

Electrical Standards Used For Specification and Construction

	Professional Societies	Trade Associations	Government & Regulatory	Misc.
Appliances		AHAM	CPSC	UL
Communication	IEEE	EIA, ECSA	FCC	
Computer	IEEE	CBEMA	NIST	
Electronics	IEEE	EIA		
Home Entertain.	IEEE, SMPTE	EIA, NCTA	FCC, CPSC	
Industry Appl.	IEEE			
Instrumentation	IEEE, ISA		NIST	
Energy, Power	IEEE/NESC	NEMA, IPCEA	NRC, FERC	ASTM, NERC
Wiring & Cables	IEEE	NEMA, IPCEA	OSHA	NEC, UL
Other		AAMI		ASTM, FDA

AAMI	= Association for Advancement of Medical Instruments
ABYC	= American Boat & Yacht Council
AHAM	= Association of Home Appliance Manufacturers
ANSI	= American National Standards Institute (EE Stds being taken over by IEEE)
ASTM	= American Society for Testing and Materials
CBEMA	= Computer and Business Equipment Manufacturers Association
CPSC	= Consumer Products Safety Commission
ECSA	= Exchange Carriers Standards Association
EIA	= Electronics Industries Association (http://www.eia.org)
FCC	= Federal Communications Commission
FDA	= Federal Department of Agriculture
IEEE	= Institute of Electrical and Electronics Engineers
IEC	= International Electrotechnical Commission (Outside US)
IPCEA	= Insulated Power Cable Engineers Association
ISA	= Instrument Society of America
ISO	= International Standards Organization: (9000=General, 9001=System, 9002=Component) (14000 = Environmental Management & Auditing)
JEDEC	= Joint Electron Devices Engineering Council (“Jed-eck”, part of EIA)
MSHA	= Mining Safety & Health Administration
NAB	= National Association of Broadcasters
NIST	= National Institute of Standards and Technology (formerly NBS)
NCTA	= National Cable Television Association
NEC	= National Electrical Code (provided by NFPA)
NEMA	= National Electrical Manufacturers Association
NERC	= North American Electric Reliability Council
NESC	= National Electrical Safety Code (for high voltage, by IEEE/ANSI)
NFPA	= National Fire Protection Association
NRC	= Nuclear Regulatory Commission
OSHA	= Occupational Safety and Health Administration
SMPTE	= Society of Motion Picture and Television Engineers
UL	= Underwriters’ Laboratories. (CSA in Canada)

WHY ARE STANDARDS NEEDED?

- **STANDARDIZED COMPONENTS**
 - Standardized discrete sizes, values
 - Predictable Performance and Ratings
 - Parts will fit and work together, regardless of manufacturer

- **Standardize Procedures**
 - Manufacturing
 - Assembling
 - Testing

- **Reassurance of good design (standards are hopefully written by experts)**
 - Avoid wasted time of wheel reinvention - use standard design approaches and procedures.
 - Designs can be built at any manufacturing facility.

Design Criteria and Requirements (Constraints)

These are some general questions that might be asked during brainstorming and design evaluation. The focus of the question depends on if you are designing a product, system, or process.

- Performs intended purpose within required tolerance/specification?
- Meets all required laws, regulations, and standards (see next page)?
- Economically feasible to design with available technology & resources?
- Economically feasible to build or manufacture? Must you retool assembly line, retrain workers, stock additional materials, etc? How long does it take to manufacture or build?
- Economically feasible to market? Are competing products already on the market? Will your sales force require additional training? Can you deliver it on time?
- Reliable enough to make customer happy, last through warrantee? Avoid unhappy customers, bad reputation, decline in sales and profit margin.
- Easy to learn how to use and operate? It is user-friendly or user-hostile?
- Economic scheduled maintenance during warrantee period, repair afterwards?
- Is the product or system safe to use? Is it safe to be around? Will only a trained person use it, or will the general public be exposed to it?
- What happens after the economic or functional life is used up? How can it be disposed, recycled or demanufactured? Are there any environmentally hazardous materials?

Many of the above can be summed up as the “-ilities.” That is:

- Designability
- Disposability
- Liability
- Maintainability
- Manufacturability
- Operability
- Marketability
- Reliability
- Repairability