

Chapter 5

NORMS AND REGULATIONS FOR AUTOMATIC DOORS & ENTRANCE CONTROLS

When writing specifications, considerations should be given to the following:

- The Door should not form the only entrance/exit to an area, e.g. a person should not be trapped in an area if there is a failure of the power supply to the door. Where this is unavoidable then a user must have access to a manual override facility to operate the door.
- Adequate space for safe positioning of the drive and its controls must be provided. In particular when the door is to be operated in a "Hold to Run" mode (User is within sight of the opening and holds the control to enable movement. If the control is released the movement stops), the control station must be sited so the user can see the moving door at all times.
- A suitable power supply with an isolating facility should be made available in the vicinity of the door. It is important to note that a 3phase power supply is normal for most industrial doors.
- Information related to special environmental conditions such as dust, temperature, humidity and any explosion risk should be included in the specification.

USERS OF DOORS

It is important that the user category is clearly defined at the specification stage, to enable the supplier to advise on and quote for the most suitable types of operation/automation and appropriate safety devices.

Users are defined according to both UL 325 regulation as well as EN 13241-1 normative.

NORMS CURRENTLY IN USE

This overview is based on both the International standards UL 325 and EN 13241-1, industrial & garage doors and gates – safety in use of power operated doors – requirements.

This standard sets out the safety goals. To ensure the safety of users, safety devices may need to be provided by the door manufacturer. In order to ensure that the full system will comply with the standard, the manufacturer will require information relevant to the guidelines on application, usage, duty and speed of operation.

★ *EN 13241-1 (FOR EUROPEAN MARKETS)*

★ *UL 325 (FOR NORTH AMERICA MARKETS)*

★ **EN 13241-1**
(FOR EUROPEAN MARKETS)
“Industrial, Commercial and Garage Doors and Gates - Product Standard”

SCOPE

This European Standard specifies the performance requirements for doors, gates and barriers for installation in areas in the reach of people, for which the main uses are giving safe access for goods and vehicles accompanied by persons in industrial and commercial premises and in residential garages.

- These devices may be manually or power operated.
- Power operated doors may be supplied either as an original power operated door or by the retrospective addition of a drive unit to a previously manually operated door.

THE STANDARD DOES NOT APPLY TO:

- Horizontally moving doors less than 2,5 m wide and 6,25 m² area, designed solely for pedestrian use
- Revolving doors of any size
- Lock gates and dock gates
- Doors on lifts
- Doors on vehicles
- Armoured doors in banks
- Doors for animals in zoos
- Theatre curtains
- Doors outside the reach of people (e.g. crane gantry fences)

CHAPTERS

EN 12445

Safety in use of power operated doors

Test methods

EN 12453

Safety in use of power operated doors

Requirements

EN 12978

Safety Devices for power operated doors and gates

Safety requirements for photoelectric sensors – both for object/person and for edge detection

EN 61496

Safety of machinery - Photoelectric sensors

Specific requirements for optical behaviour of photoelectric sensors – Type D activation

EN 12445

Safety in use of power operated doors

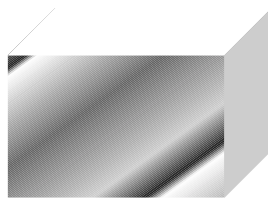
Test methods

TEST PIECE A

(Person or object detection)

- Size 70 x 30 x 20 cm
- Hard parallelepiped specimen
- The three sides (one in each dimension) shall be

Reflective



- E.g. Mirror
- Fine grained stainless steel
- White gloss paint

Dull black

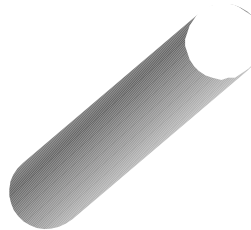


- painted raw wood

TEST PIECE B

(Edge detection)

