Another EMC resource
from EMC Standards

The Safe Design of Electrical Equipment & LVD compliance

Helping you solve your EMC problems

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The Safe Design of Electrical Equipment and compliance with the new LVD

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Change Record: v2 – v2.1, November 2018

- **Change record slide added (this one)**
- **Footnote added to all slides:**
  'Cherry Clough Consultants confidential training material'
- **Old slides 326-338 moved to 138-150**
- **Slides 52, 53, 63, 66, 89, 90, 91, and 114 updated**
- **Slides 154-157 modified and material on IEC 62368-1 added**
- **Slide 159 reformatted a little**
- **New section E added:**
  'Design and Validation for Functional Safety'
- **Old section E, 'Some Safety Resources' now called section F**
- **Final slide moved to right at the end, after section F**

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Overall contents list

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Disclaimer

This course is only a guide

- Responsibility for safety of your equipment, employees, customers and third parties…

  –is yours alone !!!!

- Each individual *must* apply the latest safety knowledge, laws, standards, technology, in their work…
  - and should act in accordance with accepted ethical standards of professional conduct

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A.
Basic Safety Principles

Note

Where an IEC or ISO standard is mentioned in this course, an EN version might now be available

Although an EN is usually identical to the IEC or ISO it comes from, sometimes there are differences, so for EU compliance it is best to follow the EN

Note

Safety standards are always being improved, amended and up-issued, so it is very important to apply the latest versions and amendments of the relevant standard(s), rather than rely on the text in this course

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Contents of the section on Basic Safety Principles

- What do we mean by 'safe'?
- Good practices in safety engineering
- Example of project safety flowchart
- The hierarchy of safety design techniques
- Hazards and risks assessments
- Doing hazard/risk assessments
- Overall safety documentation
- Qualifying and quantifying hazards and risks
- Keeping up to date with safety standards
- National safety laws
- Marketing and Sales and safety
- Making equipment for in-house use
- Competency
- Some examples of useless legal arguments
- It isn't enough to simply apply the more relevant published standard
- HALT and HASS

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What do we mean by "Safe" ?

- A HAZARD is anything with potential to do HARM…
  - and we are interested in the severity of that harm
- A harm has a likelihood (probability) of occurrence
- The RISK is the product of the severity of the harm and its probability
- Nothing can ever be 100% safe….
  - whether it was *safe enough* is determined by the courts after a safety incident, using the relevant safety laws

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What do we mean by Safe? continued...

- Safe design requires analysis of foreseeable hazards and their risks, to achieve…
  - functionality at a reasonable cost…
  - the degree of safety required
- The degree of safety required depends upon Directives and laws…
  - but also upon the application area and the type and numbers of people exposed…
  - and whether national media involvement is likely

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Two types of Safety

1) *(what I am calling)* INHERENT SAFETY…

- i.e. shock, fire, burns, cuts, explosion, toxic fumes, etc…
  - this term is used by the chemical industry, but 'intrinsic' safety is used by the explosive atmospheres industry

■ 2) FUNCTIONAL SAFETY…

- i.e. safety risks cause operation not as intended…
  - e.g. ABS failing to work; robots moving outside program parameters; process control allowing temperatures or pressures to rise too high; flight control errors, etc., etc…
- a rapidly increasing problem because electronics is now being used to control *everything*

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Good practices in safety engineering

■ "Hazard identification and risk assessment" is well-known good engineering practice…

- without this, it is difficult for an engineer to justify adding costs to improve safety

■ Under many safety or liability laws it could prove difficult to make a good legal case for an equipment's safety….

- if a hazard identification and risk assessment had not been done