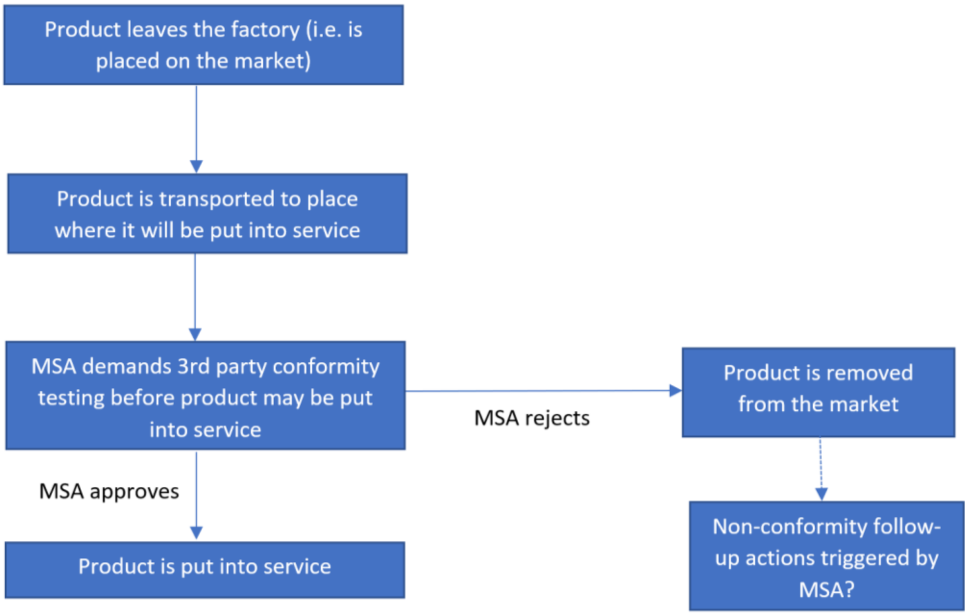

Figure 10. Ecodesign conformity verification via 3rd party testing when putting into service

Advantages:

a) the conformity verification tests are fully legally enforceable

b) knowledge of when the product is placed on the market is not required; only of when it is being put into service (which could be provided by the client and/or road network operatives)

Weaknesses:

a) the MSA needs to know the product is being put into service to intercede (note, this may not be as onerous as knowing the product is being placed on the market),

b) high 3rd party testing costs,

c) significant costs (from delay and lost service) incurred by client while product undergoes third party testing.

In principle, in situ testing when a product is due to be put into service overcomes the problem of the high burden of 3rd party testing on the client. In situ testing could be done by mobile testing equipment and is technically feasible to conduct. However, this would a) either need to be done before the product is installed within the system it is intended to be integrated into or b) conducted post such installation but with much less actionable results. This is because for the latter case site-specific system integration practice is very likely to lead to substantial physical changes in the fan flow conditions (due to different flow guides, barriers, etc.), which will not be the same as when the manufacturer tested the

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product and placed it on the market. In addition, the fan is also quite unlikely to be operating at its Best Efficiency Point after being installed (even if not yet put into service) and it may be impossible to recreate such conditions on site. In this event, the outcome would only be indicative of the real 3rd party test lab performance and would potentially require interpolation via fan laws physics to the BEP. In consequence, within a legal context the information gleaned could only be used for risk assessment purposes prior to potentially sending the product for off-site 3rd party conformity testing.

Thus at best, at present were a large fan to be shown to have poor performance via an in situ performance test the MSA could inform the client, who would then potentially have the option to not accept the product until the supplier has been able to demonstrate that it does comply with the regulations and stated energy performance (note, whether this is actually viable is likely to be highly dependent on the nature of the contractual arrangement between the client and the supplier). The MSA could also chose to use failure of an in situ test as a trigger for legally enforceable 3rd party testing; however, as this latter step would add an additional testing cost layer and would also result in operational delays and costs for the client, the MSA may only choose to pursue this course if they are quite confident that the product would also fail the 3rd party test and that legal measures could then be taken.

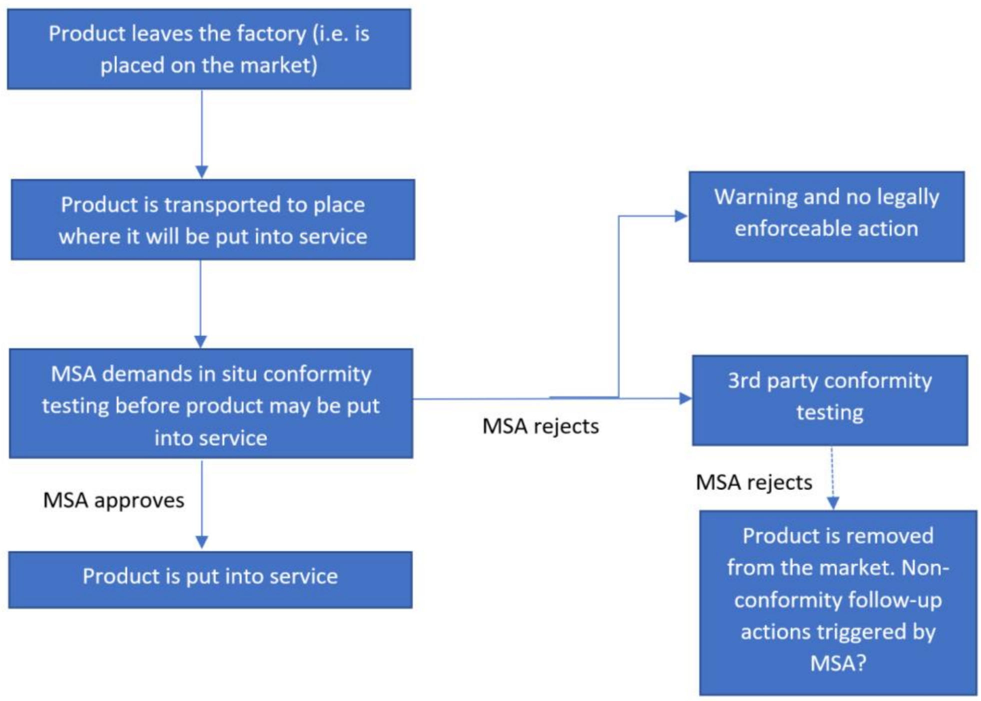

Figure 11. Ecodesign conformity verification via in situ testing when putting into service

Advantages:

a) no knowledge of when the product is placed on the market is required, only of when it is being put into service (which could be provided by the client or the road network operatives)

b) the conformity verification tests are fully legally enforceable if a product that is found to be suspicious under the in situ test is subsequently sent for 3rd party testing

c) even if legally enforceable 3rd party testing is not conducted (which would likely be at the supplier's expense if still found to be non-compliant) the MSA could inform the client and leave it with them as to how to proceed

d) availability of 3rd party test facilities capable of testing the product are not needed

e) the client will only incur a relatively short delay before the product can be put into service providing it is thought likely to comply and 3rd party testing is not undertaken.

Weaknesses:

a) the MSA needs to know the product is being put into service to intercede

b) test conditions and performance in situ are likely to deviate significantly from those at Best Efficiency Performance point within a 3rd party laboratory and thus results may be very difficult to interpret and not legally enforceable without subsequent 3rd party testing

c) high in-situ testing costs

d) in situ testing capability may not be available

e) high 3rd party testing costs could still be incurred in the event there is a need for a legally enforceable conformity verification ruling

f) significant costs (from delay and lost service) incurred by client for product if 3rd party testing is required.

4.3.3 Assessing regulatory scope and managing exemptions

Regulation 327/2011 has been found to be quite challenging to interpret for MSAs in large part due to the lack of a harmonised standard and inconsistencies in scope definitions used in the other available standards that are practically used to determine compliance.

Issues have arisen regarding whether the fan should be tested with or without protective grids in place, and if without, how to do this without damaging the fan

Some confusion has also arisen about how to treat the various elements making a fan system when moving from a: fan without housing, to a fan with housing, to a fan, housing plus diffuser. This arises considering that a fan system may have the following significant elements:

- Impeller
- Housing including: an Inlet bell, an Inlet guide, an Outlet guide, and an Outlet diffuser
- Motor
- Transmission
- Structural components
- Additional parts

As a result of these concerns it's been recognised that a harmonised standard is required (hence the issuing of the standards mandate, and harmonised standard development work described in section 2.3.1). Equally, industry representatives, such as the industry association EVIA, have recognised the need to develop guidance to support MSA efforts.