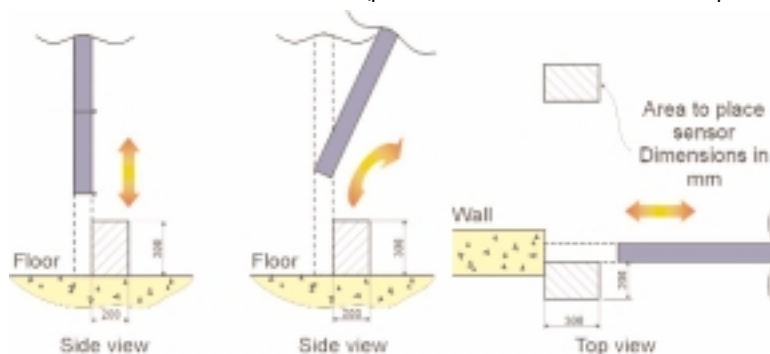
- Size 300 mm long and 50 mm in diameter
- Half of the surface is reflective
- The other half of the surface is dull black painted raw wood



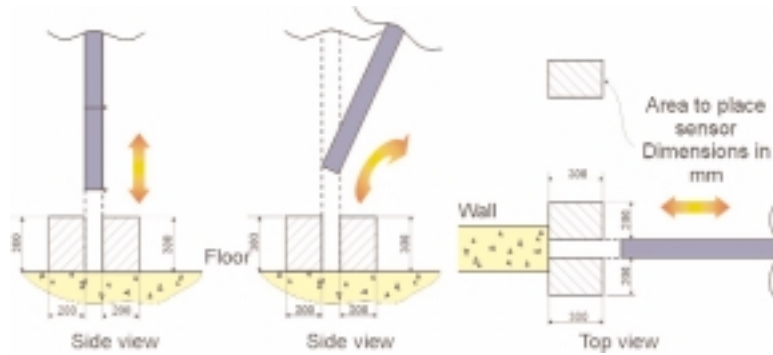
- Two testpieces, one reflective and one of dull black raw wood, can be used

TESTING OF VERTICAL SLIDING AND ANY TYPE OF HORIZONTALLY MOVING DOOR

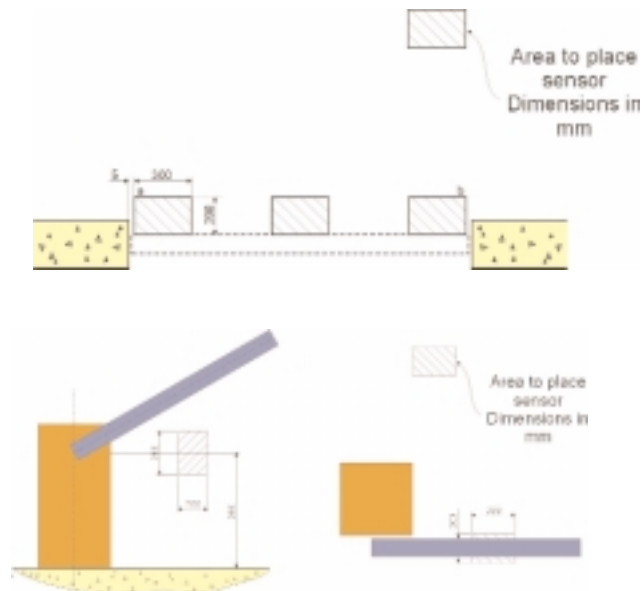
- Detection active on one side (presence detection with A test piece)



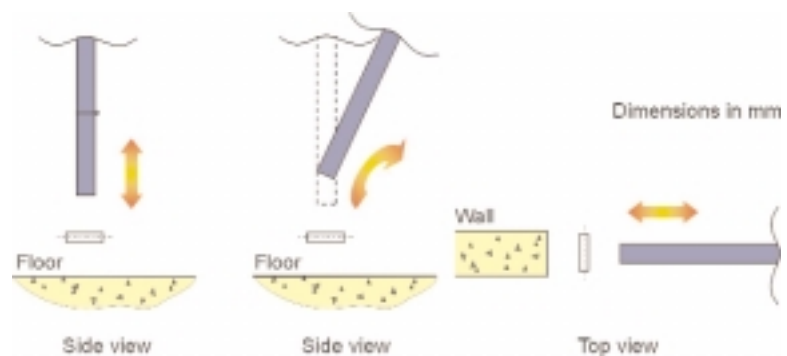
- Detection active on both sides (two coupled presence detection)
For door leaf greater than 100 mm



- Testing two coupled presence detection devices



- Detection of edge sensor installed on the door leaf
(presence detection with B test piece)



EN 12453

Safety in use of power operated doors

Requirements

MINIMUM LEVEL OF SAFEGUARDING

The minimum level of safeguarding is derived from the combination of types of users and types of activation of the door.

