

Groupe – Technologie

Une force d'innovation

Variable frequency drives testing methods

Motor Summit 2010

Zurich, Switzerland

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Outline

- > **Canadian Standard Association (CSA)**
 - > CSA Draft C838
 - > CSA Draft C840
- > **Air-Conditioning Heating and Refrigeration Institute (AHRI)**
 - > AHRI Draft 1210P
- > **International Electrotechnical Commission (IEC)**
 - > IEC Draft 60034-2-3

CSA C838

Context

- > **No Recognized Standard for VFD System Efficiency (VFD + Motor)**
- > **Difference Between System Efficiencies**
- > **If Efficiency Mentioned, Only at Motor Full Speed and Full Load**
- > **Need to Have Data at Different Motor Speeds and Loads**

Goals

- > **Establishing a Testing Procedure**
- > **Ability to Compare VFD Systems Efficiency at Different Loads and Speeds**
- > **Inform Market about VFD System Efficiency**

CSA C838

- > **Determining VFD, Motor, System Efficiency**
- > **Output / Input Method**
- > **Accuracy is Mainly Dependant of the Electric Power and the Torque Measurements**
- > **VFD Efficiency is Mostly Constant Over Temperature**
- > **Motor Efficiency Varies with Temperature (Speed and Load)**

CSA C838

- > **Method Developed to Compensate Motor Efficiency Based on Temperatures Recorded**
- > **Torque Measurement is an issue**
 - > System Efficiency
- > **Electrical Power Measurement is an issue**
 - > VFD Efficiency

CSA C840

CSA C840

- > **Focus on Pool Pump Performance**
 - > Market in Canada is Single Speed
 - > 500 000 Residential Pool Pumps in Province of Quebec (3 M Residential Customers, 7 M pop.)
 - > New Regulation in California, USA to Eliminate Single Speed Pool Pump for Two-Speed or Variable Speed (VFD)

AHRI 1210

AHRI 1210

> AHRI

- > Trade Association
- > 300 Manufacturers of Air Conditioning, Heating and Commercial Refrigeration Equipment

> Goals

- > VFD System Efficiency
- > Harmonics Generation
- > Impact of Voltage Impulse on Motor

> Standard Motor to be used (IE2 or IE3)

> Output / Input Method

> Marking

> Draft under Development

IEC 60034-2-3

IEC 60034-2-3

- > VFD System incorporate Converter and Motor
 - > Motors under IEC TC2 WG28
 - > Converter under IEC SC22G
- > IEC 60034-2-3 will cover method for determining Motor Efficiency Supplied from a Converter
- > Collaboration between WG28 and SC22

IEC 60034-2-3

- > Draft Proposal
 - > Preferred Method → Summation of Losses
- > Standard VFD to be Used (Pulse Pattern)
- > Evaluation of Harmonic Losses Based on No-Load Test
 - > Difference Between Sinusoidal Supply and with Converter
- > Efficiency determined at Nominal Speed, Different Loads

Little Side note...

New CSA Motor Standards published

- > CSA C390 – 2010 for Three-Phase Induction Motors
 - > Revision of 1998 Version
 - > Improved Method
 - > Includes a Calculation Spreadsheet in electronic format
 - > Standardization of Calculations and Report
 - > Ease of Use
 - > Limit errors
- > CSA390 – IEEE112 – IEC 60034-2-1
 - > Give Equivalent Results

New CSA Motor Standards published

- > CSA C747 – 2009 for Small Motors
 - > Covers Multiple Type of Motors
 - > Capacitor-start or Capacitor-run
 - > Split phase
 - > Shaded pole
 - > Reluctance
 - > Small Polyphase Induction
 - > Permanent Magnet
 - > Brushless DC
 - > Converter Driven
 - > Output / Input Method
 - > Calculation Spreadsheet Included
 - > MEPS?

Thank You!