4.3.4 Auditing a manufacturer's management system

As reported in section 2.1 one conformity verification option permitted under the Ecodesign Directive is auditing a manufacturer's (environmental) management system (see Art. 8 and Annex V of Ecodesign Directive 2009/125/EC).

> Where a product covered by implementing measures is designed by an organisation registered in accordance with Regulation (EC) No 761/2001 of the European Parliament and of the Council of 19 March 2001 allowing voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) (1) and the design function is included within the scope of that registration, the management system of that organisation shall be presumed to comply with the requirements of Annex V to this Directive.
>
> If a product covered by implementing measures is designed by an organisation having a management system which includes the product design function, and which is implemented in accordance with harmonised standards, the reference numbers of which have been published in the Official Journal of the European Union, that management system shall be presumed to comply with the corresponding requirements of Annex V.

Thus far, no MSA is known to have conducted such an audit, however, at least one is reported to be in the process of trialling this option. Views among MSAs currently seem to vary about the potential efficacy and viability of such an approach. Some have speculated that were manufacturers to have secured accreditation issued by a NAB (National Accreditation Body) for the Ecodesign performance tests that this could be used as evidence of conformity. However, they have also noted that while accreditation puts demands on the independence of the organization performing the testing (i.e. they have to satisfy the procedures and competences set out in ISO 17025) that implementing this within Ecodesign conformity assessment would require a change in the verification process under the Ecodesign Directive, as currently conformity assessment is done by the manufacturer without any demands on accreditation (third party verification).

Other MSAs have noted that control or audit of quality systems at a manufacturer's premises is a competence of a conformity assessment body conducted in accordance with designated conformity procedure modules. The distinction is that market surveillance addresses activities carried out and measures taken by public authorities to ensure that products comply with requirements set out in the relevant Community harmonization legislation, while a conformity body is a body that performs conformity assessment activities including calibration, testing, certification and inspection according to article 2 (13) and (17) of the Regulation 765/2008/EC.

Yet other MSAs have questioned the degree to which such audits can demonstrate that products produced at the audited site will be in conformity with the relevant Ecodesign regulation.

On the other hand, some of the manufacturers interviewed for this project believe such audits are the most viable means of conducting market surveillance for industrial fans. Those advocating this approach assert that the only viable approach is to go into the manufacturers premises and to demand to audit their product design and type development and approval process for new fans. This would allow the "bad eggs" to be identified. The thinking behind this is that all industrial fan manufacturers use computer tools to design their products. The supplier assessment process could entail

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the MSA demanding to see the fan curves within the producer's fan design computer programs and the associated documentation. If an expert assessor were doing this task they would quickly be able to establish if the product does or could conform to the requirements. An 80:20 type rule could be applied to select the products to be assessed in this manner. For the products selected the test reports and fan curve data from the computer design tools could be requested and appraised. It is alleged this would rapidly establish the compliant producers from the non-compliant ones.

5. Conclusions and recommendations

5.1 Summary of findings

The material assembled in the main body of the report has described the business practices employed in the procurement, production, approval, supply and installation of large fans that have a bearing on the viability of different market surveillance approaches and has analysed the implications of these factors on the prospective approaches that MSAs may opt to use to conduct effective Ecodesign conformity verification.

It is found that the standard Ecodesign market surveillance conformity verification approach based on selecting a product for 3rd party verification testing is not very well adapted to large fans because:

- Large fans are customised made-to-order products that are procured under private B2B commercial arrangements and hence they are not produced in series, are not ordinarily available at a manufacturers premises for sampling, and are not advertised – which means that MSAs cannot employ usual market research methods to establish whether a product is placed on the market or not, and to sample and test the product

- even when it is established that a product is placed on the market, conducting 3rd party testing once a product has left the factory premises is costly to conduct and is liable to be disruptive and costly (mostly due to the delay it would cause in finalising the larger project the fan is a part of, but also in terms of lost operational value) to the business who has procured the product.

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

- the difficulty of an MSA knowing that a product order has been placed and hence being able to request a witness test

- the fact that MSAs may not have the authority to insist on being present and to impose conditions on the FATs (Critically the current Regulation 327/2011 has no provisions mandating this activity, unlike the equivalent regulation for power transformers)

- the fact that FATs are only currently requested for some products by clients

- challenges MSAs face in securing expert 3rd party technical assistance to conduct this form of conformity verification

- the potential for manipulation of test results by …….

- possible limits on the legal powers that can be exercised in the event an MSA rejects a product following a witness test.

Prospective alternative approaches including 3rd party testing prior to commissioning (i.e. putting into service on site), in situ testing and conformity verification of environmental management systems were also considered but are found to be unviable as a means for making a final compliance determination; they, could however, be used to establish non-conformity risk as a prelude to 3rd party testing or to alert industrial fan clients to potential non-conformity risk.

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

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

5.2 Recommendations

It is proposed that MSA conformity verification approaches be structured to take the findings of this report into account when considering the different prospective verification testing pathways.

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

- all enterprises likely to procure large fans – including process industries, mining, infrastructure sectors responsible for tunnels and metros, electricity generators, transportation sector, etc.
- the system integration contractors likely to manage projects involving the installation of fans
- the authorities responsible for granting permission to move large loads on the road network.

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

For the latter case, they should secure an agreement that they will systematically inform the MSA once they have received a request for a permit to transport a large fan and share the main details concerning the type of product and its characteristics, the enterprise who is requesting the permit including contact information, the route being taken and the date of movement.

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

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

If MSAs are informed when the order for the large fan is first placed then they have the option of approaching the manufacturer and client about potentially requesting to conduct conformity verification via FAT witness testing at the place of manufacture (presuming it is the same Member State as the place of installation). Otherwise, any conformity verification testing would need to occur while the product is in transit or is poised to be put into to service. The

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possibility that MSAs may choose to do this if market actors have not chosen to inform them soon enough for a witness test to be conducted should serve as a deterrent against this behaviour, as it risks incurring significant lost service (downtime) costs to the product procurer. Note, the option to test in transit is true whether the product is manufactured within the EEA or not and hence helps to address any potential asymmetry of treatment that might create an unlevel playing field based on the location of the supplier.

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

- to properly document ways that cheating in FATs could occur and to devise strategies to overcome them, and
- ensure there is a competent independent 3rd party inspectorate community available for MSAs to hire
- to establish minimum qualification criteria for the supplier's test facilities and test procedures,
- allow external measurement equipment to be used in a manufacturers lab.

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Appendix A: Regulation No. 327/2011

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

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (1) and in particular Article 15(1) thereof,

After consulting the Ecodesign Consultation Forum,

Whereas:

(1) Under Directive 2009/125/EC ecodesign requirements are to be set by the Commission for energy-related products representing significant volumes of sales and trade, having a significant environmental impact and presenting significant potential for improvement in terms of their environmental impact without entailing excessive costs.

(2) Article 16(2) of Directive 2009/125/EC provides that in accordance with the procedure referred to in Article 19(3) and the criteria set out in Article 15(2), and after consulting the Consultation Forum, the Commission will, as appropriate, introduce an implementing measure for products using electric motor systems.

(3) Fans driven by motors with an electric input power between 125 W and 500 kW are an important part of various gas handling products. Minimum energy efficiency requirements have been established for electric motors in Commission Regulation (EC) No 640/2009 of 22 July 2009 implementing Directive 2005/32/EC

(1) OJ L 285, 31.10.2009, p. 10.

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of the European Parliament and of the Council with regard to ecodesign requirements for electric motors (2), including electric motors equipped with variable speed drives. They also apply to those motors which are part of a motor-fan system. However, many fans covered by this Regulation are used in combination with motors not covered by Regulation (EC) No 640/2009.

(4) Total electricity consumption of fans driven by motors with an electric input power between 125 W and 500 kW is 344 TWh per year, rising to 560 TWh in 2020 if current Union market trends persist. The cost- efficient improvement potential through design is about 34 TWh per year in 2020, which corresponds to 16 Mt of CO_2 emissions. Consequently, fans with an electric input power between 125 W and 500 kW represent a product for which ecodesign requirements should be established.

