Minimum Energy Performance Standards (MEPS) Regulations in Australia

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Improving the energy efficiency of appliances and equipment is a key objective for all Australian governments and the NZ government.
What is E3?

- E3 Committee comprises officials from Commonwealth, State and Territory Government agencies as well as New Zealand Government representatives.

- E3 is ultimately responsible to the Ministerial Council on Energy (MCE) comprising Ministers responsible for energy from all jurisdictions.
MEPS and labelling regulations

• Australia regulates equipment by creating mandatory performance requirements to improve product efficiency

• State laws call up the technical requirements in published Australian Standards

• Failure to meet the minimum level has legal and administrative sanctions
MEPS and Labelling

• Mandatory MEPS (Minimum Energy Performance Standards)
• Mandatory energy efficiency labelling

Products include:
• Household appliances
• Air conditioners
• Distribution transformers
• Three-phase electric motors
Energy Labelling

Products covered

• refrigerators and freezers
• clothes washers
• clothes dryers
• dishwashers
• air conditioners
History of motor MEPS

• MEPS for motors was first proposed as early as 1994 in a study of MEPS for commercial and industrial equipment

• Proposals were developed and refined through the 1990’s

• Regulatory Impact Statement for MEPS 1 was released in early 2000

• Regulations for mandatory MEPS 1 for motors came into force in October 2001
Performance Target

- MEPS program strives for world best regulatory practice, at least matching the best minimum standards imposed by major trading partners

- Motors Policies
  - MEPS 1 removed about 20% of models from the market
  - Look to other markets for policy leads
Places with motor efficiency standards

Australia
Brazil
Canada
China
Chinese Taipei
EU (voluntary)

Malaysia
Mexico
New Zealand
Thailand (pending)
USA
MEPS 2 motors - details

• Detailed requirements are set out in AS/NZS1359.5-2004
• Scope: applies to three-phase cage induction motors with ratings from 0.73 kW and up to but not including 185 kW.
• Scope includes 2, 4, 6 and 8 pole motors
• MEPS 2 came into force in April 2006
MEPS 2 motor exclusions

• Submersible motors
• Integral (not separable from gearbox or compressor)
• Multi speed motors
• Short duty cycle S2 under IEC 60034-12
• Rewound motors
MEPS 2 motors outcomes

• Sets MEPS levels to be equivalent to European Efficiency Level 1 and matches USA MEPS which were implemented in 1997

• MEPS 1 will save 450 GWh pa (500 kt CO2-e pa GHG) by 2015 compared to BAU

• MEPS 2 will save additional 550 GWh pa (600 kt CO2-e pa GHG) by 2015 compare to BAU
Test method standards for motors

AS/NZS 1359 testing methodologies

• METHOD A: 1359.102.3 – equivalent to ANSI/IEEE 112-1984 (direct measurement of stray losses, windings run at actual temperature) (also IEC 61972)

• METHOD B: 1359.102.1 – equivalent to IEC 60034.2 (assumes fixed 0.5% stray loss, windings at rated temperature)
High efficiency levels for motors

• High efficiency levels for motors were set in 2001

• These became the MEPS levels for MEPS II on 1 April 2006

• New high efficiency levels were set in the standard

• These are based upon a 15% reduction of losses from the 2001 High Efficiency levels
Simple cost comparison - example

- 15 kW motor operating 8,000 hours per year at full load, 4 pole, Method A
- MEPS 1 - 88.3% - annual energy $13,590
- MEPS 2 - 90.3% - $13,289
- 2006 High Efficiency (HE) - 91.6% $13,100
- Typical purchase cost $1500, HE premium maybe $300 (could be less)
- Payback for HE over MEPS 2 ~ 1.5 years
- Upstream and downstream system efficiency can lead to larger savings
Industrial motor efficiency

Motors as a component

- 2-5% improvement potential per motor
- Small increment, many motors, many run for long hours
- Component efficiency is built-in; can be sustained with proper maintenance for the life of the equipment
- Motors are easy to identify and regulate for efficiency
Motor system efficiency

- Motors as part of a system (pump, compressed air, fan, conveyer, etc)
- 20-50% improvement potential per system
- Large incremental savings, many systems
Motor system efficiency cont’d

• System efficiency is dependent on process - or site-specific engineering; oversizing is the norm

• System efficiency is also dependent on operating practices

• Efficiency frequently degrades over time as process demands change and experienced operators leave
Distribution transformers

• Their function is to step the supply voltage down from transmission voltages of 33,000 volts and above to a 415 volt three-phase supply (240V single phase)

• They are used widely by electricity distribution companies but also by some private firms within their own sites or within their own grids in remote areas
Why was there concern about transformer efficiency?

