



Coordination and Alignment of
IEC & ISO Standards for Energy Efficiency for
Electric Motor Driven Systems

Conrad U. Brunner, Kirk Anderson, Franco Bua, Maarten van Werkhoven
IEC ACEE, Task Group 6
EEMODS'19, 17 September 2019, Tokyo, Japan



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IEC & **I**SO **S**tandards for **E**nergy Efficiency for
Electric **M**otor Driven **S**ystems
(CAISEMS)

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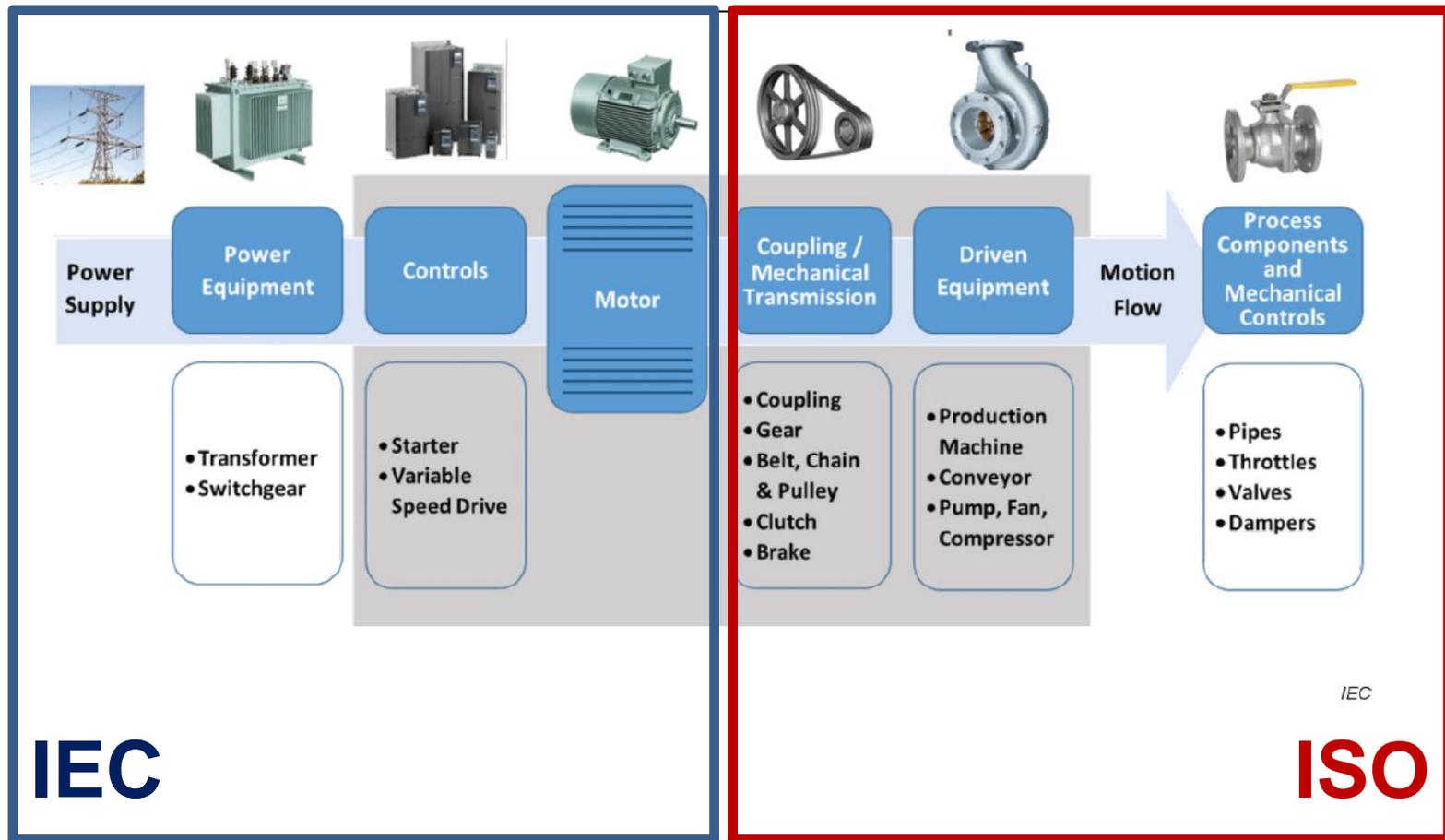
Background