(5) Many fans are integrated in other products without being separately placed on the market or put into service within the meaning of Article 5 of Directive 2009/125/EC and of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (3). To achieve most of the cost-efficient energy-saving potential and facilitate enforcement of the measure, fans between 125 W and 500 kW integrated in other products should also be subject to the provisions of this Regulation.

(6) Many fans are part of ventilation systems installed in buildings. National legislation based on Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (4), may set new stricter energy efficiency requirements on those ventilation systems, using the calculation and measurement methods defined in this regulation as regards the efficiency of the fan.

(2) OJ L 191, 23.7.2009, p. 26.

(3) OJ L 157, 9.6.2006, p. 24.

(4) OJ L 153, 18.6.2010, p. 13.

The Commission has carried out a preparatory study which analysed the technical, environmental and economic aspects of fans. The study was developed together with stakeholders and interested parties from the Union and third countries, and the results have been made publicly available. Further work and consultations showed that the scope could be further extended subject to exemptions being made for particular applications where the requirements would not be appropriate.

(7) The preparatory study showed that fans driven by motors with an input power between 125 W and 500 kW are placed on the Union market in large quantities, with their use-phase energy consumption being the most significant environmental aspect of all life-cycle phases.

(8) The preparatory study shows that electricity consumption in use is the only significant ecodesign parameter relating to product design as laid down in Directive 2009/125/EC.

(9) Improvements in the energy efficiency of fans driven by motors with an electric input power between 125 W and 500 kW should be achieved by applying existing non- proprietary cost-effective technologies that can reduce the total combined costs of purchasing and operating them.

(10) Ecodesign requirements should harmonise the energy efficiency requirements for fans driven by motors with an electric input power between 125 W and 500 kW throughout the Union, thus contributing to the functioning of the internal market and to the improvement of the environmental performance of these products.

(11) Small fans (indirectly) driven by an electric motor between 125 W and 3 kW which primarily serves other functionalities are not within the scope. For illus- tration a small fan to cool the electric motor in a chain saw is not within the scope, even if the motor of the chain saw itself (which is also driving the fan) is above 125 W.

(12) An appropriate timeframe should be provided for manufacturers to redesign products and to adapt production lines. The timing should be such that negative impacts on the supply of fans driven by motors with an electric input power between 125 W and 500 kW are avoided, and cost impacts for manufacturers, in particular small and medium-sized enterprises, are taken into account,

while ensuring timely achievement of the objectives of this Regulation.

(13) A review of this Regulation is foreseen no later than 4 years after its entry into force. The review process may be initiated earlier if evidence reaches the Commission that warrants this. The review should in particular assess the setting of technology independent requirements, the potential of the use of variable speed drives (VSD) and the necessity of the number and scope of exemptions as well as the inclusion of fans below 125 W electric input power.

(14) The energy efficiency of fans driven by motors with an electric input power between 125 W and 500 kW should be determined through reliable, accurate and reproducible measurement methods, which take into account the recognised state of the art, including, where available, harmonised standards adopted by the European standardisation bodies, as listed in Annex I to Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services ([1]).

(15) This Regulation should increase the market penetration of technologies that limit the life-cycle environmental impact of fans driven by motors with an electric input power between 125 W and 500 kW, leading to annual estimated electricity savings of 34 TWh by 2020, compared to the situation where no measures are taken.

(16) In accordance with Article 8 of Directive 2009/125/EC, this Regulation should specify the applicable conformity assessment procedures.

(17) In order to facilitate compliance checks, manufacturers should be requested to provide information in the technical documentation referred to in Annexes IV and V to Directive 2009/125/EC.

(18) In order to further limit the environmental impact of fans driven by motors with an electric input power between 125 W and 500 kW, manufacturers should provide relevant information on disassembly, recycling or disposal at end-of-life of such fans.

(19) Benchmarks for currently available fan types with high energy efficiency should be identified. This will help to ensure the wide availability and easy accessibility of information, in particular for small and medium-sized enterprises and very small firms, which will further facilitate the integration of best design technologies and facilitate the development of more efficient products for reducing energy consumption.

([1]) OJ L 204, 21.7.1998, p. 37.

The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 19(1) of Directive 2009/125/EC,

HAS ADOPTED THIS REGULATION:

Article 1

Subject matter and scope

1. This Regulation establishes ecodesign requirements for the placing on the market or putting into service of fans, including those integrated in other energy-related products as covered by Directive 2009/125/EC.

2. The Regulation shall not apply to fans integrated in:

(i) products with a sole electric motor of 3 kW or less where the fan is fixed on the same shaft used for driving the main functionality;

(ii) laundry and washer dryers ≤ 3 kW maximum electrical input power;

(iii) kitchen hoods < 280 W total maximum electrical input power attributable to the fan(s).

3. This Regulation shall not apply to fans which are:

(a) designed specifically to operate in potentially explosive atmospheres as defined in Directive 94/9/EC of the European Parliament and of the Council (1);

(b) designed for emergency use only, at short-time duty, with regard to fire safety requirements set out in Council Directive 89/106/EC(2);

(c) designed specifically to operate:

(i) (a) where operating temperatures of the gas being moved exceed 100 °C;

(b) where operating ambient temperature for the motor, if located outside the gas stream, driving the fan exceeds 65 °C;

(ii) where the annual average temperature of the gas being moved and/or the operating ambient temperature for the motor, if located outside the gas stream, are lower than − 40 °C;

with a supply voltage > 1 000 V AC or > 1 500 V DC;

(iii) in toxic, highly corrosive or flammable environments or in environments with abrasive substances;

(d) placed on the market before 1 January 2015 as replacement for identical fans integrated in products which were placed on the market before 1 January 2013; except that the packaging, the product information and the technical documentation must clearly indicate regarding (a), (b) and (c) that the fan shall only be used for the purpose for which it is designed and regarding (d) the product(s) for which it is intended.

Article 2

Definitions

In addition to the definitions set out in Directive 2009/125/EC, the following definitions shall apply:

1. 'Fan' means a rotary bladed machine that is used to maintain a continuous flow of gas, typically air, passing through it and whose work per unit mass does not exceed 25 kJ/kg, and which:

— is designed for use with or equipped with an electrical motor with an electric input power between 125 W and 500 kW (≥ 125 W and ≤ 500 kW) to drive the impeller at its optimum energy efficiency point,

— is an axial fan, centrifugal fan, cross flow fan or mixed flow fan,

— may or may not be equipped with a motor when placed on the market or put into service;

2. 'Impeller' means the part of the fan that is imparting energy into the gas flow and is also known as the fan wheel;

3. 'Axial fan' means a fan that propels gas in the direction axial to the rotational axis of one or more impeller(s) with a swirling tangential motion created by the rotating impeller(s). The axial fan may or may not be equipped with a cylindrical housing, inlet or outlet guide vanes or an orifice panel or orifice ring;

(1) OJ L 100, 19.4.1994, p. 1.

(2) OJ L 40, 11.2.1989, p. 12.

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4. 'Inlet guide vanes' are vanes positioned before the impeller to guide the gas stream towards the impeller and which may or may not be adjustable;

5. 'Outlet guide vanes' are vanes positioned after the impeller to guide the gas stream from the impeller and which may or may not be adjustable;

6. 'Orifice panel' means a panel with an opening in which the fan sits and which allows the fan to be fixed to other structures;

7. 'Orifice ring' means a ring with an opening in which the fan sits and which allows the fan to be fixed to other structures;

8. 'Centrifugal fan' means a fans in which the gas enters the impeller(s) in an essentially axial direction and leaves it in a direction perpendicular to that axis. The impeller may have one or two inlets and may or may not have a housing;

9. 'Centrifugal radial bladed fan' means a centrifugal fan where the outward direction of the blades of the impeller(s) at the periphery is radial relative to the axis of rotation;

10. 'Centrifugal forward curved fan' means a centrifugal fan where the outward direction of the blades of the impeller(s) at the periphery is forward relative to the direction of rotation;

11. 'Centrifugal backward curved fan without housing' means a centrifugal fan where the outward direction of the blades of the impeller(s) at the periphery is backward relative to the direction of rotation and which does not have a housing;

12. 'Housing' means a casing around the impeller which guides the gas stream towards, through and from the impeller;

13. 'Centrifugal backward curved fan with housing' means a centrifugal fan with an impeller where the outward direction of the blades at the periphery is backward relative to the direction of rotation and which has a housing;

14. 'Cross flow fan' means a fan in which the gas path through the impeller is in a direction essentially at right angles to its axis both entering and leaving the impeller at its periphery;

15. 'Mixed flow fan' means a fan in which the gas path through the impeller is intermediate between the gas path in fans of centrifugal and axial types;

16. 'Short-time duty' means working of a motor at a constant load, which is not long enough to reach temperature equilibrium;

17. 'Ventilation fan' means a fan that is not used in the following energy-related products:

— laundry and washer dryers > 3 kW maximum electrical input power,

— indoor units of household air-conditioning products and indoor household air-conditioners, ≤ 12 kW maximum airco output power,

— information technology products;

18. The 'specific ratio' means the stagnation pressure measured at the fan outlet divided by the stagnation pressure at the fan inlet at the optimal energy efficiency point of the fan.

