

emergency stop is in place. These measures are just as important and should always be part of the risk reduction strategy for a machine.

5. The E-stop should ideally be activated just twice per year.

Assuming that there’s no need to stop hazardous motion in a given year, then the emergency stop should only be activated twice over this time period for the purpose of manual testing. Some manufacturers set things up so that operators use the E-stop for routine machine shutdowns, but this is a standards violation and will lead to the early breakdown of the device.



Figure 2 – A commonly used e-stop button installation

Figure 2 shows a typical e-stop button installation that is used for machinery. Notice the red retentive mushroom head push button, with the yellow collar behind it identifying it as an emergency stop. This particular model uses a “twist to release” feature. Depending on the machinery application, this button may also be paired with a Machine Safety Relay and/or a larger line-stop based e-stop system.

Interested in learning more about e-stops and their applications? Additional whitepapers can be found on the OMRON website at <https://automation.omron.com>. There are also a large collection of technical standards documents and regulations that must be followed when it comes to e-stops. Your local OMRON application specialist can help you navigate the e-stop requirements for your local area.

About the Author



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TECHNICAL ARTICLE

Primer on Machine Safety E-Stop Categories

By Graham Nasby, City of Guelph Water Services

Since we have an article on best practices when it comes to selecting e-stop technology, it seems only natural to have a brief primer on machine safety “emergency stop” categories. In North America, the terminology for emergency stop “category” typically originates from these published technical standards: IEC-60204-1 and NFPA-79 among others. Depending on the geographic area or industry, there may also be additional local technical standards as well. For example, in Canada the CSA C22.2 No. 301 technical standard applies.

Yes, terminology does matter. Each of these standards does have specifically defined terms about how to refer to emergency stop systems, and specifically safety stop systems. For example, in these standards, an e-stop is referred to as a “stop category”. The word “emergency” is more a descriptor of how/when the stop is being called upon to function.

As a best practice, an e-stop should only be used for actual emergency situations. During normal operations, the preferred way of shutting down equipment should always be to use its normal control system and/or normal operator input. A category-rated stop system should only be used emergency situations. For many pieces of equipment, the emergency stop may also not be preferable since it will often prioritize quick stopping of equipment for safety, rather than a slower stop to avoid equipment damage.

Here is a summary of the typical “stop categories” used:

	IEC 60204-1 ¹	NFPA 79 ²	CSA C22.2 No. 301 ³
0	stopping by immediate removal of power to the machine actuators (i.e. an uncontrolled stop)	is an uncontrolled stop by immediately removing power to the machine actuators.	stopping by immediate removal of power to the machine actuators (i.e., an uncontrolled stop;
1	a controlled stop with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved;	is a controlled stop with power to the machine actuators available to achieve the stop then remove power when the stop is achieved.	a controlled stop with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved;
2	a controlled stop with power left available to the machine actuators.	is a controlled stop with power left available to the machine actuators.	a controlled stop with power left available to the machine actuators.

This article is only a brief summary. A longer discussion of these standards and how they apply to “safety stop” categories, can be found in Doug Dixon’s excellent article on Machine Safety 101 entitled “Emergency Stop Categories”⁴. As with all safety systems, it is always recommended to check with a specialist that is familiar with the specific requirements of the local jurisdiction of the installation.

¹ IEC 60204-1, Safety of machinery – Electrical equipment of machines – Part 1: General requirements (aka EN 60204-1)

² NFPA 79, Electrical Standard for Industrial Machinery

³ Industrial electrical machinery. CSA Standard C22.2 No. 301. 2016.

⁴ <https://machinerysafety101.com/2010/09/27/emergency-stop-categories/>