Types of Users

- Type 1 A limited group of persons are trained to operate the door and the door is out of public area.
- Type 2 A limited group of persons are trained to operate the door and the door is located in a public area.
- Type 3 Any person is free to operate the door and the door is in contact with the general public.

Types of Activation

- Type A Hold-to-run pushbutton control
- Type B Hold-to-run control with key switch or similar
- Type C Limitation of force according to Annex A, either by force limitation or by safeguarding (edge detection, rubber profile)
- Type D Detection of the presence of a person or obstacle standing on the floor at one side of the door (Photoelectric sensors)
- Type E Detection of presence which is designed and installed in a way that in no circumstances can a person be touched by the moving door leaf.

The following table underlines the two major safety requirements for photoelectrics Type C Activation and Type D Activation as described in EN 12978.

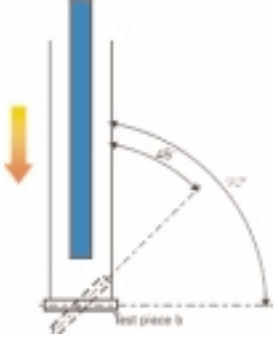
Minimum levels of safeguarding at main edge

Type of door activation	Types of user		
	Trained Users (no public) Type 1	Trained users (Public) Type 2	Untrained users (Type 3)
Hold to run control	A	B	Not possible
Impulse activation In sight of the door	C or E	C or E	C and D, or E
Impulse activation Out of sight of the door	C or E	C and D, or E	C and D, or E
Automatic Control	C and D, or E	C and D, or E	C and D, or E

DOORS

SENSITIVE PROTECTIVE EQUIPMENT

In normal operation **PSPE** (pressure sensitive protective equipment), **ESPE** (electro-sensitive protective equipment) and inherent (built into the drive) protective equipment shall be designed so that:

- When they are in working order, they respond by giving an appropriate output signal(s)
 - ✓ when part of a person is in the detection zone
 - ✓ or when a person applies the activating force at any point within the active area of the safety edge sensing element,
 - ✓ or when closing on a test piece positioned at any angle between 90° and 45° to the direction of the motion if the signal from the sensing unit is within a specified signal range for inherent systems
- 
- The door controller must stop the door movement for as long as the safety edge is activated or the door is reversed
 - The safety edge must be active at maximum 30 mm from each end of the profile
 - if a single fault occurs in the components between the sensing unit and the door control or in the sensing unit which prevents the control signal from stopping the leaf movement:
 - ✓ either they maintain their protective function if according to category 3 or 4 of EN 954-1 (includes self checking functions)
 - ✓ or they are monitored according to category 2 of EN 954-1, with the acceptable deviation that the check of the safety function can be done at the latest at one of the final end positions of the leaf. If a fault is detected, the door must stop or switch to hold-to-run control.

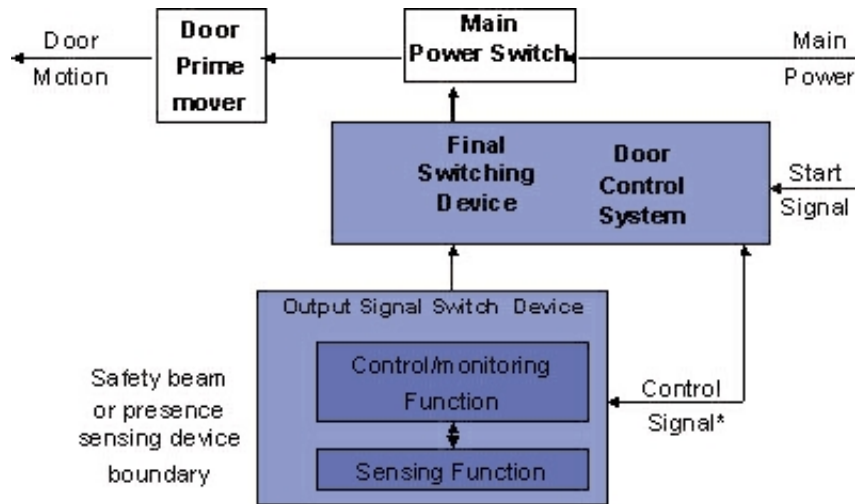
Both sensitive protective equipments (PSPE and ESPE) meet the safety requirements for photoelectric sensors – both for object/person detection and for edge detection as described in EN 12978