Article 3

Ecodesign requirements

1. The ecodesign requirements for fans are set out in Annex I.

2. Each fan energy efficiency requirement of Annex I Section 2 shall apply in accordance with the following timetable:

(a) first tier: from 1 January 2013, ventilation fans shall not have a lower target energy efficiency than as defined in Annex I, Section 2, Table 1;

(b) second tier: from 1 January 2015, all fans shall not have a lower target energy efficiency than as defined in Annex I, Section 2, Table 2.

3. The product information requirements on fans and how they must be displayed are as set out in Annex I, Section 3. These requirements shall apply from 1 January 2013.

4. The fan energy efficiency requirements of Annex I Section 2 shall not apply to fans which are designed to operate:

(a) with an optimum energy efficiency at 8 000 rotations per minute or more;

(b) in applications in which the 'specific ratio' is over 1,11;

(c) as conveying fans used for the transport of non-gaseous substances in industrial process applications.

5. For dual use fans designed for both ventilation under normal conditions and emergency use, at short-time duty, with regard to fire safety requirements as set out in Directive 89/106/EC, the values of the applicable efficiency grades set out in Annex I Section 2 will be reduced by 10 % for Table 1 and by 5 % for Table 2.

6. Compliance with ecodesign requirements shall be measured and calculated in accordance with requirements set out in Annex II.

Article 4

Conformity assessment

The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV to that Directive or the management system for assessing conformity set out in Annex V to that Directive.

Article 5

Verification procedure for market surveillance purposes

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the verification procedure set out in Annex III to this Regulation.

Article 6

Indicative benchmarks

The indicative benchmarks for the best-performing fans available on the market at the time of entry into force of this Regulation are set out in Annex IV.

Article 7

Revision

The Commission shall review this Regulation no later than 4 years after its entry into force and present the result of this review to the Ecodesign Consultation Forum. The review shall in particular assess the feasibility of reducing the number of fan types in order to reinforce competition on grounds of energy efficiency for fans which can fulfil a comparable function. The review shall also assess whether the scope of exemptions can be reduced, including allowances for dual use fans.

Article 8

Entry into force

This Regulation shall enter into force on the 20th day following its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 30 March 2011.

For the Commission

The President

José Manuel BARROSO

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ANNEX I

5.2.1 ECODESIGN REQUIREMENTS FOR FANS

1. **Definitions for the purposes of Annex I**

(1) 'Measurement category' means a test, measurement or usage arrangement that defines the inlet and outlet conditions of the fan under test.

(2) 'Measurement category A' means an arrangement where the fan is measured with free inlet and outlet conditions.

(3) 'Measurement category B' means an arrangement where the fan is measured with free inlet and with a duct fitted to its outlet.

(4) 'Measurement category C' means an arrangement where the fan is measured with a duct fitted to its inlet and with free outlet conditions.

(5) 'Measurement category D' means an arrangement where the fan is measured with a duct fitted to its inlet and outlet.

(6) 'Efficiency category' means the fan gas output energy form used to determine the fan energy efficiency, either static efficiency or total efficiency, where:

(a) 'fan static pressure' (p_{sf}) has been used to determine fan gas power in the efficiency equation for fan static efficiency; and

(b) 'fan total pressure' (p_f) has been used to determine fan gas power in the efficiency equation for total efficiency.

(7) 'Static efficiency' means the energy efficiency of a fan, based upon measurement of the 'fan static pressure' (p_{sf}).

(8) 'Fan static pressure' (p_{sf}) means the fan total pressure (p_f) minus the fan dynamic pressure corrected by the Mach factor.

(9) 'Stagnation pressure' means the pressure measured at a point in a flowing gas if it were brought to rest via an isentropic process.

(10) 'Dynamic pressure' means the pressure calculated from the mass flow rate, the average gas density at the outlet and the fan outlet area.

(11) 'Mach factor' means a correction factor applied to dynamic pressure at a point, defined as the stagnation pressure minus the pressure with respect to absolute zero pressure which is exerted at a point at rest relative to the gas around it and divided by the dynamic pressure.

(12) 'Total efficiency' means the energy efficiency of a fan, based upon measurement of the 'fan total pressure' (p_f).

(13) 'Fan total pressure' (p_f) means the difference between the stagnation pressure at the fan outlet and the stagnation pressure at the fan inlet.

(14) 'Efficiency grade' is a parameter in the calculation of the target energy efficiency of a fan of specific electric input power at its optimum energy efficiency point (expressed as parameter 'N' in the calculation of the fan energy efficiency).

(15) The 'target energy efficiency' (η_{target}) is the minimum energy efficiency a fan must achieve in order to meet the requirements and is based on its electrical input power at its point of optimum energy efficiency, where η_{target} is the output value from the appropriate equation in Section 3 of Annex II, using the applicable integer N of the efficiency grade (Annex I, Section 2, Tables 1 and 2) and the electrical power input $P_{e(d)}$ of the fan expressed in kW at its point of optimum energy efficiency in the applicable energy efficiency formula.

(16) 'Variable speed drive (VSD)' means an electronic power converter integrated — or functioning as one system — with the motor and the fan, that continuously adapts the electrical power supplied to the electric motor in order to control the mechanical power output of the motor according to the torque-speed characteristic of the load being driven by the motor, excluding variable voltage controllers where only the supply voltage for the motor is varied.

(17) 'Overall efficiency is either 'static efficiency' or 'total efficiency', whichever is applicable.

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2. Fan energy efficiency requirements

The minimum energy efficiency requirements for fans are set out in Tables 1 and 2.

Table 1

First tier minimum energy efficiency requirements for fans from 1 January 2013

Fan types	Measurement category (A-D)	Efficiency category (static or total)	Power range P in kW	Target energy efficiency	Efficiency grade (N)
Axial fan	A, C	static	$0,125 \le P \le 10$	$\eta_{target} = 2,74 \cdot \ln(P) - 6,33 + N$	36
			$10 < P \le 500$	$\eta_{target} = 0,78 \cdot \ln(P) - 1,88 + N$	
	B, D	total	$0,125 \le P \le 10$	$\eta_{target} = 2,74 \cdot \ln(P) - 6,33 + N$	50
			$10 < P \le 500$	$\eta_{target} = 0,78 \cdot \ln(P) - 1,88 + N$	
Centrifugal forward curved fan and centrifugal radial bladed fan	A, C	static	$0,125 \le P \le 10$	$\eta_{target} = 2,74 \cdot \ln(P) - 6,33 + N$	37
			$10 < P \le 500$	$\eta_{target} = 0,78 \cdot \ln(P) - 1,88 + N$	
	B, D	total	$0,125 \le P \le 10$	$\eta_{target} = 2,74 \cdot \ln(P) - 6,33 + N$	42
			$10 < P \le 500$	$\eta_{target} = 0,78 \cdot \ln(P) - 1,88 + N$	
Centrifugal backward curved fan without housing	A, C	static	$0,125 \le P \le 10$	$\eta_{target} = 4,56 \cdot \ln(P) - 10,5 + N$	58
			$10 < P \le 500$	$\eta_{target} = 1,1 \cdot \ln(P) - 2,6 + N$	
Centrifugal backward curved fan with housing	A, C	static	$0,125 \le P \le 10$	$\eta_{target} = 4,56 \cdot \ln(P) - 10,5 + N$	58
			$10 < P \le 500$	$\eta_{target} = 1,1 \cdot \ln(P) - 2,6 + N$	
	B, D	total	$0,125 \le P \le 10$	$\eta_{target} = 4,56 \cdot \ln(P) - 10,5 + N$	61
			$10 < P \le 500$	$\eta_{target} = 1,1 \cdot \ln(P) - 2,6 + N$	
Mixed flow fan	A, C	static	$0,125 \le P \le 10$	$\eta_{target} = 4,56 \cdot \ln(P) - 10,5 + N$	47
			$10 < P \le 500$	$\eta_{target} = 1,1 \cdot \ln(P) - 2,6 + N$	
	B, D	total	$0,125 \le P \le 10$	$\eta_{target} = 4,56 \cdot \ln(P) - 10,5 + N$	58
			$10 < P \le 500$	$\eta_{target} = 1,1 \cdot \ln(P) - 2,6 + N$	
Cross flow fan	B, D	total	$0,125 \le P \le 10$	$\eta_{target} = 1,14 \cdot \ln(P) - 2,6 + N$	13
			$10 < P \le 500$	$\eta_{target} = N$	

