



By Geoffrey Peckham

UNDERSTANDING SYMBOLS: EMERGENCY STOP

One of the critical building blocks for your product's safe design is the proper use of color-coding and symbols. This article will explore the new developments that have occurred in the field of marking emergency stop actuators.

The need to correctly identify emergency stop actuators designed into machinery is highly important so operators can easily locate them to stop a machine in an emergency situation. This article will explore best practices for symbols that identify these devices (see Figure 1) and give you practical guidance to make sure your machine products are in compliance with the latest standards on this vital, potentially life-saving topic.

STANDARDS FOR EMERGENCY STOP ACTUATORS

There are a host of standards that include sections on emergency stop devices. For our purposes here, we are going to look at:

- *NFPA 79: Electrical Standard for Industrial Machinery*
- *EN/IEC 60204-1: Safety of machinery – Electrical equipment of machines – Part 1: General requirements*
- *EN/ISO 13850: Safety of machinery – Emergency stop function – Principles for design*
- *The Machinery Directive 2006/42/EC*

GENERAL REQUIREMENTS

Perhaps the Machinery Directive best summarizes the general requirement for emergency stop actuators in its section 1.2.4.3 on emergency stop:

“Machinery must be fitted with one or more emergency stop devices to enable actual or impending danger to be averted...”

The device must:

- have clearly identifiable, clearly visible and quickly accessible control devices,
- stop the hazardous process as quickly as possible, without creating additional risks,
- where necessary, trigger or permit the triggering of certain safeguard movements.”



Figure 1: A typical emergency stop button on a machine (Label design at left ©2015 Clarion Safety Systems. All rights reserved.)

It's interesting to note in this excerpt from the Machinery Directive that the first trait the device must have is the ability to be "clearly identifiable." The Directive does not explain how to accomplish making it clearly identifiable, leaving that job to the standards, as they define, below.

AGREED-UPON CONSENSUS FOR COLOR-CODING

Making an emergency stop actuator easily identifiable revolves around three factors: the size of the device, the location of the device and the colors used to make it stand out from its environment. The sizes of actuators are governed by their manufacturers. Their proper locations should be determined by a risk assessment to make them, as EN/ISO 13850 says in 4.3.2, "readily accessible and capable of non-hazardous actuation by the operator and others who could need to actuate them."

Next comes color-coding. Often U.S. and international standards have differed in their color-coding requirements, but not here. Compare the following; they all stipulate the same thing:

NFPA 79 (2015)

"10.7.3 Emergency Stop Actuators. Actuators of emergency stop devices shall be colored RED. The background immediately around pushbuttons and disconnect switch actuators used as emergency stop devices shall be colored YELLOW...The RED/YELLOW color combination shall be reserved exclusively for emergency stop applications."

EN/IEC 60204 (2006)

"10.7.3 Colour of actuators: Actuators of emergency stop devices shall be coloured RED. If a background exists immediately around the actuator, then this background shall be coloured YELLOW. See also ISO 13850."

EN/ISO 13850 (2014)

"4.3.5 The actuator of the emergency stop device shall be coloured RED. As far as a background exists behind the actuator and as far as it is practicable, the background shall be coloured YELLOW....

4.3.6 The actuator and the background should not be labelled with text or symbols. Where a symbol is needed for clarification, the symbol from IEC 60417-5638 shall be used..." (See Figure 2.)

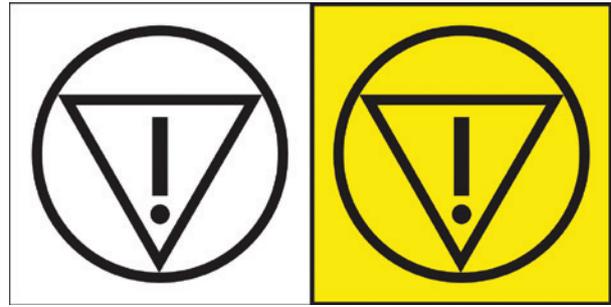


Figure 2: Left, IEC symbol number 60417-5638 for emergency stop; right, how Clarion typically reproduces this symbol with a yellow background

The stipulation in EN/ISO 13850 that says "the actuator and background should not be labelled with text or symbols" uses the word "should" instead of "shall" to indicate that the statement is advisory, not mandatory. This is significant because currently many machine manufacturers place yellow die-cut background legend plates behind their actuators that have the words "EMERGENCY STOP" printed on them. The use of words on these backplates is allowable internationally. But like the stipulations the Machinery Directive places on the use of text on a machine's warnings, the text on emergency stop background legend plates may also need to be translated into the language of the country in which the machine is to be used, and on request, into the operator's language.

MACHINERY DIRECTIVE 2006/42/EC

"1.2.2 Control devices must be: clearly visible and identifiable, using pictograms where appropriate..." The Machinery Directive's accompanying guide¹ says that the visibility and clear identification of control devices is meant to enable operators to use the devices without hesitation and avoid unintended commands due to operators confusing one control device with another. The guide also says, "It is important for manufacturers to identify control devices using, as far as possible, standardized colours, shapes and pictograms so that operators are not surprised when they change tasks or move from one machine to another." To this writer, this stipulation is all the more important for the emergency stop actuator so tragedy can be avoided.

¹ Section 186, Guide to Application of the Machinery Directive 2006/42/EC

THE LATEST ADVANCEMENT

ISO 7010 is the international standard for safety symbols. In 2011, it registered a new symbol (see Figure 3) to indicate the location of emergency stop buttons. The new symbol uses the green-square-with-white-symbol format for safety equipment location signs. Doing so makes it part of a family of safety symbols used in facilities to denote, for example, the location of stretchers, eyewash stations, emergency showers, and emergency exits. New best practices in safety sign placement would install this safety sign in a facility near the locations of emergency stop buttons to increase awareness of their locations and keep hesitation to a minimum when emergency situations occur (see Figure 4).

In my opinion, the new ISO emergency stop safety sign better fulfills the Machinery Directive's longtime preference for using "readily understandable pictograms" on machines to more effectively communicate safety messages across language barriers. The new, more representational, ISO emergency stop safety symbol is considerably more intuitive to understand when compared to the abstract IEC symbol shown in Figure 2. Yet because the EN/ISO 13850 standard mandates that the older IEC symbol "shall" be used, I recommend that the IEC symbol be used on machines for now. When EN/ISO 13850 comes up for revision, expect a change proposal to make reference to the new ISO symbol. Once this is done, the new symbol will most likely become the standard in industry and used by machinery manufacturers around the globe to more effectively convey the location of these critical, lifesaving devices. ©



Figure 3: New ISO safety sign (symbol) for emergency stop



Figure 4: Example of a photoluminescent emergency stop button safety sign mounted in a facility

Geoffrey Peckham is CEO of Clarion Safety Systems. He is also chair of both the ANSI Z535 Committee for Safety Signs and Colors and the U.S. Technical Advisory Group to ISO Technical Committee 145 – Graphical Symbols, and member of the U.S. Technical Advisory Group to ISO Project Committee 283 (ISO 45001 Occupational Health and Safety Management Systems). Geoffrey can be reached at gmpeckham@clarionsafety.com.