Coordination and Alignment of IEC & ISO Standards for Energy Efficient Electric Motor Driven Systems (CAISEMS)

INTRODUCTION

AMCA ASET-EU
5 November 2019, Brussels, Belgium

Maarten van Werkhoven, IEC ACEE TG6
Conrad. U. Brunner, IEC ACEE, Convenor TG6
Electric Motor Driven Systems (EMDS)

Source: ACEE Case Study 2, Motors, 2018
# 9 Technical Committees

<table>
<thead>
<tr>
<th>Motor control</th>
<th>Motor</th>
<th>Mechanical equipment</th>
<th>Driven equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC TC 121</td>
<td>IEC TC 2</td>
<td>ISO TC 41</td>
<td>ISO TC115</td>
</tr>
<tr>
<td>Switchgear &amp; controlgear</td>
<td>IEC TC 22 SC 22G</td>
<td>ISO TC 60</td>
<td>ISO TC 117</td>
</tr>
<tr>
<td>1927</td>
<td>1911</td>
<td>Pulleys &amp; belts</td>
<td>Pumps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gears</td>
<td>Fans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1947</td>
<td>1964</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1947</td>
<td>1964</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1957</td>
</tr>
</tbody>
</table>

Group Standard

- Adjustable speed drive
- Rotating machinery
- Cooling-Compressors
- Air-Compressors

ISO TC 118

- 1964
- 1965
IEC GUIDE 118
Edition 1.0 2017-03

GUIDE

Inclusion of energy efficiency aspects in electrotechnical publications

IEC GUIDE 119
Edition 1.0 2017-03

GUIDE

Preparation of energy efficiency publications and the use of basic energy efficiency publications and group energy efficiency publications

Policy Guidelines for Motor Driven Units
Part 2: Recommendations for aligning standards and regulations for pumps, fans and compressors

May 2018
IEC Advisory Committee for Energy Efficiency, TG6

Initiator CAISEMS project

• **Background:**
  - Electric motors driven systems are responsible for 53% of global electricity use (Re: IEA WEO 2016)
  - Motor systems can harvest the most energy savings
  - Motor systems need *System Standards*

• **Initiative of IEC ACEE TG6:**
  - IEC Guides 118 and 119 (published March 2017)
  - Background research by EMSA: Policy Guidelines for Motor Driven Units (part 1: October 2016 / part 2: May 2018)
  - Cooperation with several IEC and ISO secretariats in Geneva and Singapore and all TCs involved

• **Members of IEC ACEE Task Group 6:**
  - Conrad U. Brunner, Convenor, Switzerland (IEC TC2, IEC ACEE)
  - Kirk Andersen, NEMA, USA (IEC ACEE)
  - Franco Bua, CEI, Italy (IEC ACEE)
  - Benno Weis, Siemens, Germany (IEC TC22, IEC ACEE)
  - Maarten van Werkhoven, EMSA, Netherlands (IEC ACEE)

-> **1st Meeting of CAISEMS** 20 September 2019, Tokyo Japan
Goals of the CAISEMS project

1. Aligned terminology, scope and boundary for EMDS
2. Coordinated operating points and conditions for tests
3. Typical operating characteristics and time/load profiles for economy
4. Ex ante: calculation method for system energy performance
5. Ex post: acceptance / testing procedure for system energy performance
6. Coordinated efficiency classification methods and metrics for product and system energy performance
7. Aligned interpolation method for losses and efficiency of EMDS
Goals of the workshop

1. Explain current situation of IEC and ISO Standards for Energy Efficiency in EMDS
2. Learn from all TC's involved: status and projects in EE
3. Show potential fields for coordination and alignment
4. Identify energy efficiency aspects
5. Discuss necessity for Group and Basic standards
6. Identify key stake-holders for improvement
7. Form joint Task Force for further action
Conversion steps:
Complexity of EMDS (full and partial load)

SYSTEM EFFICIENCY \[ \eta \] = \frac{\text{OUTPUT}}{\text{INPUT}}
Cooperation between TCs