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Table 2
Second tier minimum energy efficiency requirements for fans from 1 January 2015

Fan types	Measurement category (A-D)	Efficiency category (static or total)	Power range P in kW	Target energy efficiency	Efficiency grade (N)
Axial fan	A, C	static	0,125 ≤ P ≤ 10	$\eta_{target} = 2{,}74 \cdot \ln(P) - 6{,}33 + N$	40
			10 < P ≤ 500	$\eta_{target} = 0{,}78 \cdot \ln(P) - 1{,}88 + N$	
	B, D	total	0,125 ≤ P ≤ 10	$\eta_{target} = 2{,}74 \cdot \ln(P) - 6{,}33 + N$	58
			10 < P ≤ 500	$\eta_{target} = 0{,}78 \cdot \ln(P) - 1{,}88 + N$	
Centrifugal forward curved fan and centrifugal radial bladed fan	A, C	static	0,125 ≤ P ≤ 10	$\eta_{target} = 2{,}74 \cdot \ln(P) - 6{,}33 + N$	44
			10 < P ≤ 500	$\eta_{target} = 0{,}78 \cdot \ln(P) - 1{,}88 + N$	
	B, D	total	0,125 ≤ P ≤ 10	$\eta_{target} = 2{,}74 \cdot \ln(P) - 6{,}33 + N$	49
			10 < P ≤ 500	$\eta_{target} = 0{,}78 \cdot \ln(P) - 1{,}88 + N$	
Centrifugal backward curved fan without housing	A, C	static	0,125 ≤ P ≤ 10	$\eta_{target} = 4{,}56 \cdot \ln(P) - 10{,}5 + N$	62
			10 < P ≤ 500	$\eta_{target} = 1{,}1 \cdot \ln(P) - 2{,}6 + N$	
Centrifugal backward curved fan with housing	A, C	static	0,125 ≤ P ≤ 10	$\eta_{target} = 4{,}56 \cdot \ln(P) - 10{,}5 + N$	61
			10 < P ≤ 500	$\eta_{target} = 1{,}1 \cdot \ln(P) - 2{,}6 + N$	
	B, D	total	0,125 ≤ P ≤ 10	$\eta_{target} = 4{,}56 \cdot \ln(P) - 10{,}5 + N$	64
			10 < P ≤ 500	$\eta_{target} = 1{,}1 \cdot \ln(P) - 2{,}6 + N$	
Mixed flow fan	A, C	static	0,125 ≤ P ≤ 10	$\eta_{target} = 4{,}56 \cdot \ln(P) - 10{,}5 + N$	50
			10 < P ≤ 500	$\eta_{target} = 1{,}1 \cdot \ln(P) - 2{,}6 + N$	
	B, D	total	0,125 ≤ P ≤ 10	$\eta_{target} = 4{,}56 \cdot \ln(P) - 10{,}5 + N$	62
			10 < P ≤ 500	$\eta_{target} = 1{,}1 \cdot \ln(P) - 2{,}6 + N$	
Cross flow fan	B, D	total	0,125 ≤ P ≤ 10	$\eta_{target} = 1{,}14 \cdot \ln(P) - 2{,}6 + N$	21
			10 < P ≤ 500	$\eta_{target} = N$	

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3. **Product information requirements on fans**

1. The information on fans set out in points 2(1) to 2(14) shall be visibly displayed on:

   (a) the technical documentation of fans;

   (b) free access websites of manufacturers of fans.

2. The following information shall be displayed:

   (1) overall efficiency (η), rounded to 1 decimal place;

   (2) measurement category used to determine the energy efficiency (A-D);

   (3) efficiency category (static or total);

   (4) efficiency grade at optimum energy efficiency point;

   (5) whether the calculation of fan efficiency assumed use of a VSD and if so, whether the VSD is integrated within the fan or the VSD must be installed with the fan;

   (6) year of manufacture;

   (7) manufacturer's name or trade mark, commercial registration number and place of manufacturer;

   (8) product's model number;

   (9) the rated motor power input(s) (kW), flow rate(s) and pressure(s) at optimum energy efficiency;

   (10) rotations per minute at the optimum energy efficiency point;

   (11) the 'specific ratio';

   (12) information relevant for facilitating disassembly, recycling or disposal at end-of-life;

   (13) information relevant to minimise impact on the environment and ensure optimal life expectancy as regards installation, use and maintenance of the fan;

   (14) description of additional items used when determining the fan energy efficiency, such as ducts, that are not described in the measurement category and not supplied with the fan.

3. The information in the technical documentation shall be provided in the order as presented in points 2(1) to 2(14). The exact wording used in the list does not need to be repeated. It may be displayed using graphs, figures or symbols rather than text.

4. The information referred to in points 2(1), 2(2), 2(3), 2(4) and 2(5) shall be durably marked on or near the rating plate of the fan, where for point 2(5) one of the following forms of words must be used to indicate what is applicable:

   — 'A variable speed drive must be installed with this fan',

   — 'A variable speed drive is integrated within the fan'.

5. Manufacturers shall provide information in the manual of instruction on specific precautions to be taken when fans are assembled, installed or maintained. If provision 2(5) of the product information requirements indicates that a VSD must be installed with the fan, manufacturers shall provide details on the characteristics of the VSD to ensure optimal use after assembly.

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ANNEX II

MEASUREMENTS AND CALCULATIONS

1. Definitions for the purposes of Annex II

(1) 'Inlet stagnation volume flow rate' (q) is the volume of gas that passes through the fan per unit of time (in m^3/s) and is calculated on the basis of the mass of gas moved by the fan (in kg/s) divided by the density of this gas at the fan inlet (in kg/m^3).

(2) 'Compressibility factor' is a dimensionless number that describes the amount of compressibility that the gas stream experiences during the test and is calculated as the ratio of the mechanical work done by the fan on the gas to the work that would be done on an incompressible fluid with the same mass flow, inlet density and pressure ratio, taking into account the fan pressure as total pressure' (k_p) or 'static pressure' (k_{ps}).

(3) k_{ps} means compressibility coefficient for the calculation of fan static gas power.

(4) k_p means compressibility coefficient for the calculation of fan total gas power.

(5) 'Final assembly' means a finished or assembled on-site assembly of a fan that contains all the elements to convert electric energy into fan gas power without the need to add more parts or components.

(6) 'Not final assembly' means an assembly of fan parts, consisting of at least the impeller, which needs one or more externally supplied components in order to be able to convert electric energy into fan gas power.

(7) 'Direct drive' means a driving arrangement for a fan where the impeller is fixed to the motor shaft, either directly or with a co-axial coupling, and where the impeller speed is identical to the motor's rotational speed.

(8) 'Transmission' means a driving arrangement for a fan which is not 'direct drive' as defined above. Such driving arrangements may include transmissions using a belt-drive, gearbox or slipping coupling.

(9) 'Low-efficiency drive' means a transmission using a belt whose width is less than three times the height of the belt or using some other form of transmission apart from a 'high-efficiency drive'.

(10) 'High-efficiency drive' means a transmission using a belt whose width is at least three times the height of the belt, a toothed belt or using toothed gears.

2. Measurement method

For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations must be made using a reliable, accurate and reproducible method, which takes into account the generally recognised state-of-the-art measurement methods, and whose results are deemed to be of low uncertainty, including methods set out in documents the reference numbers of which have been published for that purpose in the *Official Journal of the European Union*.

