NEMA Premium® License Overview

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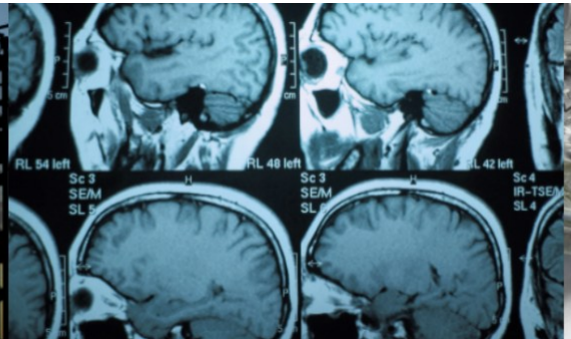
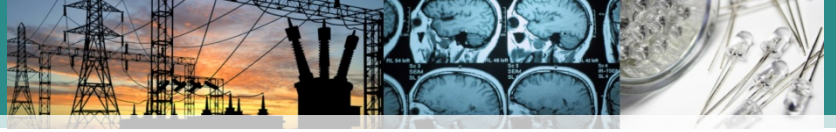
Zurich 2012

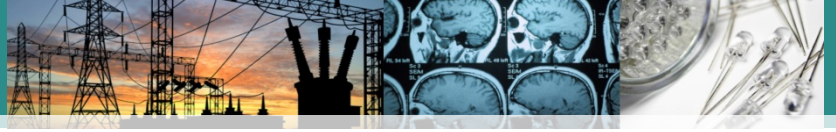
The Association of Electrical and Medical Imaging Equipment Manufacturers

Agenda

- NEMA Premium® Motor license
- Federal Government
  - Small motor regulations
  - Developing medium motor regulations
- NEMA Discussion Topics



NEMA Premium® Motors

- One of three NEMA Premium® products
- Currently 17 Motor licenses issued
- Premium efficiency motors represent over 65 percent of motors sold
- Limited federal policing and verification
- What to do after EISA 2007
- NEMA adds additional verification testing

NEMA Premium® License Requirements

- Identify list of qualifying products to NEMA Premium® (Appendix B/C)
- Report annually to NEMA any updates/changes to product
- Supply NEMA with annual sales data (Appendix D)
- Follow US Regulations set forth in 10 CFR Part 431 for Test Procedures, Labeling and Certification Requirements for Electric Motors
- All qualifying products subject to 3rd Party testing per NEMA discretion
- Annual NVLAP Lab Accreditation validated
- Annual Verification/Challenger Program (Appendix H/I)
- Manufacturer agrees to support promotion of NEMA Premium® Program

US Standards 10 CFR Part 431

AEDM (Alternative Efficiency Determination Method)

- AEDM must be applied to at least five basic models that have been tested in accordance with § 431.16, and
- Predicted total power loss for each such basic model, calculated by applying the AEDM, must be within plus or minus ten percent of the mean total power loss determined from the testing of that basic model
- Basic Model Selection requirements; highest unit volumes of production, within scope of NEMA Premium 12-12 Tables, varying horsepowers without duplication, different frame series without duplication and has the lowest nominal full load efficiency among the basic models with the same rating

Non-AEDM Basic Model Certification Process

- Each model shall be tested to determine compliance with the minimum efficiency levels and no individual model shall be below NEMA Minimum Efficiency
- Basic Model process required for all 113 ratings of NEMA Table 12-12 or as submitted

Labeling Requirements

- Motor Nominal Full Load Efficiency (NEMA Table 12-10 Defined)
- Compliance Certification number (“CC number”) supplied by DOE to the manufacturer or private labeler

NEMA Premium®
Licenses Additional Requirements

- Annual sampling of licensee product
  - Third party test
  - IEEE112B or CSA 390
- NEW OEM NEMA Premium® license
  - Provides utilities with a much needed prescriptive rebate scheme
  - Provides OEM's with a recognized trademark differentiation in the market place
  - Accelerates adoption rate of more efficient equipment reducing energy usage

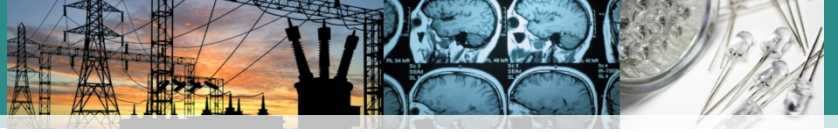
Small Motor Regulation

Effective March 9th 2015

Small Motor Rulemaking Scope

- General Purpose (defined by NEMA MG1-1987)
- 2-digit frame number (42, 48, 56 frame)
  - Includes equivalent IEC Frame sizes
- 2,4,6 Pole
- ¼ to 3 HP
- Polyphase, Cap Start Induction Run, Cap Start/Cap Run
- Open construction
- Continuous Duty
- NEMA Service Factor