- IEC ACEE: ► System standard
- 4E EMSA*: Policy Guidelines for Motor Driven Units, recommendations for standard makers
- Electric Motor Driven Systems (EMDS) are responsible for 53% of global electricity use **)
- Pilot study in ACEE for horizontal energy efficiency aspects: Basic or Group Standards
- Important: Cooperation between IEC and ISO

*) EMSA: 4E Electric Motor Systems Annex

**) IEA WEO 2016

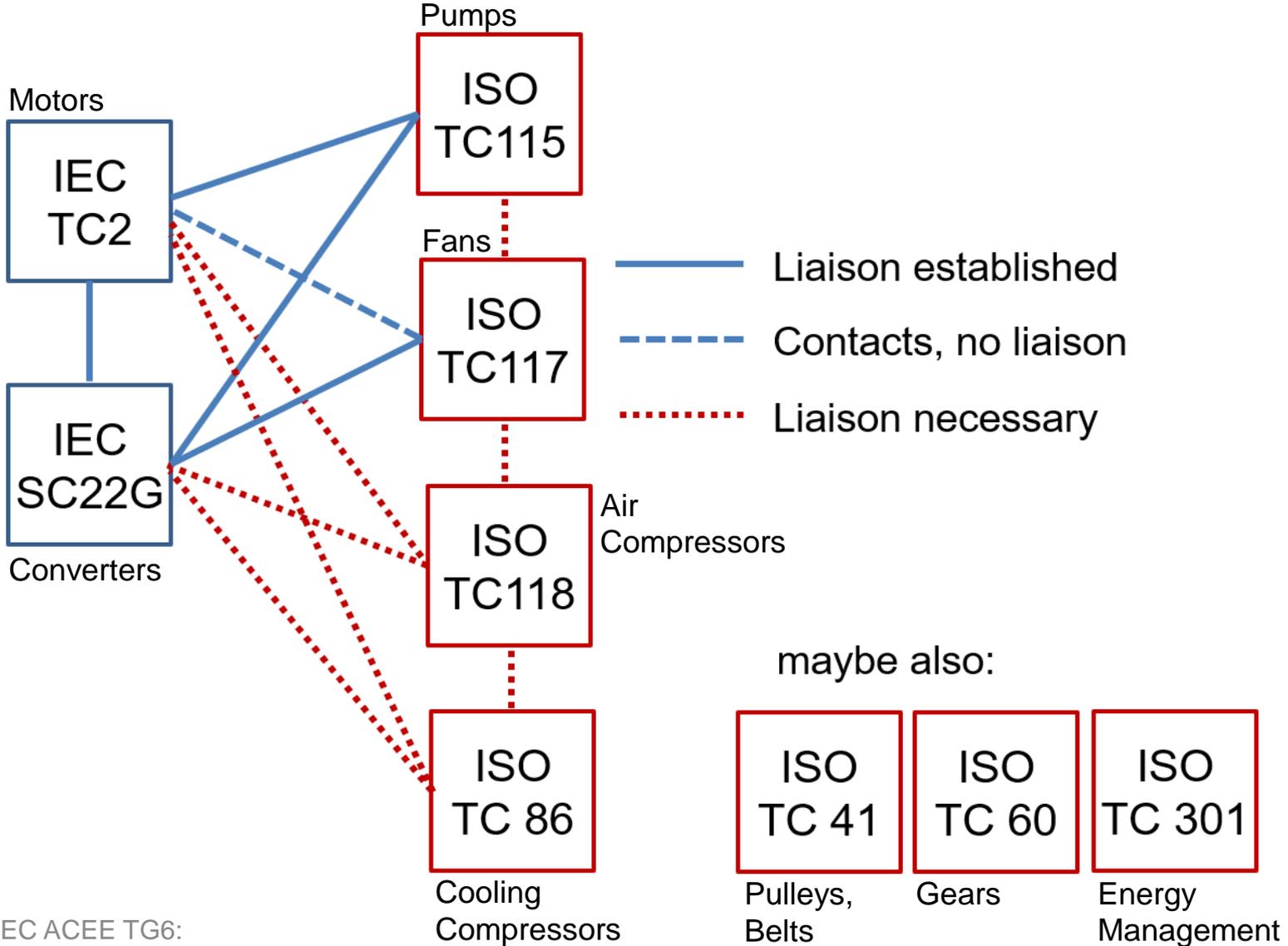
Electric Motor Driven Systems



9 Technical Committees Involved

Motor control		Motor	Mechanical equipment		Driven application			
IEC TC 121	IEC TC 22 SC 22G	IEC TC 2	ISO TC 41	ISO TC 60	ISO TC115	ISO TC 117	ISO TC 86	ISO TC 118
Switchgear & controlgear	Adjustable speed drive	Rotating machinery	Pulleys & belts	Gears	Pumps	Fans	Cooling-Com- pressors	Air-Com- pressors
1927	1934	1911	1947	1947	1964	1964	1957	1965

Cooperation to be established



Existing ee Standards

Motor control		Motor	Mechanical		Driven equipment			
IEC TC 121	IEC TC 22 SC 22G	IEC TC2	ISO TC 41	ISO TC 60	ISO TC115	ISO TC 117	ISO TC 86	ISO TC 118
Switchgear & controlgear	Adjustable speed drive	Rotating machinery	Pulleys & belts	Gears	Pumps	Fans	Cooling-Compressors	Air-Compressors
WG1	WG18	WG12	SC1		SC2	WG11	SC4	SC1
