EuP Preparatory Study Lot 11 on Electric Motors

Minutes of Second Stakeholder Meeting on Fans for Ventilation in Non-Residential Buildings

Tuesday 5 December 2006

Venue: VDMA, Lyonerstraße 18, 60528 Frankfurt, Germany

Attendees: *see list of participants (2006-12-05-EUP-Fans-Meeting-Participants-Buisiness-cards.pdf)*

The EuP Preparatory Study Lot 11 on electric motors focuses on four different interlinked energy-using products: electric motors, water pumps, circulators and fans for ventilation. These minutes record the main issues and outcomes discussed at the second stakeholder meeting on fans for ventilation in non-residential buildings. The details of this meeting were posted on the study web-site (www.ecomotors.org) in advance of this meeting, and an e-mail was sent to all registered stakeholders to alert them to these web-site updates. The discussion and questions raised were based on the contents of the second report also posted on this web-site in advance of the meeting (**http://www.ecomotors.org/files/Lot11-fans-2nd-report.pdf**).

In advance to the 2nd Stakeholder meeting several other meetings took place with Fraunhofer ISI and fan manufacturers to inform them about the project and the EuP activities in this context and about the additional information needed to complete the project. There where meetings with individual manufacturers as well as one meeting for German fan manufacturers organized by VDMA, where Fraunhofer ISI has been present. Furthermore, at IKK trade fare Fraunhofer ISI talked to manufacturers from China, Taiwan, UK, Spain, Italy, Slovenia, Denmark and Turkey.

Key issues and actions

(see also slides "EuP Preparatory Study Lot 11 fans for ventilation in non-residential buildings")

Definition of the product (p. 9)

Stakeholders ask why we have to consider only the fan without the motor and whether this is the correct interpretation of the directive, as a proper environmental impact assessment of the fan without the motor would not be possible. Some manufacturers state that in their view the fan is only working when it is driven (usually by an electric motor) and therefore only fan wheel+motor+drive is considered to be a useful product

in the sense of the EuP Directive. This product with its electrical energy input and its primary functional parameters flow and pressure increase can be analysed with the methodology to be applied in the preparatory study.

At the meeting stakeholders discussed how many fans are sold without motor. The study will provide an answer to this on the basis of which the decision will be taken on whether to consider the fan alone or not. There are some manufacturers who sell some of their fans without motor (e.g. FläktWoods: fans for AHUs; GebhardtVentilatoren: fans for belt-drive; Punker: specialised in fan wheels). Even though stakeholders couldn't give numbers on share of fan sales without motor there was a common understanding that this represents only a minor share of the market.

Manufacturers want to have a system related approach including the equipment downstream the fan wheel (ducting, silencer, filter, etc.) (due to the strong relationship between the product and the system) rather than a product related approach. However, as the EuP directive focuses on products and parts, not on systems, this study can take into account only parts upstream the fan wheel up to the electricity grid.

***Action**: To clarify the situation, the project team will publish a position paper on product definition based on the Directive and the MEEUP methodology for final comments from stakeholders before the end of January. This will describe what "the product", "the part" and "the component" is. System issues (e.g. components downstream the fan wheel) will be discussed as a boundary issues in the methodology.*

***Action**: **Stakeholders** have been asked to formulate in writing there individual position in this regard so that it could serve as an additional information input for the project team.*

Approach to compare integrated and non-integrated products (p. 10)

To some attendees it is unclear why we need a comparison between belt-driven, direct driven and integrated fans and why we are not just comparing products within these categories. However, as long as these products are providing the same primary functional parameter (service) as defined on page 22 in the 2nd inception report (October 2006), comparison must happen in line with the MEEUP methodology. Furthermore, the study will also provide insights to these technology related issues and other second functional parameter-level issues during the course of the study.

Most fan products are sold on the market together with the motor that will be used for it so that fan manufacturers can provide real data also on motor and transmission. As for some fan products this data is not known, i.e. when the fan wheel is sold alone, for comparison of these products assumptions are necessary. Therefore an approach was outlined by the study team to enable comparison of all fan products on the market, i.e. those sold together with motor and drive and those only sold as a fan wheel. Nevertheless, some manufacturers are of the opinion that assumptions such as in this approach should not be made and that a comparison between product categories (integrated vs. non-integrated) would not be feasible.

The approach proposed was in particular criticised by stakeholders at the meeting because of its inaccuracy, unsing only a small number of default values. This problem could be however dealt with by a more detailed breakdown to different sizes (power

ranges). *Dr. Anschütz (GebhardtVentilatoren, D) says he could supply some useful data on this.* AMCA also supplies related curves but these would be hard to justify experimentally. *Dr. Schnepf (Helios, D) says that there is some more reliable data on belt efficiency available.*

In view of possible obligatory measurement methods to be defined in the implementing measures of the EuP directive, manufacturers stated that besides default values such as defined in the proposed approach e.g. for belt efficiency, the use of the real values of the actual product under analysis should also be accepted, if these are known, i.e. when the fan-wheel and motor are sold together as one product. This has already been considered in the proposed methodology.

It is also emphasised by manufacturers that it would be dangerous to apply the proposed approach in the implementing measures as it would have big impacts on competition within the fans market.