3. Calculation method

The methodology for calculating the energy efficiency of a specific fan is based on the ratio of gas power to electrical input power to the motor, where fan gas power is the product of gas volume flow rate and pressure difference across the fan. The pressure is either the static pressure or the total pressure, which is the sum of static and dynamic pressure depending upon the measurement and efficiency category.

3.1. Where the fan is supplied as a 'final assembly', measure the gas power and the electric input power of the fan at its optimum energy efficiency point:

(a) where the fan does not include a variable speed drive, calculate the overall efficiency using the following equation:

$$\eta_e = P_{u(s)} / P_e$$

where:

η_e is the overall efficiency;

$P_{u(s)}$ is the fan gas power, determined according to point 3.3, of the fan when it is operating at its optimal energy efficiency point;

P_e is the power measured at the mains input terminals to the motor of the fan when the fan is operating at its optimal energy efficiency point;

(b) where the fan includes a variable speed drive, calculate the overall efficiency using the following equation:

$$\eta_e = (P_{u(s)} / P_{ed}) \cdot C_c$$

where:

η_e is the overall efficiency;

$P_{u(s)}$ is the fan gas power, determined according to point 3.3, of the fan when it is operating at its optimal energy efficiency point;

P_{ed} is the power measured at the mains input terminals to the variable speed drive of the fan when the fan is operating at its optimal energy efficiency point;

C_c is a part load compensation factor as follows:

— for a motor with a variable speed drive and $P_{ed} \geq 5$ kW, then $C_c = 1{,}04$,

— for a motor with a variable speed drive and $P_{ed} < 5$ kW, then $C_c = -0{,}03 \ln(P_{ed}) + 1{,}088$.

3.2. Where the fan is supplied as 'not final assembly', the fan overall efficiency is calculated at the impeller's optimum energy efficiency point, using the following equation:

$$\eta_e = \eta_r \cdot \eta_m \cdot \eta_T \cdot C_m \cdot C_c$$

where:

η_e is the overall efficiency;

η_r is the fan impeller efficiency according to $P_{u(s)} / P_a$

where:

$P_{u(s)}$ is fan gas power determined at the point of optimal energy efficiency for the impeller and according to point

3.3 below;

P_a is the fan shaft power at the point of optimal energy efficiency of the impeller;

η_m is the nominal rated motor efficiency in accordance with Regulation (EC) No 640/2009 whenever applicable. If the motor is not covered by Regulation (EC) No 640/2009 or in case no motor is supplied a default η_m is calculated for the motor using the following values:

— if the recommended electric input power 'Pe' is ≥ 0,75 kW,

$\eta_m = 0{,}000278*(x^3) - 0{,}019247*(x^2) + 0{,}104395*x + 0{,}809761$,

where $x = Lg\,(P_e)$,

and P_e is as defined in 3.1(a),

— if the recommended motor input power 'Pe' is < 0,75 kW,

$\eta_m = 0{,}1462*\ln(P_e) + 0{,}8381$,

and P_e is as defined in 3.1(a), where the electric input power Pe recommended by the manufacturer of the fan should be enough for the fan to reach its optimum energy efficiency point, taking into account losses from transmission systems if applicable.

η_T is the efficiency of the driving arrangement for which the following default values must be used:

— for direct drive $\eta_T = 1{,}0$;

— if the transmission is a low-efficiency drive as defined in 1(9) and

— $P_a \geq 5$ kW, $\eta_T = 0,96$, or

— 1 kW < P_a < 5 kW, $\eta_T = 0,0175 * Pa + 0,8725$, or

— $P_a \leq 1$ kW, $\eta_T = 0,89$,

— if the transmission is a high-efficiency drive as defined in 1(10) and

— $P_a \geq 5$ kW, $\eta_T = 0,98$,

— or 1 kW < P_a < 5 kW, $\eta_T = 0,01 * Pa + 0,93$, or

— $P_a \leq 1$ kW, $\eta_T = 0,94$.

C_m is the compensation factor to account for matching of components = 0,9; C_c is the part load compensation factor:

— for a motor without a variable speed drive $C_c = 1,0$,

— for a motor with a variable speed drive and $P_{ed} \geq 5$ kW, then $C_c = 1,04$,

— for a motor with a variable speed drive and $P_{ed} < 5$ kW, then $C_c = -0,03 \ln(P_{ed}) + 1,088$.

3.3. The fan gas power, $P_{u(s)}$ (kW), is calculated according to the measurement category test method chosen by the fan supplier:

(a) where the fan has been measured according to measurement category A, fan static gas power P_{us} is used from the equation $P_{us} = q \cdot p_{sf} \cdot k_{ps}$;

(b) where the fan has been measured according to measurement category B, fan gas power P_u is used from the equation $P_u = q \cdot p_f \cdot k_p$;

(c) where the fan has been measured according to measurement category C, fan static gas power P_{us} is used from the equation $P_{us} = q \cdot p_{sf} \cdot k_{ps}$;

(d) where the fan has been measured according to measurement category D, fan gas power P_u is used from the equation $P_u = q \cdot p_f \cdot k_p$.

4. Methodology for calculating the target energy efficiency

The target energy efficiency is the energy efficiency a fan from a given fan type must achieve in order to comply with the requirements set out in this Regulation (expressed in full percentage points). The target energy efficiency is calculated by efficiency formulas that include the electrical input power $P_{e(d)}$ and the minimum efficiency grade as defined in Annex I. The complete power range is covered by two formulas: one for fans with an electric input power from 0,125 kW up to and including 10 kW and the other for fans above 10 kW up to and including 500 kW.

There are three series of fan types for which energy efficiency formulas are developed to reflect the different characteristics of various fan types:

4.1. The target energy efficiency for axial fans, centrifugal forward curved fans and centrifugal radial bladed fans (axial fan within) is calculated using the following equations:

Power range P from 0,125 kW to 10 kW	Power range P from 10 kW to 500 kW
$\eta_{target} = 2,74 \cdot \ln(P) - 6,33 + N$	$\eta_{target} = 0,78 \cdot \ln(P) - 1,88 + N$

where the input power P is the electrical input power $P_{e(d)}$ and N is the integer of the energy efficiency grade required.

4.2. The target energy efficiency for centrifugal backward curved fans without housing, centrifugal backward curved fans with housing and mixed flow fans is calculated using the following equations:

Power range P from 0,125 kW to 10 kW	Power range P from 10 kW to 500 kW
$\eta_{target} = 4,56 \cdot \ln(P) - 10,5 + N$	$\eta_{target} = 1,1 \cdot \ln(P) - 2,6 + N$

where the input power P is the electrical input power $P_{e(d)}$ and N is the integer of the energy efficiency grade required.

4.3. The target energy efficiency for cross flow fans is calculated using the following equations:

Power range P from 0,125 kW to 10 kW	Power range P from 10 kW to 500 kW
$\eta_{target} = 1{,}14 \cdot \ln(P) - 2{,}6 + N$	$\eta_{target} = N$

where the input power P is the electrical input power $P_{e(d)}$ and N is the integer of the energy efficiency grade required.

5. Applying the target energy efficiency

The fan overall efficiency η_e calculated according to the appropriate method in Section 3 of Annex II must be equal to or greater than the target value η_{target} set by the efficiency grade to meet the minimum energy efficiency requirements.

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ANNEX III

VERIFICATION PROCEDURE FOR MARKET SURVEILLANCE PURPOSES[17]

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the following verification procedure for the requirements set out in Annex I.

1. The authorities of the Member State shall test one single unit.

2. The model shall be considered to comply with the provisions set out in this Regulation if the overall efficiency of the fan (η_e) is at least target energy efficiency*0,9 calculated using the formulas in Annex II (Section 3) and the applicable efficiency grades from Annex I.

3. If the result referred to in point 2 is not achieved:

   — for models that are produced in lower quantities than five per year, the model shall be considered not to comply with this Regulation,

   — for models that are produced in quantities of five or more per year, the market surveillance authority shall randomly test three additional units.

4. The model shall be considered to comply with the provisions set out in this Regulation if the average of the overall efficiency (η_e) of the three units referred to in point 3 is at least target energy efficiency*0,9 using the formulas in Annex II (Section 3) and the applicable efficiency grades from Annex I.

5. If the results referred to in point 4 are not achieved, the model shall be considered not to comply with this Regulation.