Energy efficiency	Extended product approach	Scope and performance	ISO 5292		ISO 9906	ISO 5801	ISO/DIS 916	ISO 5389
IEC TR 63196	IEC 61800-9-1	IEC 60034-1			Pumps acceptance testing	Efficiency classification	SC6	SC6
	Efficiency testing and classification	WG28			ISO/PRF TR 19688	ISO/DIS 12759-2	ISO 5151	ISO 1217
	IEC 61800-9-2	Efficiency testing			Pump system energy assessment	ISO/DIS 12759-3	ISO 13253	ISO/CD 11011 -1/-2
		IEC 60034-2-1			ISO/ASME FDIS 14414		ISO 13256	ISO/WD 22484
		IEC 60034-2-2					ISO 15042	
		IEC 60034-2-3					ISO 16358	
		WG31					SC7	
		Efficiency classification						ISO 23953-2
GENERAL EE	BASIC	IEC 60034-30-1						
TESTING	Classification	IEC 60034-30-2						
		Guide						
		IEC TS 60034-31						

incomplete draft, to be amended

Draft V2 20190509

Relevant International Standards (incomplete)

- IEC

- System and Basic Standards
 - Guide 119:
- Extended Product Approach
 - IEC 61800-9-1
- Operating points:
 - IEC 60034-2-3
 - IEC 61800-9-2
- Interpolation methods:
 - IEC 60034-2-3
 - IEC 60034-31
- Application guidelines
 - IEC TS 60034-31
- Switchgear and controlgear
 - IEC TR 63196,

- ISO

- Energy Management Series
 - ISO 50001 , etc.
- Efficiency classification for fans
 - ISO 12759-2: Fans
 - ISO/DIS 12759-3
- Pump system energy assessment
 - ISO 14414
- etc.