It is mentioned that also for integrated products it would be possible to define the efficiency of the fan-wheel alone, i.e. it would theoretically be possible to compare only "the fan-wheel" of an integrated product without the motor to a fan wheel of a non-integrated product in terms of efficiency. However, then for integrated products it is still not clear which part of the material that is used by both, the fan and the motor, should be assigned to the fan and how the mechanical power would fit in the MEEUP methodology. Consequently, by stakeholders this is not considered to be a useful approach of analysing products in line with the MEEUP methodology.

Test Standards (p. 12 f.)

***Action**: Manufacturers are requested to give a feedback on the detailed standards list in the 2nd report. Also, comments on the SFP classes available are welcome and arguments whether these are an appropriate indication.*

The SFP (specific fan power) approach is strongly emphasised and recommended by some manufacturers. SFP can be defined for the fan wheel or for fan wheel +motor or for fan wheel +motor+drive or for fan wheel+motor+drive+filter etc. or even for the ventilation system of the whole building. In DIN EN 13779 (prEN) a method is shown to calculate the SFP for the fan wheel alone. Not all of the manufacturers are aware of this standard. Some manufacturers are of the opinion that SFP is always defined at least for fan+motor+transmission.

It was mentioned by Mr. Siderius from Center Novem, that in the Netherlands particularly for agricultural fans there are useful standards available. The Danish ventilator scheme and its importance in practice was mentioned by manufacturers as to be technically sound.

Market trends (p. 24)

Manufacturers say that there is rather a trend from forward to backward curved blades, not backward to aerofoil blades. Regarding use of plastics, in Scandinavia it is not allowed to use larger plastic parts in ventilation systems due to the risk of fire, i.e. trend to plastics is limited. Furthermore there is a trend to **plug fans**.

Frequency and characteristics of use (p. 26)

Usage patterns should be defined for different climatic zones such as it has been done for the boilers (3 zones). For the fans study, only 2 zones within Europe could be sufficient (north (heating) / south (cooling)). Depending on region and type of building (application) running hours / load profiles can be very different. However none of the participants felt able to give indication which values we should use as best estimates. It has to be investigated if the climatic zones as defined for the boiler study (lot 1) could be a basis also for the fans study. The study team will identify and describe some standard use patterns as part of task 3 in the next updated inception report.

Economical product life, repair and maintenance (p. 29)

Life-time depends on application, +- 10yrs on average was accepted as correct average lifetime, even if some might be in use much longer (up to 20yrs) if the fan / ventilation system continues working without problems at a smaller number of yearly operation hours. Life-time mainly depends on bearings, sometimes also corrosion is an issue. The decision for replacement instead of repair depends mainly on cost and reliability issues.

Frequency of cleaning depends on application; typically manufacturers recommend rather short cycles for maintenance. However, the fan is often part of a maintenance programme for the whole building.

The study team will back up this life-time assumption with references to existing studies and literature, if available, in order to be integrated into the next updated inception report.

Use phase – electricity consumption and fan efficiencies (p. 35 ff.)

Stand-by consumption of EC-/VFD-fans is due to running the processor, estimated by manufacturers to be 1-3% of electricity consumption at full load, e.g. for a 1 kW fan/motor stand-by consumption is 7 W (example by Mr Albig, Ziehl-Abegg). VFD `s for induction motors seem to have however larger losses.

It is pointed out by manufacturers that there are also other issues of importance apart from efficiency. E.g. for fan coil units (FCUs) a change from forward to backward curved blades will increase capital cost as well as space requirements for installation, which would have an impact on building layout. There would also be impacts on noise levels. So there will be some limitations e.g. for replacing forward curved by backward curved centrifugal fans for this application.

The duty point of a product has also to be taken into account for the analysis, whereas the design duty (maximum required air exchange rate) is mostly unimportant. The number and level of duty points be consolidated in the next updated inception report based on the present proposals (see position paper) The values can be orientated also on values given in national standards such as the VDI Guideline (Draft VDI 6014)

The table with efficiencies for the different fan categories (p. 36) is criticised by manufacturers as efficiency is also dependent e.g. on motor power, pressure level, different speeds, different pitch angles. A structured base for comparison of efficiency values would be necessary.

Action: C*omments/feedback from* ***stakeholders*** *is requested on the presented efficiencies to be used for calculation of electricity consumption. Information on individual products/trade marks will not be published in the report but only on an aggregated level. Also, the study team will back-up the efficiency data with references.*

For full analysis of the use phase BOM + efficiency data from ***manufacturers*** *is requested until end of January 2007. Each manufacturer should provide at least one BOM per product category as defined in chapter 1 of the study. Efficiency data should be given for the whole operating range (Δp, $\dot{V}$).*

Manufactures said that there is more data available but to give more data input would not be easy e.g. due to the large variation of products available. *The study team will complement the BOM for those product categories for which information has not been received in order to assure a full-fledged updated inception report on this issue.*

SUMMARY AND CONCLUSIONS

Overall, attendees gave a positive feedback on the meeting. The main issues discussed were the definition of the product, the possibilities of comparing integrated and non-integrated products, as well as analysis of the use phase.

Action: *It was agreed that the* ***study group*** *will compile a list of questions regarding the additional data needed, which will be distributed shortly among manufacturers.*

ANNEX: DEFINITION OF THE FAN AS AN ENERGY USING PRODUCT (EUP)