• The move towards corporatisation of electricity utilities greatly reduced their ability to optimise total costs

• Regulators and utilities themselves were tending to heavily weight first cost over life cycle costs

• Poor efficiency transformers were appearing on the market
Private market issues

The private market was seen to be less likely to consider operating costs than electricity distributors for the following reasons:

• Transformers are not part of core business.

• Electricity costs and energy losses are likely to be a small part of operating costs.

• There can be limited access to capital and revenue, unlike the utility sector.
MEPS for transformers

• In 2002 a Regulatory Impact Statement for MEPS for distribution transformers was released for public comment.

• The RIS estimated that there were nearly 600,000 distribution transformers installed around Australia, increasing by 1.5% per annum. About 100,000 are “private”.

• Transformer lifetime is typically around 30 years.
Savings from transformer MEPS

• Savings accrue rapidly as the stock of transformers is increased and is replaced.

• The losses in these transformers was estimated at some 5,800 GWh in 2000, equivalent to 3.2% to total electricity supply and 6 Mt CO2-e.
Savings from transformer MEPS

- The cumulative greenhouse savings over a 30 year projection period was estimated to be as high as 65 Mt CO2-e
- NPV of additional costs was $343m (30 years)
- NPV of savings was $497m
- Benefit cost ratio 1.4 (lower for utilities, much higher for private networks)
Scope of transformer MEPS

• Standard AS 2374.1.2 sets out details.
• Applies to dry-type and oil-immersed type, three-phase and single-phase power transformers with power ratings from 10 kVA to 2500 kVA and system side voltage up to 24 kV.
• Came into force in October 2004.
• Based broadly on Canadian MEPS levels adjusted for frequency.
Exclusions from transformer MEPS

- instrument transformers; auto transformers;
- traction transformers mounted on rolling stock;
- starting transformers; testing transformers; welding transformers;
- three phase transformers with three or more windings per phase;
- arc-furnace transformers; earthing transformers;
- rectifier or converter transformers;
- uninterruptible power supply (ups) transformers;
- transformers with an impedance less than 3% or more than 8%; transformers designed for frequencies other than 50 hertz; gas-filled dry-type transformers;
- flameproof transformers
Transformer MEPS levels

Three phase oil filled type:
- 25kVa ≥ 98.28%
- 100kVa ≥ 98.76%
- 500kVa ≥ 99.13%
- 1000kVa ≥ 99.27%
- 2500kVa ≥ 99.40%

Three phase dry type:
- 25kVa ≥ 97.17%
- 100kVa ≥ 98.07%
- 500kVa ≥ 98.74%
- 1000kVa ≥ 98.92%
- 2500kVa ≥ 99.09%
Transformer MEPS levels

Single phase oil filled type:
- 10 kVA ≥ 98.30%
- 16 kVA ≥ 98.52%
- 25 kVA ≥ 98.70%
- 50 kVA ≥ 98.90%

Single phase dry type:
- 10 kVA ≥ 97.01%
- 16 kVA ≥ 97.27%
- 25 kVA ≥ 97.53%
- 50 kVA ≥ 97.91%
High efficiency levels

- The standard also specifies high efficiency levels for transformers in addition to MEPS
- Provides a best practice goal for manufacturers and specifiers
- Typically 10% to 20% lower loss at the 50% output efficiency measurement point
Future directions - transformers

• At Energy21C conference, E3 announced the proposed move to MEPS 2 for transformers, no earlier than October 2010.

• Negotiations with suppliers are in progress.

• A Regulatory Impact Statement is expected to be released for public consultation in the next few months.
Other transformer efficiency issues

• Transformers are most efficient between 40% and 80% of their rated load - size your transformer according to the demand power.

• Do not overload your transformer – the transformer efficiency decreases significantly if it is overloaded.

• Consider both the transformer and the overall system efficiency.
Compliance with MEPS

Establishing test laboratories
  • NATA accredited test labs to verify products are as described (check testing).

Conducting Testing
  • Round robin tests to improve capability
  • Domestic and international motor testing
  • Domestic transformer testing
Compliance with MEPS

Making Non-Compliance unattractive
• Publicity is the most timely option
• Traditional legal sanctions

Compliance newsletters
• E3 publishes these on all the products we regulate.
• Communication tool with industry, as well as highlighting any issues.
Compliance conclusions

Efficiency Standards are here to stay:
- Cost effective greenhouse measure.
- Meets WTO trade obligations and benefits the community.
- Suppliers support the measure.

Enforcement:
- Government will take action over non-compliance.
- Supplier support predicated on government protecting the investment in more efficient product.
- Likely action is adverse publicity with other options possible.
MEPS education

• E3 works closely with industry association on MEPS for motors and transformers
• More information at our website – technical reports, events, announcements, MEPS information

www.energyrating.gov.au