

International Energy Agency IEA

Implementing Agreement - Efficient Electrical End-Use Equipment 4E

Electric Motor Systems Annex



EMSA - New Motor Technologies

Charles Gaisford

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Electric Motor Systems Annex (EMSA)

- 4E provides international forum for governments and other stakeholders to share expertise and develop understanding of electrical end use equipment and policies; and facilitate coordination of policies for efficient electrical equipment.
- EMSA Objectives: to build Global Motor Systems Network to stimulate knowledge, technology and policy in field of efficient motor systems. EMSA contribution will be in technical and policy advice, harmonization of standards and distribution of best practice experience.
- www.motorsystems.org

Objectives for Policy Makers

- To introduce effective policies & measures resulting in the reduction of energy consumption (& CO₂ emissions) by electric motor systems
 - Understanding of the market and associated savings potential
 - Implement effective policies
 - Minimise adverse economic impacts
 - Stimulate the market

Supporting The Policy Maker

- Unambiguous product definitions
- Reliable test methods
 - Consistent across different test facilities
 - Understand acceptable tolerance limits
 - Standard reporting formats
 - Ensure compliance
- Methods to classify and rate performance
- Test methods and classification systems to align with policy framework

New Motor Technologies (Task G)

The Task is about supporting the development of energy performance test and classification standards for ‘new motor technologies’

Participants

- UK (*Leading*)
- Australia
- Denmark
- Netherlands
- Switzerland
- Other countries interested
- *Will also engage with other stakeholders*

What is happening in the motor market?

- AC induction motor technology well established
 - General purpose / versatile
 - Variable speed functionality through use of electronic controller (variable speed drive)
 - Holds majority market
 - Good energy efficiency
 - Approaching limits of energy efficiency potential

- Other motor technologies tend to service niche markets
 - Permanent magnet, Switched reluctance, various types of DC motors
 - Tend to service niche applications (well established)
 - Variable speed functionality through use of electronic controller
 - Some have very high energy efficiency / scope to improve

- However other motor technologies starting to move into general purpose market
 - Higher efficiencies than AC induction
 - Use less materials (e.g. permanent magnet)
 - Advances with electronic controllers mean increasing performance
 - Reducing capital cost

What is happening in the motor market?

- Increasing demand for variable speed controls (electronic controllers)
 - Significant energy saving potential
 - At least 50% of motor applications could realise energy savings through variable speed control
 - Reliable
 - Can simplify installations
 - No gearboxes
 - Easier commissioning of systems
 - Reduced maintenance
 - Becoming commoditised
 - Cost effective

What is happening with energy policy?

- AC induction motor technology
 - Regulations governing minimum efficiency requirements are increasingly widespread
 - Incentives uplifting the top end of the market are also increasing
 - Some countries encourage the take up of variable speed drives

- Other motor technologies
 - No minimum efficiency requirements
 - Limited number of incentives to uplift top end of the market
 - Some incentives for products incorporating the technology

- Conclude there is a gap in policy measures reaching other motor technologies

Electric Motor Test Standards

- There are several standards globally however there is increased harmonisation around IEC60034-2-1
 - Covers a range of motor types (D.C. motors, synchronous A.C. and induction machines) but is not specific to e.g. permanent magnet, switched reluctance and other motors operating with electronic controllers

- Electronic controllers and other peripheral components are not included in test standards
 - IEC are currently drafting a standard to cover variable speed drives

Motor Performance Information



- There are different standards globally however there is increased harmonisation around IEC60034-30;
‘Efficiency classes of single-speed, three-phase, cage-induction motors’
 - Again focus on AC induction motors

Gaps in performance information



- No published test methods for electronic controllers (for any motor types)
 - In development: IEC 60034-2-3, '*Specific test methods for determining losses and efficiency of converter fed AC machines*'

- No performance classification data for electronic controllers
 - *Future EuP measures likely to require VSD performance information*

Future requirements for policy makers (regulators)

- In order to uplift average performance of products on the market policy makers will develop measures such as:
 - mandatory minimum performance requirements for the bottom of the market and
 - incentives for the top end of the market

- To do this policy makers require
 - Ability to test and classify different motor technologies

 - Ability to test and classify performance of electronic controllers

 - Confidence that fair comparisons can be made
 - Compare different technologies E.g. is it possible to prove a PM package is more efficient than an AC induction motor package?

The risks

- The motor market is changing rapidly
- Demands of climate change policy require rapid increase in energy performance of technology
 - So policy must move ahead quickly
 - E.g. EC has already issued mandates to standards makers to develop standards for VSD's & other motor technologies
- However standards making process is time consuming
 - Based on sound evidence
 - Robust
 - Consensus
- Diversity in motor technologies requires a complex framework of standards to meet policy makers requirements
- **Regulators need high confidence in standards especially when they might be used in the context of legal requirements.**

New Motor Technologies (Task G)

Objectives

- To engage with stakeholders (policy makers, standards makers, technical experts, manufacturers, academia and testing institutions) and facilitate dialogue and collaboration resulting in an improved understanding of stakeholders needs and leading to the finalizing of standards that are robust and sufficient for use by regulators

- To provide information and tools to assist the development of policy for electric motors and their controls
 - Encourage research in support of test methods and classification systems
 - Provide support to the development of test standards and classification standards
 - Learn and respond to lessons from previous standards work

New Motor Technologies (Task G)

- There are many issues to consider and these will have to be addressed in a pragmatic manner. Examples *could* include...
 - What types of technology comparisons are likely to be made in the future?
 - What product types should be included in future standards?
 - How to define a ‘standard’ variable speed drive
 - What are the effects of different hardware and software configurations on energy performance?
 - What type of duty profiles should comparisons be based on?
 - How significant are standby losses?

New Motor Technologies (Task G)

Our next activity

- Workshop at Motor Summit
 - 28th October 2010

New Motor Technologies (Task G)

- For further information:
 - www.motorsystems.org
 - email: Charles.Gaisford@WSPGroup.com