[17] Note, these requirements are now replaced by Annex X of Regulation COMMISSION REGULATION (EU) 2016/2282 of 30 November 2016 amending Regulations ... No 327/2011 ... with regard to the use of tolerances in verification procedures specifies the tolerances to be deployed in Ecodesign verification testing for fans

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ANNEX IV

INDICATIVE BENCHMARKS REFERRED TO IN ARTICLE 6

At the time of adoption of this Regulation, the best available technology on the market for fans is as indicated in Table 1. These benchmarks may not always be achievable in all applications or for the full power range covered by the Regulation.

Table 1

Indicative benchmarks for fans

Fan types	Measurement category (A-D)	Efficiency category (static or total)	Efficiency grade
Axial fan	A, C	static	65
	B, D	total	75
Centrifugal forward curved fan and centrifugal radial bladed fan	A, C	static	62
	B, D	total	65
Centrifugal backward curved fan without housing	A, C	static	70
Centrifugal backward curved fan with housing	A, C	static	72
	B, D	total	75
Mixed flow fan	A, C	static	61
	B, D	total	65
Cross flow fan	B, D	total	32

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Appendix B: CEN-CENELEC

European Committee for Standardisation (CEN)

Website: http://www.cen.eu/

CEN was officially created as an international non-profit association based in Brussels in 1975.

CEN is a business facilitator in Europe, removing trade barriers for European industry and consumers. Its mission is to foster the European economy in global trading, the welfare of European citizens and the environment. Through its services it provides a platform for the development of European Standards and other technical specifications.

CEN is a major provider of European Standards and technical specifications. It is the only recognised European organisation according to Directive 98/34/EC for the planning, drafting and adaption of European Standards in all areas of economic activity with the exception of electrotechnology (CENELEC) and telecommunications (ETSI).

CEN's 33 National Members work together to develop voluntary European Standards (ENs). These standards have a unique status since they also are national standards in each of its 33 Member countries. With one common standard in all these countries and every conflicting national standard withdrawn, a product can reach a far wider market with much lower development and testing costs. ENs help build a European Internal Market for goods and services and position Europe in the global economy. More than 60,000 technical experts as well as business federations, consumer and other societal interest organisations are involved in the CEN network that reaches over 480 million people.

In a globalised world, the need for international standards simply makes sense. The Vienna Agreement – signed by CEN in 1991 with ISO, its international counterpart – ensures technical cooperation by correspondence, mutual representation at meetings and coordination meetings, and adoption of the same text, as both an ISO Standard and a European Standard.

The European Commission and the European Free Trade Association Secretariat act as CEN's Counsellors in terms of regulatory or public interest. CEN works in a decentralised way. Its members – the National Standardisation Bodies of the EU and EFTA countries – operate the technical groups that draw up the standards, the CEN-CENELEC Management Centre in Brussels manages and coordinates this system. CEN is one of the three European Standards Organisations whose main objective is to remove trade barriers for European industry and consumers.

Aims – CEN, as the integrated system for European standardisation, aims to:

- Support and strengthen the achievement of the European Single Market;
- Enhance the competitiveness of European players in the global market;
- Foster the European economy and the welfare of European citizens under the global concept of sustainable development;

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- Ensure the most efficient input of Europe to international standardisations activities and cooperation.Through the delivery of formal standards, other deliverables and related services needed by interested parties in Europe, working closely with CENELEC and as closely as possible with ETSI to achieve all sectoral market needs.

Vision and mission.

CEN's mission is to fulfil the needs of our customers by:

- Being a leading partner of European Standards and related products and services for the benefit of all stakeholders and standard users in Europe, through transparent, balanced and consensus based processes within a sustainable infrastructure, including the promotion of innovative products and emerging technologies;

- Ensuring the quality, safety, environment and interoperability requirements for products, services and organisations;

- Adapting proactively to new developments and supporting European competitiveness, the protection of the environment and sustainable growth for the wellbeing of its citizens and strengthening of the internal market;

- Promoting the European Standardisation System and its results, leading the implementation of best practice in standardisation around the world.

Participation: 'CEN network – More than 60,000 technical experts from industry, associations, public administrations, academia and societal organisations are involved in the CEN network.

The stakeholders of the CEN System, both of the processes and the deliverables are industry, service, commerce and other market players and public and private institutions.

Most of them are represented in the CEN network through:

- National Members – constitute the final decision makers within CEN;

- Associate Members – represent interest groups of various dimensions at European level;

- Affiliates – are the National Standards Bodies from Central and Eastern Europe who may become CEN National Members;

- Partner standardisation bodies – National Standards Bodies that are member of ISO, but are unlikely to become CEN Members or CEN Affiliates for political or geographical reasons;

- Governmental bodies and other authorities, including the European Commission and the European Free Trade Association (EFTA);

- European organisations (mainly trade federations);

- Relations outside the European Union and EFTA.

National Members – The National Standards Bodies of the 28 European Union countries, The Former Yugoslav Republic of Macedonia and Turkey plus the National Standards Bodies of three European Free Trade Association countries (Iceland, Norway and Switzerland) compose CEN's National Membership.

The National Members:

- Make up the delegations to the technical committees by finding expertise in each country;
- Vote for, and implement, European Standards as national standards;
- Provide the secretariats of the committees;
- Finance more than 50% of the work;

In turn they are largely financed by industry, the sale of standards and government grants.

See also - http://www.cen.eu/cen/Members/Pages/default.aspx

Counsellors – Counsellors participate in the CEN General Assembly. They also attend the Administrative Board when policy issues are being discussed. Counsellors are from European institutions. At present there are two Counsellors: The European Commission, The EFTA Secretariat.

European and international organisations – European organisations: CEN works in conjunction with European organisations by granting them the status of Associated Standards Body or Technical Committee Liaison Organisation. International organisations: CEN has an agreement for technical cooperation with ISO. CEN has signed the World Trade Organisation's 'Code of Good Practice for the Preparation, Adoption and Application of Standards'.

Relations outside EU and EFTA – CEN represents the unique European standardisation (and consequent conformity assessment) model in the global arena. The scope of CEN's activities is quite broad, as is the nature of relations that many external organisations have with CEN.

However, in order to remain relevant in a globalised world dominated by global players, CEN cooperates more and more with CENELEC, the European Committee for Electrotechnical Standardisation, and ETSI, the European Telecommunications Standards Institute.

The European Commission and EFTA also actively support the global awareness activities carried out by CEN, CENELEC and ETSI as a tool to enhance the competitiveness of European businesses worldwide. These are the main reasons why CEN is active in so many areas of the world.

International collaboration can take many forms, from various types of formal cooperation agreements (Affiliates, Partner Standardisation Bodies, MoUs, other Agreements) to visibility grant agreement, co-funded by EC, EFTA, CEN CENELEC and ETSI (namely SESEC, SESEI and the EU-China Standards Information Platform) to technical assistance programmes. These are mainly aimed at increasing trade with partners outside the European Union and EFTA by sharing with them the European model of Quality Infrastructure and integrating them in the international standardisation.

Committee Structure:

Number of Committees:

Number of Technical Bodies:

- CEN Technical Bodies – 1978
- Active CEN Technical Committees – 307
- Active CEN Workshops – 23
- CEN Technical Committees/Sub-committees – 56
- CEN Working Groups – 1430
- CEN-CENELEC Technical Committees – 15
- CEN-CENELEC Working Groups – 2

List of sectors – see also http://www.cen.eu/cen/Sectors/Sectors/Pages/default.aspx

'Technical Committees and Workshops – Standards are driven by business and drafted by experts in the field. In building European consensus, industry, trade federations, public authorities, academia, NGO and other representatives are invited to contribute to the standardisation process. It is this open participation which accounts for the strength of European standardisation.

The route for participating in the development of European Standards is through a National Standards Body (NSB) or through a trade federation. Through the NSB, you can become involved in a national 'mirror committee' which is responsible for the developing a national position on a particular standard and representing this position to the relevant CEN Technical Committee. It may also be possible to become a member of the national delegation to the CEN Technical Committee or to be nominated to serve as an expert in one of the Working Groups. Most of our European Standards and other approved documents have been drawn up in Technical Committees.

The traditional possibilities of standardisation work is extended by the CEN Workshop to meet market needs in bridging the gap between consortia documents and European Standards. The CEN Workshop delivers a CEN Workshop Agreement (CWA), which is a less formal document. A CWA will satisfy market demands for a more flexible and timelier alternative to the traditional European Standard (EN), but one which still possesses the authority derived from the 'openness of participation' and agreement inherent in the operations of CEN and its national members. Participation in a workshop is thus open to anyone, non-Europeans being welcome, and the opportunity to participate will be widely advertised in advance by its proposers and by CEN and its member bodies.

