DEMYSTIFYING IEC 62368-1 TYPES OF PERSONS

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AGENDA

- Introduction – why a new standard was needed
- Energy source classes introduction
- Types of persons
- Legacy standards review
- Conclusions

INTRODUCTION

WHY A NEW STANDARD WAS NEEDED

INTRODUCTION

- IEC 62368-1 is relatively new for A/V-ICT equipment
- Replaces IEC 60065 (A/V) and IEC 60950-1 (ICT)
- Significant changes to previous terms & requirements
- Increasingly referenced by worldwide regulations:
  - EU
  - North America
  - Australia
  - New Zealand, etc.

INTRODUCTION (CONTINUED)

- Uses hazards based engineering principles to:
  - Identify all injury types
  - Identify energy source types
  - Apply safeguards where required
  - Prevent transfer of hazardous energy to body parts

INTRODUCTION (CONTINUED)

- Technology convergence/overlap between legacy scopes
  - Same risks from A/V and ICT
  - Requirements should align
- Older standards difficult to maintain & extend
  - Existing requirements and testing differ
  - Newer requirements apply to both standards
- IEC 62368-1 covers the scopes of both legacy standards

OBJECTIVE OF THIS PRESENTATION

- Overview energy source classes
- Describe the classes of persons concepts
- Compare with legacy requirements for persons
- Some familiarity with the legacy standards would be an advantage but not required
- Details of requirements, conditions, and exceptions are in the standard. This presentation is a concept overview only

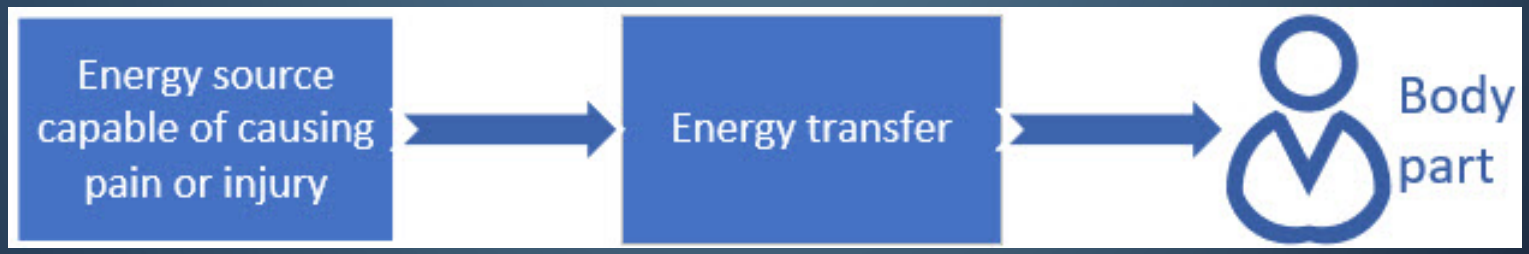
ENERGY SOURCE CLASSES

IN IEC 62368-1

ENERGY SOURCE CLASSES

- Based on a three-block model for pain and injury
- Considers increasing risks from rising energy levels
- Three-block model for safety
- Energy sources classified as Class 1, Class 2, Class 3
- Higher class number = greater risk

THREE BLOCK MODEL FOR PAIN & INJURY



- Three energy source classes represent magnitude and duration of each energy source type
- Energy source class limits determined by body part susceptibility to each energy source type

CLASS 1 ENERGY SOURCE

- Lowest risk level
- Considered reasonably safe to touch
- Parts and energy accessible to all persons
- Unlikely to cause harm during:
  - Normal use
  - Abnormal use
  - Single fault conditions
  - Foreseeable misuse conditions

CLASS 2 ENERGY SOURCE

- Medium risk
- Pain & discomfort but not needing medical treatment
- Accessible to persons who reasonably understand the risks
- Must not cause harm during normal or fault conditions