- IEC TC2
- IEC SC22G
- ISO TC115
- ISO TC117
- ISO TC118
- ISO TC 86

- Liaison established
- Contacts, no liaison
- Liaison necessary

- Motors
- Pumps
- Fans
- Air Compressors
- Cooling Compressors

- maybe also:
  - ISO TC 41
  - ISO TC 60
  - ISO TC 301
  - Pulleys, Belts
  - Gears
  - Energy Management
Participants

28 Participants:
• 13 Invited Guests
• 15 Speakers

IEC TC (3):
• 2 Motors
• 22 Converters
• 121 Switchgear and Controlgear

ISO TCs (3):
• 115 Pumps
• 117 Fans
• 118 Compressors for Air

University/Research (4):
• DTI (Denmark)
• EMSA (AU, AT, CH, DK, NL, SW, US) Gent (Belgium)
• KIT (Germany)
• TPA (Netherlands)

Countries (11):
• Belgium
• Denmark
• France
• Germany
• Hungary
• Italy
• Japan
• Netherlands
• Switzerland
• UK
• USA

Regulators (3):
• EU (DG Energy)$^1$
• Japan (METI)$^2$
• Switzerland (SFOE)$^3$

1. **EU Directorate-General for Energy**
2. **Japan Ministry of Economy, Trade and Industry**
3. **Swiss Federal Office of Energy**

Industry (10):
• Atlas Copco
• Danfoss
• ebmpapst
• Fuji
• Greenheck Fan
• Hitachi
• KSB
• Schneider Electric
• Siemens
• Wilo

Industry Associations (9):
• AMCA (US/EU)
• CEMEP (Europe)
• Europump (EU)
• EVIA (EU)
• JEMA (Japan)
• JISC (Japan)
• JSA (Japan)
• NEMA (USA)
• Pneurop (EU)
IEC & ISO TC members

TC2, Motors
TC22, Power Electronics
TC117, Fans
TC118, Air-Compressors
SC22G, Converters
TC121, Switch-/Controlgear
TC115, Pumps
Results of workshop

1. The workshop was a success to bring together for the first time the key stakeholders for EMDS from IEC and ISO, from Industry, Universities and Government Regulators.

2. Good representation of IEC and ISO TCs, industry and associations plus regulators.

3. Regulators expressed interest in coordinated system standards by IEC and ISO.

4. Energy efficiency is important for Electric Motor Driven Systems.

5. Systems are important because they harvest the biggest energy savings.
Results of workshop

1. Constructive discussion on how to conceive system standards.

2. The participants provided a number of proposals on organizational and technical level on how to improve the cooperation between the TCs involved and to coordinate and align the respective standards.

3. The intensive collaboration is needed: stakeholders are willing to collaborate, analyze the problems because it is important; they want to identify the problems, define the goals and the necessary tools.

4. Consensus on next steps

5. Many spontaneous participants to join future work in CAISEMS. (deadline by 30 November 2019 to announce interest for collaboration)
NEXT STEPS

1. Form a CAISEMS Task Force jointly with IEC & ISO, hosted by ACEE TG6, invitation for volunteers from each TC
   30 November 2019

2. Updates: lists of relevant topics to be clarified and coordinated
   - Standards (and drafts) for EE in EMDS in IEC & ISO
   - Terminology questions to be clarified -
   - EE classification metrics - hoven
   - Interpolation methods -
   - MEPS existing and drafts for EMDS and components -
   31 December 2019

3. Set up goal and workplan 2020, 2021
   31 March 2020

4. 2nd MEETING of CAISEMS: video conference
   Set up a Working Group
   31 May 2020

5. 3rd MEETING of CAISEMS: Zurich (Motor Summit)
   Identify Horizontal Energy Efficiency Aspects
   Workplan with Tasks
   20 November 2020
EMSA Electric Motor Systems Annex

- 4E members: 14 (EMSA + CA, CN, EC, FR, KR, JP, UK)
- EMSA members: 7 countries
- www.motorsystems.org

Goal: help governments design & implement successful Energy Efficiency policies
Thank you

Contact

Conrad U. Brunner
Impact Energy
Zurich Switzerland
cub@cub.ch

Maarten van Werkhoven
TPA Advisors
Amsterdam, Netherlands
mvanwerkhoven@tpabv.nl