Test Standards: IEEE 112 Methods A & B, CSA C390, IEEE114 and CSA C747



Small Motor Regulation – Cont'd

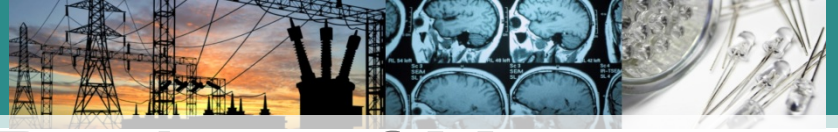
Products Out of Scope:

- Non-General Purpose Motors:
  - Definite Purpose, Special Purpose, etc.
  - Permanent split capacitor (PSC), Split phase & Shaded pole motors
  - Air-Over Motors
- Motors in end-use equipment already covered by other efficiency legislation
- Totally Enclosed Motors
- Motors below ¼ HP rating
- Motors that can't meet General Purpose Service Factors

Min. Efficiency Values

Motor horsepower / standard kilowatt equivalent	Average full load efficiency Polyphase Open motors (number of poles)		
	6	4	2
0.25 / 0.18	67.5	69.5	65.6
0.33 / 0.25	71.4	73.4	69.5
0.5 / 0.37	75.3	78.2	73.4
0.75 / 0.55	81.7	81.1	76.8
1 / 0.75	82.5	83.5	77.0
1.5 / 1.1	83.8	86.5	84.0
2 / 1.5	N/A	86.5	85.5
3 / 2.2	N/A	86.9	85.5

Motor horsepower / standard kilowatt equivalent	Average full load efficiency Capacity-start capacitor-run and capacitor-start induction-run Open motors (number of poles)		
	6	4	2
0.25 / 0.18	62.2	68.5	66.6
0.33 / 0.25	66.6	72.4	70.5
0.5 / 0.37	76.2	76.2	72.4
0.75 / 0.55	80.2	81.8	76.2
1 / 0.75	81.1	82.6	80.4
1.5 / 1.1	N/A	83.8	81.5
2 / 1.5	N/A	84.5	82.9
3 / 2.2	N/A	N/A	84.1



EISA 2007 Requires Review of Motor Standards

- Motor Coalition Formed Spring 2010
  - Determination of greatest energy savings potential and enforcement
  - Agreement on action plan to achieve
    - Legislation?
    - Regulation?
  - Product definitions
  - Testing issues
  - Timing of implementation

The Motor Coalition Members

- American Council for an Energy-Efficient Economy
- Alliance to Save Energy
- Appliance Standards Awareness Project
- Earthjustice
- Natural Resources Defense Council
- Northeast Energy Efficiency Partnerships
- Northwest Energy Efficiency Alliance
- National Electrical Manufactures Association
- Pacific Gas and Electric

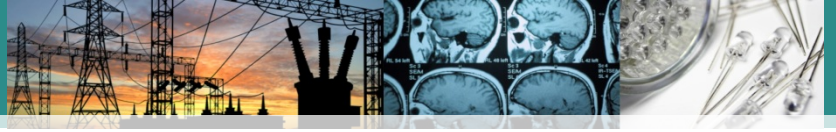
2010-11 Coalition Strategy

- Determine and document a plan to improve the efficiency of the greatest number of units providing the **greatest savings impact** while **reducing potential enforcement issues** within the **least amount of time.**
- Deliver a plan to DOE as a **platform for a consensus rule** that can be acted upon within the **least amount of time** delivering **large net benefits.**
- **Move to a direct and final rule with most expeditious results that saves greatest energy**

MC's Proposed Expanded Scope

- Partial motors
  - ¾ motors
- Gear motors
  - Integral shafts
- Definite purpose
  - Special shafts
  - Special flanges
- Special purpose
  - Vertical
- 56 or 90 Frame motors
- TENV
- NEMA or IEC

More effectively capture motors imported as a component or finished good for both general purpose and the new categories.