Technical Committees – A Technical Committee (TC) is a technical decision making body with precise title, scope and work programme, established in the CEN System by the Technical Board (BT). A TC essentially manages the preparation of CEN deliverables – in accordance with an agreed business plan.

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A Technical Committee is composed of a chairperson, a secretary and CEN national members. The national delegations are designated by the CEN members. At meetings CEN national members are represented by a number of delegates, normally not exceeding three, one of whom acts as head of delegation. Other bodies may delegate observers to meetings. Observers in the TC may be Associates, Affiliates, European Commission and EFTA secretariats and on request, Observers from organisations that have been granted liaison and Specific PSBs, having indicated that they want and have been granted the right to participate in the TC.

A Technical Committee:

- Established and secures BT approval for its programme of work with precise title, scope and scheduled target dates for the critical stage of each project based on agreed business plans;
- Follows up and ensures the achievement/delivery of the work programme as detailed in the business plans;
- Follows up and ensures they achievement/delivery of the work programme as detailed in the business plan and in accordance with the CEN strategic aim to develop standards 'in production times needed by the market';
- Takes into account any ISO/IEC work coming within its scope, together with such data as may be supplied by members and by other relevant international organisations, and work on related subjects in any other Technical Committees (TC);
- Establishes an Editing Committee once work starts;
- Remains formally responsible should questions of amendment and interpretation arise pending the next periodic review of those standards is has produced;
- Supplies drafts in the reference language version for processing at the 3 key stages (CEN enquiry, formal vote and publication);
- Reviews all ENs within its responsibility at least every 5 years. In addition reviews other deliverables in accordance with the Internal Regulations Part 2.

See also - ftp://ftp.cen.eu/CEN/Services/Education/Handsonguides/Handsonstandards.pdf

CEN Workshops – In an era where the global standards market is gaining more and more international importance and recognition, CEN has introduced the CEN Workshop (WS) structure and process. This open process aims at bridging the gap between industrial consortia that produce de facto standards with the limited participation of interested parties, and the formal European standardisation process which produces standards through consensus under the authority of CEN member bodies. CEN WSs are flexible structure that benefits from the openness and consensus that are key values of CEN.

The CEN Workshop offers a new mechanism and approach to standardisation – a place where clients can bring their standardisation and specification requirements and are given the opportunity to find a solution in an environment 'tailor-made' for their needs. The Workshop concept provides a unique opportunity for any party faced with a challenge to find others in a similar situation, and to develop a result by consensus, validated in an open arena.

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The procedures for setting up and operating Workshops are deliberately kept to a minimum and all the decision-making powers rest with the interested parties themselves – the members of the Workshop. These include all market players (industry, service providers, administrations, users and consumers) and can come from any part of the globe. They are responsible for the funding and direction of the Workshop and for the approval of the deliverables.

The main activity of a CEN Workshop is the development and publication of the CEN Workshop Agreement (CWA).

Workshops can be introduced anywhere in the CEN environment, but the pressing needs of the Information Society meant that they were introduced first in the ICT area. The concept has since been successively applied to the non-ICT areas of CEN's activities.

Special consideration whether or not to create a Workshop is given:

1) where the proposed Secretariat of the WS and CCMC have identified a Technical body at European or International level (ISO, IEC, CEN and/or CLC) dealing with a topic similar to the proposed WS;

2) where the proposed Secretariat of the WS and CCMC have identified management system's aspects to be dealt with in the future WS;

3) where the proposed Secretariat of the WS and CCMC have identified Conformity Assessment's aspects to be dealt with in the proposed Workshop.

For list of Workshops etc, see also
http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/Workshops/Pages/default.aspx

and
http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/Pages/default.aspx

CEN is governed by the General Assembly of its National Members in accordance with its legal Statues (see also - ftp://ftp.cen.eu/BOSS/Reference_Documents/Statutes/Statutes_E.pdf). The General Assembly is responsible for the budget, membership and appointment of officers.

The Administrative Board (CA) is the authorised agent of the General Assembly to direct CEN's operations. It prepares the annual budget and membership applications. The Administrative Board is advised by two CA Consultative Committees (CACC):

- Consultative Committee for External Policy – The Vice President Policy, Mike Low (UK), chairs this committee which prepares and monitors decisions such as CEN's relationship with the European political environment, the enlargement of the European Union and European Economic Area, as well issues involving other European organisations and international or intercontinental standardisation.

- Consultative Committee for Financial Affairs – This committee is chaired by the Vice President Finance, Jorge Marques dos Santos (Portugal). It advises the Administrative Board on all financial aspects and specifically the running of the new Framework Partnership Agreement with the European Commission and EFTA Secretariat.

Technical Board – the Technical Board (BT) controls the standards programme and promotes its execution by the CEN Management Centre, Technical Committees and other bodies.

Presidential Committee – the Presidential Committee is a joint corporate body created by the CEN and CENELEC General Assemblies mandated by the Administrative Boards of both organisations to manage and administer the common CEN-CENELEC non sector specific policy and strategic issues, including Membership issues (potential new members, affiliates, PSB).

Director General – operations are managed by the Director General, who reports to the Administrative Board and the General Assembly. The Director General is based at the CEN-CENELEC Management Centre in Brussels, where about 90 staff members provide administrative and technical support to the CEN and CENELEC members, coordinate the decentralised standards' development programme, and publish the outputs.

See also
ftp://ftp.cen.eu/BOSS/Reference_Documents/IR/CEN_CLC/IR1_E.pdf

Constitution and organisation – CEN is a major provider of European Standards and technical specifications. It is the only recognised European Organisation according to Directive 83/189 (now called Directive 98/34/EC) for the planning, drafting and adoption of European Standards in all areas of economic activity with the exception of electrotechnology (CENELEC) and telecommunications (ETSI).

CEN has a particular responsibility due to the New Approach where standards define specific technical details in connection with European legislation and the New Legislative Framework – NLF.

See also
http://www.cen.eu/boss/supporting/Guidance%20documents/GD009%20-%20Guidance%20on%20the%20New%20Approach/Pages/default.aspx

European standardisation has a variety of stakeholders:

- National Standards Bodies (NSB), which constitute the final decision makers within CEN;
- Associates, who represent interest groups of various dimensions at European level;
- Affiliates, which are NSBs from central and Eastern Europe included in the European Neighbourhood Policy;
- Governmental bodies and other public authorities, including EC/EFTA;
- Private companies of all sizes, from various industrial and service sectors;
- Trade associations at European and national level;
- Public and private institutions, including universities and other academic bodies;
- Social partners, i.e. representatives of particular interest groups at European and national level;
- Partner standardisation bodies;

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- A wide range of representatives from the conformity assessment community including testing and certification.

Many of these stakeholders are at the same time customers and 'standards producers'.

CEN is an international association governed by Belgian law.

List of abbreviations

ADCO – Administrative Co-operation Working Group

BT – Technical Board

CA – Administrative Board

CCAC – Administrative Board Consultative Committees

CCMC – CEN-CENELEC Management Centre

CEN – European Committee for Standardisation

CENELEC – European Committee for Electrotechnical Standardization

CLC – CENELEC (contraction)

CFD – Computational Fluid Dynamics

CWA – CEN Workshop Agreement

EC – European Commission

EEA – European Economic Area

EFTA – European Free Trade Association

EN – European Standard (Norm)

EPC – Engineering/Electrical Performance Contractor

ETSI – European Telecommunications Standards Institute

EU – European Union

FAT – Factory Acceptance Test

ISO – International Organisation for Standards

IEC – International Electrotechnical Committee

ITU – International Telecommunications Union

MS – Member State

MSA – Market Surveillance Authority

MV&E – Monitoring Verification & Enforcement

NGO – Non-Governmental Organisation

NLF – New Legislative Framework

NSB – National Standards Body

OEM – Original Equipment Manufacturer

SESEC – Seconded European Standardization Expert in China

SESEI – Seconded European Standardization Expert in India

TC – Technical Committee

WS – Workshop

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More information
about the INTAS project activities
and all of its results
are published on:

www.INTAS-testing.eu

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TRANSFORMERS FANS