Modular Safety Gate Systems

Modular safety gate systems add locks, escape releases, and control devices to existing gates to improve worker safety and system uptime in a variety of applications. They are indispensable in preventing injury and downtime in industries like paper, packaging, pharmaceutical, automotive, food processing, and numerous other industrial environments. Read on to learn how to choose the right components of a modular safety gate for your application.

1. Analyze your application.

The first step in choosing modular safety gate components is determining your application's safety requirements. You may need to lock your gate so it stays closed during the process, even resisting dangerous overruns; stop process motion via an interlock if the gate opens; secure process guards in place with guard locks; or a combination of the three.

Consider how much force each type of lock needs to withstand. Magnetic interlocks are commonly available for forces of 500 or 1,000 N. Safety gate locks and guard locks can withstand forces as high as 7,500 N and provide latching forces up to 30 N.

2. Search for safety levels.

Make sure that any safety interlock or gate locking system you install meets appropriate machinery safety standards. Use ISO 13849-1 or your own corporate policies/procedures as a guide to assign each area of risk a performance level (PL) between a and e, or use IEC 62061 to determine the safety integrity levels (SILs) between 1 and 3 associated with your process. The method you use will depend on your region, industry, process, and organization.

Once you know what safety standards you need to meet, make sure your safety gate locking mechanisms, interlocks, and controls are certified to the appropriate PL or SIL. Many guard locks are certified to PL d or e. Safety gate locks or interlocks may also meet PL e as well as SIL 3.

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3. Ensure ease of use.

Easy-to-use controls can improve process efficiency and increase the likelihood of an appropriate response in an emergency. Choose a pushbutton unit with preconfigured or modular options to allow access to gate locks, guard locks, and process controls in one place. Multiple combinations of pushbuttons, key switches, and E-STOPs are available.

4. Consider diagnostics.

Cut down on service calls and reduce downtime by integrating safety devices into a system that can transmit up-to-the-second diagnostic information to any web-connected location. Diagnostic systems that use fieldbus protocols allow transmission of diagnostic data, remote activation of safety devices, and local real-time diagnostics of process conditions and sensor network health.

Fieldbus modules can handle up to 16 sensors wired in series or individually with a maximum total cable length of 900 m, up to 50 m between devices, and up to 150 m of cable between the last device and the fieldbus module. The modules can also connect to a plant safety bus or to third-party devices via up to 6 direct I/Os.

5. Enable escape.

Gates and guards are designed to keep employees safely away from process areas, but access is often necessary for maintenance or changeover activities. To make sure employees are protected, especially when visibility or line of sight are compromised, make sure escape releases are readily available.

For each accessible area, an escape release should be accessible to the maintenance worker. If the application allows, the escape release can be connected directly to the locking component. If the line of sight is compromised further from the gate, the escape release can be installed in a physically separate location by means of a flexible extension cable. Either way, the safety of the maintenance worker needs be considered.

6. Evaluate the environment.

To ensure long life for your modular safety gate system, make sure the locks, sensors, and interlocks can withstand your operating environment. For instance, some guard locks for processes with potentially dangerous overruns are rated for 0°C to 55°C.

Sensor and control housings must also be able to withstand the vibration, shock, and impact they may encounter in an industrial environment. Consider the housing's IP rating. Washdown environments require a minimum of IP 65, and many housings are available up to IP 67, which completely seals out dust as well as resisting immersion in water.

Physically install interlock sensors and gate locks with a careful eye to alignment. Some units allow as much tolerance as ±3 mm vertically and ±5 mm laterally.

7. Minimize commissioning time.

Modular safety gate systems can be easy to install since they are tailored to the needs of a specific application. Sensors, locks, and controls that seamlessly network together efficiently integrate by reducing wiring and allowing for easy component replacement as well as system expansion with additional units. For instance, the components of Pilz's modular safety gate system connect in series via quick-disconnect M12 12-pin connections streamlined with rotatable end caps and available IP 20 or IP 67 cabling.

Look for control units with features that ease physical installation like integrated, rotatable mounting brackets and slimline housings that fit standard 40-mm profile systems.

Choosing a modular safety gate system also provides access to compatible accessories like door handles and mounting brackets for sliding doors and both left- and right-hinged swinging doors. Accessories for covers, flaps, and lids are also available.

8. Get expert advice.

Designing, installing, or upgrading process safety measures can be nerve-racking, especially when worker safety, compliance, and process uptime are at stake. A modular safety gate system can give you the freedom to install the safest, most efficient components without wasting money or installation time on products you don't need. Designers of industrial safety systems, like engineers at Pilz, can provide additional expert guidance on building your ideal modular safety gate system.