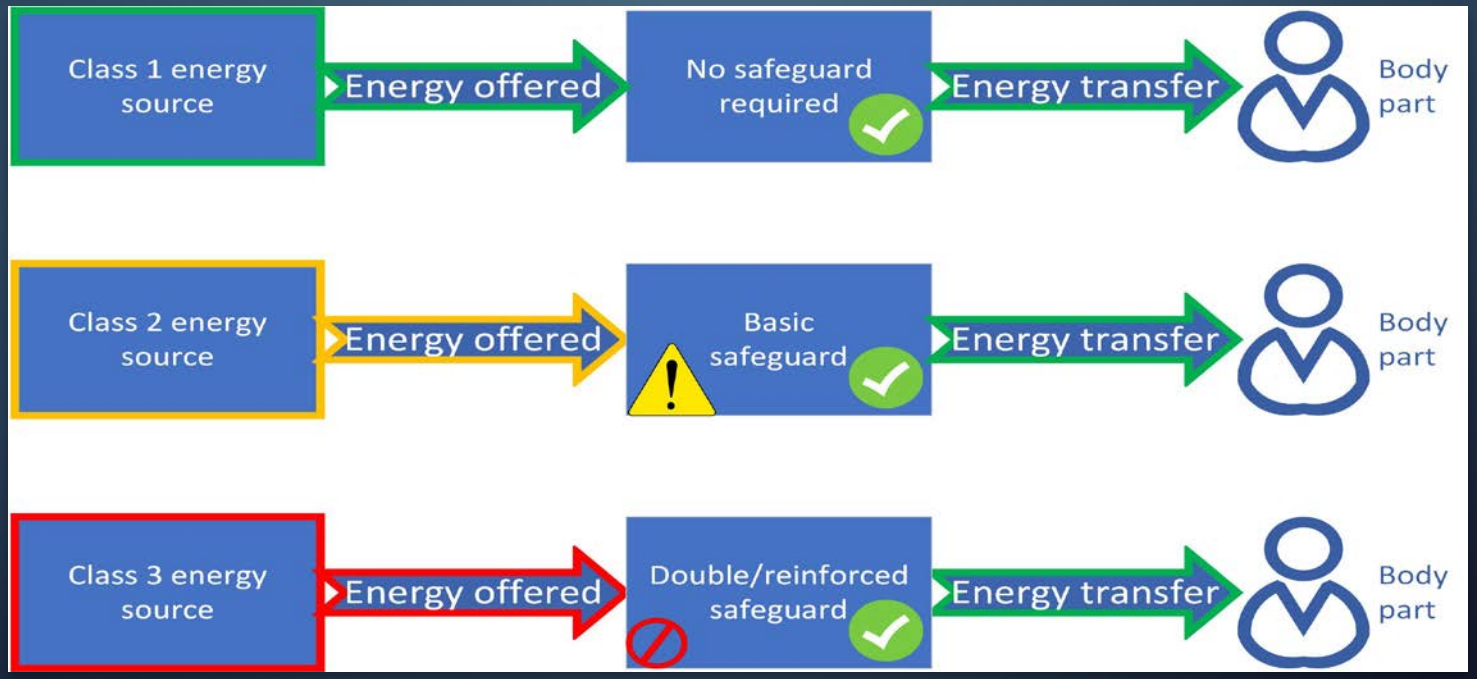
CLASS 3 ENERGY SOURCE

- Highest risk level
- May cause significant harm or even death during
  - Normal operating conditions,
  - Abnormal conditions
  - Foreseeable misuse, or
  - Fault conditions
- Access only by persons who can understand & avoid risks

POTENTIAL INJURY TYPES ADDRESSED

- Electrically caused injury (electric shock)
- Electrically-caused fire
- Hazardous substance exposure
  - Acids, dielectrics, lubricants etc
- Mechanically-caused injury
  - Moving parts, sharp edges, tipping etc
- Burns from contact with hot parts or arc flash
- Injury from excessive radiation exposure
  - Light, lasers, ultraviolet, infrared, x-ray, acoustic)