Typology of EMDS

MO
DE
TR
CO

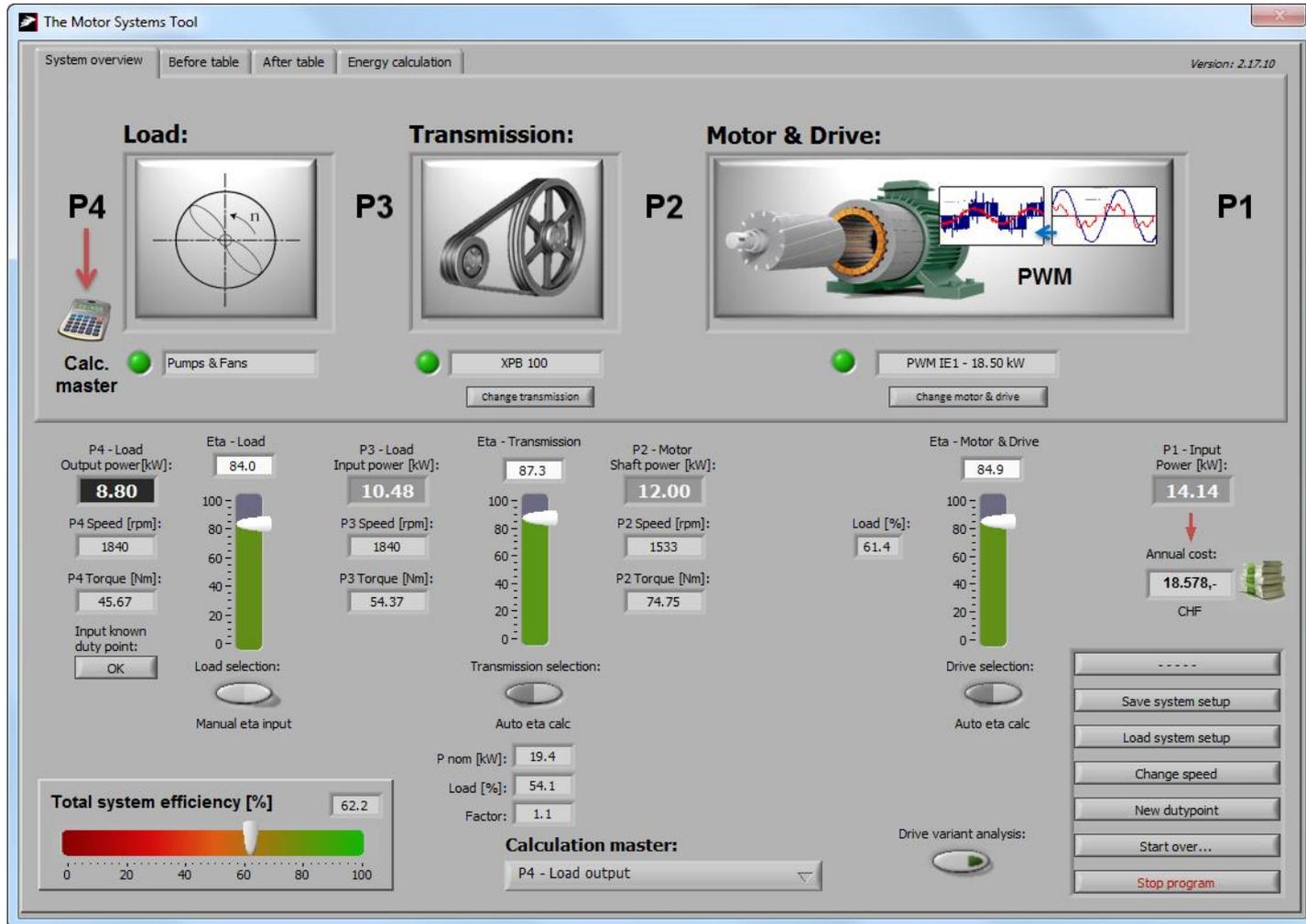
Motor
Driven equipment
Transmission
Converter