EN 12978

“Safety requirements for Photoelectric sensors – both for object / person and for edge detection”

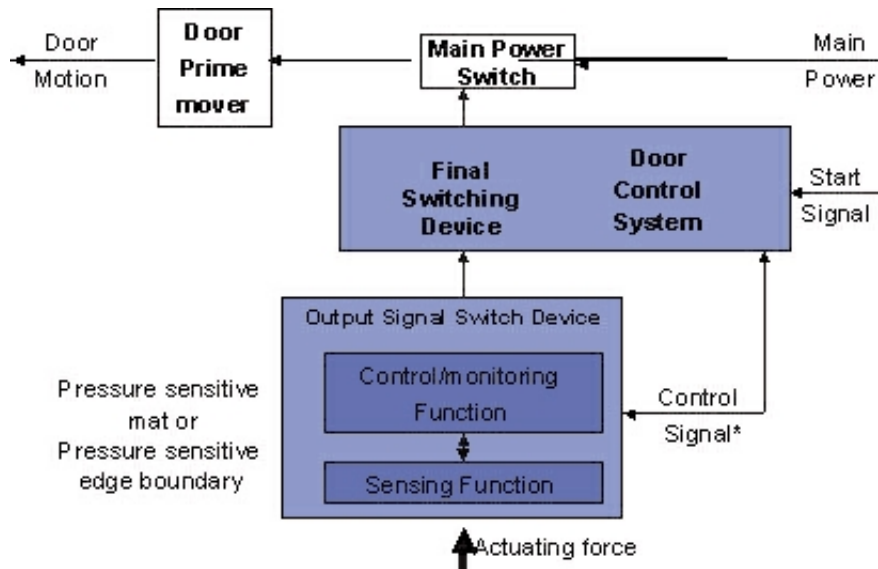
ELECTRO SENSITIVE PROTECTIVE EQUIPMENT (ESPE)

Type D Activation - Object/Person detection (as mentioned in EN 12453)



PRESSURE SENSITIVE PROTECTIVE EQUIPMENT (PSPE)

Type C Activation – Edge detection (as mentioned in EN 12453)

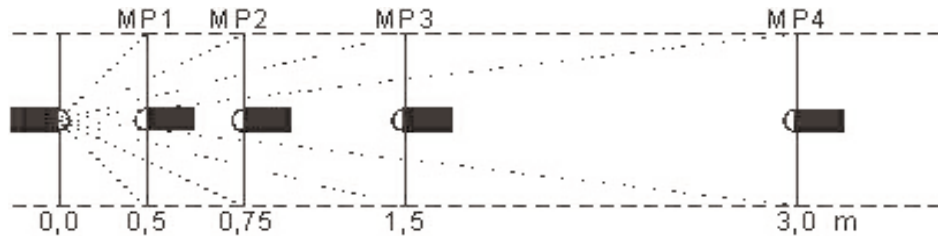


* The control signal should activate the Output Signal Switch Device in order to test the sensor performance. This should be done at the latest at one of the final end position of the leaf.

EN 61496

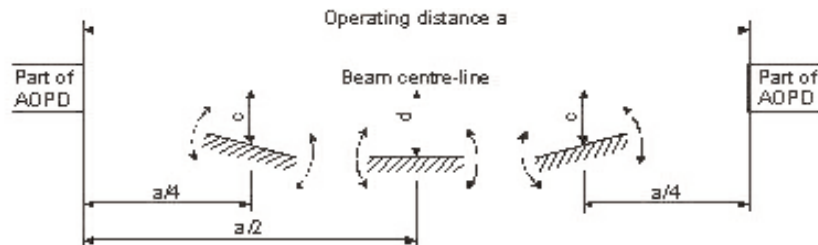
"Specific requirements for optical behaviour of Photoelectric sensors Type D activation"