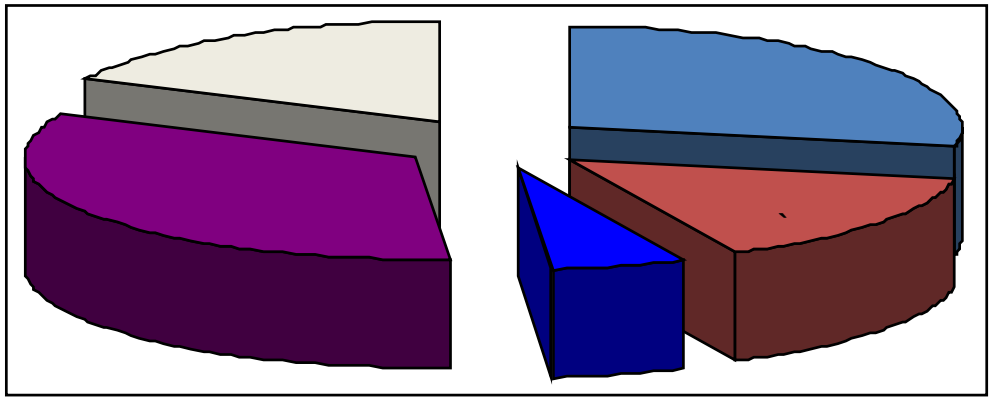


Options Explored

- 1- Increase nominal efficiency level for the existing scope of covered motors.
  - Super Premium
- 2- Expand scope of covered motors using existing efficiency levels.
  - More than double the number of units covered by regulation

MC Expanded Product Scope
Millions of unit per year

Total 5.6 million units USA per year



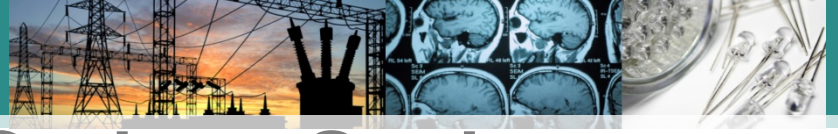
- Type 1 and 2
- Partial & Gearmotor
- Definite & Special
- Imported motors or component
- 56 Frame

Motor Coalition adds nearly 4 million units beyond the 1.6 type one and two currently covered

Average efficiency gains by motor sizes

HP Range and Type units	Table 12-12 Efficiency	DOE 1998 Average Installed Efficiency	Efficiency Percent gain	Estimated Kilowatts Saved per Hour	Estimated Kilowatts Hours Saved per year @ 4000 hours of operation
1 to and including 5 HP	89.5%	82.7%	8.2%	379,940	1,519,759,754
>5 to and including 20 HP	91.7%	86.8%	5.6%	417,403	1,669,612,146
>20 to and including 50 HP	94.1%	89.2%	5.5%	276,754	1,107,016,373
>50 to and including 100 HP	95.0%	91.9%	3.4%	144,238	576,950,419
>100 to and including 200 HP	95.4%	92.7%	2.9%	56,690	226,760,701
>200 to and including 500 HP	95.8%	93.4%	2.6%	46,078	184,310,307
Total Units					**5,284,409,701**

All data at 100% load; power quality per NEMA standards; Kwh saved based on 4000 hours / year of operation



Comparing the Two Options Savings Potential

Option 1

- Two efficiency bands average .7% increase over current NEMA Premium levels
- Incremental energy saved calculated to be 300 million Kwh using current product scope

Option 2

- Compared to 5.3 billion Kwh Motor Coalition proposal
- Annual Motor Coalition incremental savings 5 TWH

Test considerations/issues and timing

Testing of definite and special purpose

- Vertical
- Immersible
- Contact Seals
- CCPs
- Partial and gear motors

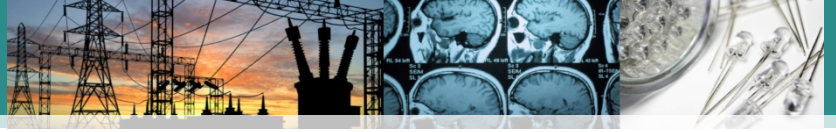
Test configuration fixturing

NEMA 1MG Energy Committee

- Develop test configuration requirements to use current IEEE/CSA test procedures

Conclusions

- Two decades of cooperative development of new motor standards have delivered significant energy savings
- The greatest future energy savings opportunity lies in expanding product scope
- Expanded scope approach is supported by a broad coalition of motor manufacturers and efficiency proponents.



NEMA 1MG Discussion Topics

- Government Regulator(s) Buy-In
  - US(DOE), Canada (NRCAN), EU(ErP), China(CCC), Australia (AS/NZ), Mexico (NOM), Korea (KMEPS), Brazil (INMETRO), Japan, etc.
  - Require common minimum efficiency standard globally?
    - North America standards most stringent
    - Mature lab accreditation and certification process
    - Specific labeling requirements
    - Harmonized test procedures with IEEE, CSA and IEC
    - Harmonized 60Hz efficiency standard levels
- Verification Program Enforcement
  - Australia Verification Program as model?
- Lab Certification Program
  - NIST/NVLAP requires ISO 17025 accreditation
- Common Certification Process
  - Certification/Sampling Process:10 CFR Part 431.17
  - Test Procedure: IEC 60034-2-1, CSA C390, IEEE 112 Method B
  - Lab Accreditation Program: NVLAP/NIST (ISO 17025)
- NEMA Premium® / IECEE MoU
  - Mutual acceptance of National or Regional marks (NEMA Premium®, NOM, C390, etc.?)