Coordination and Alignment

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 system

System performance calculation



Horizontal energy efficiency aspect

IEC Guide 118 and 119

- Basic Standard
- Group Standard

List of recent publications

- IEC ACEE: Case study: electric motors, 2018
- IEC ACEE: Introduction to ACEE work, 2018
- IEA Technical Cooperation Program:
Energy Efficient End-Use Equipment (4E) www.iea-4e.org
Electric Motor System Annex (EMSA) www.motorsystems.org
 - **EMSA: Policy Guidelines for Motor Driven Units**
 - Part 1: Analysis of standards and regulations for pumps, fans and compressors, October 2016
 - Part 2: Recommendations for aligning standards and regulations for pumps, fans and compressors, May 2018
- Europump: Extended Product Approach for Pumps, a Europump Guide, draft version, Brussels, Belgium, October 2014

EEMODS 2019: First CAISEMS Workshop

20 September 2019

Agenda				Speaker	Affiliation	Topic	Country
08:30 Registration				Sandie B. Nielsen	IEC TC 2, IEC SC 22G, Danish Technological Institute (DTI)	System efficiency: Software Motor Systems Tool	Denmark
09:00 Workshop starts							
Speaker	Affiliation	Topic	Country	Martin Doppelbauer	IEC TC 2 chairman, IEC SC 22G, Karlsruhe Institute of Technology (KIT)	Interpolation methods for partial load	Germany
Conrad U. Brunner	IEC ACEE TG6, Impact Energy	Welcome and goal of the IEC & ISO Workshop on energy efficient EMDS	Switzerland	Benno Weis	IEC TC 22 chairman, Siemens	The Extended Product Approach according to IEC 61800-9-1	Germany
Franco Bua	IEC ACEE TG6	Basic and Group Standards according to IEC Guides 118 and 119	Italy	Kurt Stockman	University of Gent, IEC SC 22G WG18	Gearbox and belt drive efficiency from a EMDS perspective	Belgium
Maarten van Werkhoven	IEC ACEE TG6, EMSA, TPA energy advisors	Policy Guidelines for Motor Driven Units	Netherlands	Shunsuke Matsunaga	Hitachi Industrial Equipment Systems, chairman of Inverter TC of JEMA	Impact of motor system standards on motors, inverters and application in Japan	Japan
Geoff Lockwood	ISO TC 117, EVIA, ebmpapst	Energy efficiency standards for fans, focus on Europe	UK	Kirk Anderson	IEC ACEE TG6, NEMA	What the US industry (NEMA) can benefit from aligned motor system standards?	USA
Tim Mathson	AMCA, Greenheck Fan Corp.	Regulatory policy for fans, focus on USA	USA	Jesper Jerlang	Danfoss	What can the European Industry (CEMEP) benefit for from aligned motor standards?	Denmark
Benoît Leprêtre	IEC TC 121, Schneider Electric	Energy efficiency standards for switch-gear and controlgear	France	General discussion (100 minutes)			
Peter Gaydon	ISO TC 115, Hydraulic Institute	Regulations on pumps in the USA	USA	Conrad U. Brunner	IEC ACEE TG6, Impact Energy	Conclusions, the way forward	Switzerland
Markus Teepe	ISO TC 115, Wilo	Energy efficiency standards for pumps	Germany	17:00 Workshop ends			
Luc De Beul	ISO TC 118, Pneurop, Atlas Copco	Energy efficiency standards for air compressors	Belgium				
Lunch break (60 minutes)							

Contact

IEC ACEE Task Group 6:

IEC & ISO System Standards for Electric Motor Driven Units (CAISEMS)

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- Franco Bua, University of Padova, Italy
- Kirk Anderson, NEMA, USA
- Benno Weis, Siemens, Germany
- Maarten van Werkhoven, EMSA, Netherlands

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