THREE-BLOCK MODEL FOR SAFETY
(ADAPTED FROM IEC 62368-1)



- Several energy source types & classes may be found in a product
- Can derive different energy source classes from any class

TYPES OF PERSONS

BASED ON SKILL AND UNDERSTANDING OF RISKS

TYPES OF PERSONS

- IEC 62368-1 provides safety for all persons
- Three types of persons are specified:
  - Ordinary persons
    - Not aware of or not adequately understand the risks
  - Instructed persons
    - Instructed, and trained or supervised, by a skilled person
  - Skilled persons
    - Can reliably protect themselves in all conditions

ORDINARY PERSONS

- Applies to the general population, equipment user or not
  - Includes bystanders / casual handlers
  - Normal and abnormal operating conditions
  - Single-fault conditions, and foreseeable misuse conditions
- May access any energy source class 1
- Basic safeguard against energy source class 2
- Double or reinforced safeguard against energy source 3
- Instructed and skilled persons may also access energy source 1

INSTRUCTED PERSONS

- Instructed, and trained or supervised, by a skilled person
- May bypass equipment safeguard between class 1 & 2 energy sources
- Use precautionary safeguard to avoid painful contact
  - Specific precautionary safeguards are not documented
- May not bypass the safeguard of energy source class 3
- During faults, energy source class 2 limits are maintained
- Also skilled persons can access Class 2 energy sources

SKILLED PERSONS

- Fully safety trained, qualified and experienced
  - Must be able to recognise & avoid hazards via own expertise
- May bypass any safeguard as needed
- May access Class 3 energy source areas
- Use their skill safeguard against risk of pain, injury, death
- Protected against unintentional contact with other Class 3 energy sources

ACCESS LEVEL MATRIX

<table>
<tr><th rowspan="2">Persons</th><th rowspan="2">Conditions</th><th colspan="3">Energy source class</th></tr>
<tr><th>1</th><th>2</th><th>3</th></tr>
<tr><td rowspan="2">Ordinary persons</td><td>Normal or abnormal</td><td>Accessible</td><td colspan="2">Not to be accessible</td></tr>
<tr><td>Fault condition</td><td>Accessible</td><td>Accessible</td><td rowspan="3">Not to be access ible</td></tr>
<tr><td rowspan="2">Instructed persons</td><td>Normal or abnormal</td><td>Accessible</td><td rowspan="2">Use precautionary safeguard</td></tr>
<tr><td>Fault condition</td><td>Accessible</td></tr>
<tr><td>Skilled persons</td><td>Any condition</td><td>Accessible</td><td colspan="2">Use skill safeguard</td></tr>
</table>

LEGACY STANDARDS REVIEW

PROVISIONS IN IEC 60065 AND IEC 60950-1

IEC 60065 TERMS

- "User" is equivalent to ordinary person of IEC 62368-1
  - Sometimes called the "end user"
- Applies to the general population as in IEC 62368-1
- "Instructed person" is defined but only used once:
  - Marking of hazardous live audio output terminals
  - But users may access these with unspecified ready made cords
- "Skilled person" is defined but only used in one clause
  - Terminals for audio output voltage

IEC 60950-1 TERMS

- Less harmonized with IEC 62368-1 than IEC 60065
- Only specifies two terms:
- "Users" (or operators)
  - Analogous with ordinary persons in IEC 62368-1
- "Service persons"
  - Analogous with IEC 62368-1's skilled persons
- No direct analogue with instructed person
  - Indirect: user-access for controlled restricted access locations

CONCLUSIONS

SUMMARY AND CONCLUSIONS

- IEC 62368-1 clearly defines and uses throughout:
  - Three risk levels
  - Three-block model for safety
  - Three person types of differing safety knowledge & awareness
- Other standards differ from each other significantly, and do not clearly apply the terms for each person type
- Understanding person types, risk classes and safeguards is fundamental to understanding the standard