Safety standards exist to ensure the safety of processes and to help prevent accidents from happening on the industrial plant floor. These standards provide a formulized method to determine the risk associated with industrial machinery. Safety standards also provide guidelines to prevent unsafe conditions and components.

**Who establishes safety standards?**
International safety standards for machinery are governed by two organizations: IEC and ISO. IEC is the International Electrotechnical Commission and generally develops standards for electrical, electronic, and related technologies while its counterpart ISO (International Standards Organization) covers other technical fields. Most industrialized countries are members of IEC and ISO.

Both organizations prepare and publish international standardization that promotes safety, quality and technical compatibility between products and services. Once these standards are in place, a third party laboratory such as TUV, certifies these products based on the required standards.

EN (European Norm) standards are used throughout the EEA countries. All new EN standards are aligned with IEC and ISO standards, and in most cases have identical text.

**What about OSHA and ANSI?**
Both OSHA and ANSI are important agencies in North America and they provide guidelines on how machinery can operate safely in order to prevent a dangerous situation. However, they do not create standards on how each safety component is considered safe. Both OSHA and ANSI rely on standards such as ISO/EN 13849 and IEC 62061 to define what makes a safety device safe. ifm safety products meet OSHA and ANSI requirements.

**CONTROL-LEVEL AND DEVICE-LEVEL SAFETY STANDARDS**

**CONTROL-LEVEL - Functional Safety Standard Definitions**

**ISO/EN 13849 -1 (Performance Level A-E)**

- General principle of design with safety related parts of a control system. Applies to both mechanical and electronic safety components.
- Risk assessment under this standard is in the form of a qualitative Risk Analysis Chart (below).
Use this chart to determine the targeted Performance Levels (PL) A through E. Note: PLe is considered the most dangerous.

Once the PL is determined, the MTTFd (Mean Time to Dangerous Failure) for all components must meet the required level.

By the end of 2009, this standard will replace the EN 954-1 standard (Category B through 4).

**IEC 62061 (Machinery) SIL 1-3EN**

- Unlike ISO/EN 13849, the risk assessment methodology has a quantifiable approach.
- Standard applies to functional safety of programmable electronic control systems for machinery.
- This standard applies to SIL 1 through 3 with SIL 3 being the most dangerous.
- To determine the targeted SIL rating, the Risk Analysis Chart (below) is used to quantify the risk.

Once the targeted SIL is determined, the components that are used must have a PFHd (Probability of Dangerous Failure per Hour) equal to required SIL rating needed. (See chart below).

- Derived from IEC 61508 but specifically for industrial machinery.

**NFPA 79-2007** – Updated to reference IEC 62061 and ISO/EN13849-1

- Recognized by ANSI as the North American electrical standard for machinery.

Both Control-Level Safety Standards - IEC 62061 and ISO/EN 13849-1 are Comparable. Why? IEC 62061 and ISO/EN 13849-1 both cover safety related electrical control systems. Both standards produce the same results but use different methods. They are intended to provide users with an option to choose the one most suitable for
their situation. A user can choose to use either standard. The end result of both standards are comparable in levels of safety performance or integrity. The methodologies of each standard have differences that are appropriate for their intended users (See chart below).

<table>
<thead>
<tr>
<th>Standard</th>
<th>Complex Safety Systems</th>
<th>Simpler Conventional Safety Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 13849</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>IEC 62061</td>
<td>✓</td>
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</tbody>
</table>

**DEVICE-LEVEL - Functional Safety Standard Definitions**

IEC 61496-1 and -2 (Electrosensitive Protective Equipment) Defines Type 2 or Type 4 Light Curtains - (See chart below).

<table>
<thead>
<tr>
<th>Type</th>
<th>Control Reliable</th>
<th>Tighter Effective Aperture Angle</th>
<th>Redundant Circuity</th>
<th>High Risk</th>
<th>Low to Moderate Risk</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Type 4</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Type 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- IEC 61496 standard has two parts:
- IEC 61496-1: Defines requirements and necessary tests for ESPE (Electro-sensitive Protective Equipment) for response time, number of outputs, fault modes, design, stress and mechanical vibration.
- IEC 61496-2: Defines optical requirements for Active Optoelectronic Protective Devices (AOPD). Light Curtains being the most common type.
- It is these specific standards in which a Type 2 or Type 4 light curtain is defined.

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