Magnetic Standards in Manufacturing

Steve Constantinides with Reinhold Strnat

SMMA Fall Technical Conference
November 9-11, 2010
St. Louis, MO
• Today we’ll be covering these subjects and I will attempt to provide you with an appreciation for the value of standards and specifically what is happening in the area of magnetics standards.
Why have standards?

• Standards form the basis for discussion regarding
  – Material properties
  – Purchase agreements for raw materials, sub-assemblies and finished product
  – Acceptance or rejection of product by broadly accepted, proven test methods
  – Meaningful comparison of competitive materials or designs

• Standards are almost always in the form of a formal document, recognized by standards organizations, government and industry associations
  – This differentiates it from custom, convention, company product information and internal corporate standards
• In addition to presenting details of the test method, a good standard also provides the reason for performing the test or for using this particular test method.
• It can also explain issues associated with the test such as advantages / disadvantages, accuracy / inaccuracy and the underlying science of the method.
• Participating in the writing of standards is a wonderful learning opportunity in association with knowledgeable peers in the industry.

Other Benefits of Standards

• Provide rationale for test or specification
• Education regarding material and tests
• Support information such as calculations
• Recommendations for applying the test or specification
• Caveats & pitfalls of the test or specification
• References
There are dozens of standards organizations in the world. Many standards organizations are national, such as NIST or ANSI, or regional, such as CEN in Europe. Some are industry-specific, and may be national, regional or international with respect to geographic participation. Examples are IEEE, IEC SAE, etc. A few standards organizations were developed to serve a rapidly evolving situation. W3C, the World Wide Web Consortium, formulated the rules for programming and presenting internet delivered information. It evolved into a well-recognized organization which continued the role of coordinating web standards.
The user community can benefit from standards relevant to:
  o The specific geographic location
  o The test or specification for a product or measurement specific to their industry
  o That which is more generally recognized within their specific industry.

Most of the standards organizations cooperate with each other, but retain individual property control of standards.
Types of Standards

• Definitions
• Material specifications
• Test methods (measurement of raw material, component or sub-assembly)
• Test methods (measurement of finished product)
• Operating Procedures

• These are the typical sort of standards.
• We’ll see how this list compares with ASTM and IEC committees a bit later.
• The MMPA, the Magnetic Material Producer’s Association, was formed by a group of US magnet manufacturers in the early 1960’s. It changed into the IMA (International Magnetics Association) in 2003. It was disbanded in 2006 with members moving to the Transformer Association (soft magnetics) or the SMMA (permanent magnets).

• The IEC came into being on 26-27 June 1906 in London, UK.

• ASTM is the oldest of the three having started in 1898.
• With the dissolution of the IMA in 2006, the Soft Ferrite document ownership continues with those members who joined the Transformer Association.

• The permanent magnet documents transferred to the Permanent Magnet Division (PMD) within the SMMA. (Effective June 2010, the SMMA merged with the MCA to form the MCMA, the Motion Control and Motor Association).

• The Permanent Magnet Guidelines and Standard Specifications documents are available for download from the SMMA website. These documents have not yet undergone review by the PMD and are presented “as-is.”

• An older document, Testing and measurement…, has useful information but is dated and would benefit from revision. The PMD is currently considering the value in updating this document.
• Magnetic material specification and test methods are under the purview of Technical Committee 68 (TC68).

• TC68 has the listed functional Work Groups (WG1 through WG5).

• The United States national committee (USNC), which is administratively associated with ANSI, provides USA input to the IEC.

• The USNC’s membership comes mostly from representatives of the several electrical and electronic engineering and trade associations. Other participants in the USNC are technical advisors to the USNC on the affairs of the several IEC technical committees which comprise the technical work of the IEC.

• Magnetic specifications in IEC are represented for the USA by members of ASTM committee A06 under the auspices of ANSI. The ASTM representatives are currently Richard Lyke, Reinhold Strnat, Scott Masteller and Steve Constantinides.
This is a listing of the current IEC specifications related to magnetics. There are 23 total.

- They are available for purchase directly from IEC or from the ANSI web-store (http://webstore.ansi.org)
- Each of the specifications may have one or more amendments.
ASTM committees were formed to address each of the normal standards subjects
Operating Procedures are covered as necessary in the Test Methods standards.
An additional committee, Precision and Bias, was formed to deal with numerical quantification issues, primarily associated with Testing.
- There are currently 50 active standards with more in the writing and balloting phases.
- ASTM standards must be reviewed at least very five years for accuracy and continued relevance.
• There are new measurement techniques being developed.
• For example, a proposed method to measure very high intrinsic coercivity magnetic materials is PFM, Pulse Field Magnetometry. After the technique has been proven fully functional, a standard will be prepared.
• in a second example, an instrument for measuring feebly magnetic materials developed by Föerster Instruments resulted in standard A342.
The technical and manufacturing community benefit from the work of standards organizations.

These organizations benefit from the active participation of the manufacturers and users.

We at ASTM would like to encourage your participation.

Participation in ASTM

- Soft and permanent magnetic materials
- New test methods
- Semi-annual meetings
- Web-based conference calls
- Join ASTM, contact ASTM directly or one of the A06 Committee members
- Learn more at:
  - www.astm.org/COMMITTEE/A06.htm
References

4. ASTM website, www.astm.org
5. IEC website, www.iec.ch