EFFECTIVE APERTURE ANGLE (EAA) TEST METHOD



Category 2 Photoelectric	MP 1	MP 2	MP 3	MP 4
Limit values degrees	27,5	19,3	10	5

MIRROR PROTECTIONS - EXTERNAL REFLECTIONS



Operating distance a [m]	Category 2 Photoelectric	
	c [mm]	d [mm]
0,5	29,8	21,8
0,75	39,0	32,4
1,5	58,4	64,0
3,0	65,4	123,6
$>3,0$	$a \tan 1,25^\circ$	$a \tan 2,3^\circ$

★ **UL 325**
(FOR NORTH AMERICAN MARKETS)
"Door, Drapery, Gate, Louver and Window Operators and Systems"

SCOPE

- UL325 is a manufacturer's standard that covers door and gate operators
- The standard defines minimum requirements for testing a product for safety, safety features and performance, and how the product should be manufactured.
- A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this Standard, and that involves a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements to determine that the level of safety as originally anticipated by the intent of this Standard is maintained.
- A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this Standard shall not be judged to comply with this Standard.
- Where appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this Standard, UL325

REQUIREMENTS COVER:

- Electric operators for doors, draperies, gates, louvers, windows and other opening and closing appliances rated 600 volts or less to be employed in ordinary locations in accordance with the National Electrical Code, NFPA 70.
- Complete doors, gates, and other such assemblies that include electric opening and closing appliances.
- Accessories, such as external entrapment protection devices, for use with appliances covered by this standard.
- Doors and door operators intended for exit use as defined in the Life Safety Code, NFPA 101 and codes such as the BOCA National Building Code, the Standard Building Code, and the Uniform Building Code, are additionally subject to design requirements specific to such use

CHAPTERS

TEST METHODS

REQUIREMENTS

USA & CANADA REQUIREMENTS FOR PRODUCT SPECIFICATIONS

TEST METHODS

TEST PIECE A

(person or object detection)

- Test piece size 6 x 12 inches
- The sides shall be painted white



The surface may simulate surfaces mentioned below-E.g. Mirror

- o Fine grained stainless steel
- o White gloss paint

TEST PIECE B

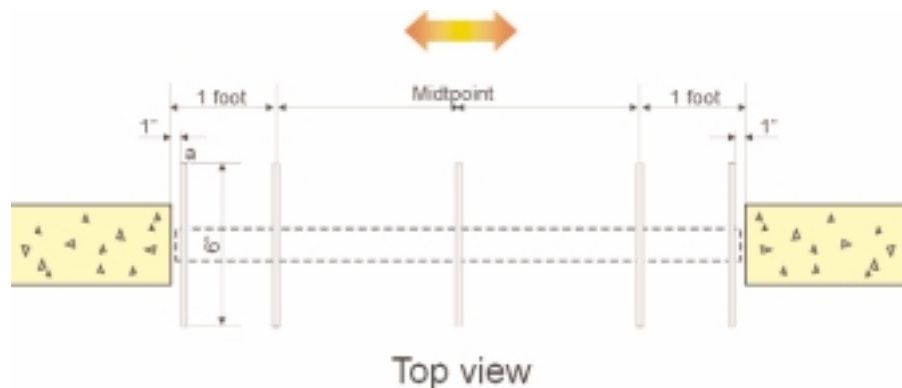
(Edge detection)

- Size 1 7/8 inch in diameter

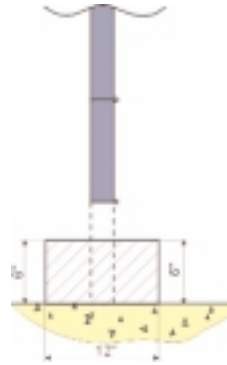


TESTING OF VERTICAL SLIDING AND ANY TYPE OF HORIZONTALLY MOVING DOOR

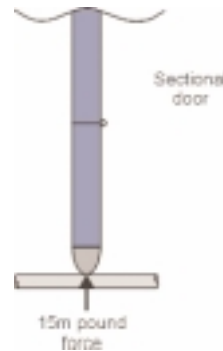
- When a photoelectric sensor senses an obstruction as described below that is to be placed on a level surface below the door or gate. The sensor is to be tested with the obstruction at a total of five different locations over the width of the door or gate opening. The locations shall include distances 1 inch from each end, 1 foot from each end, and the midpoint.



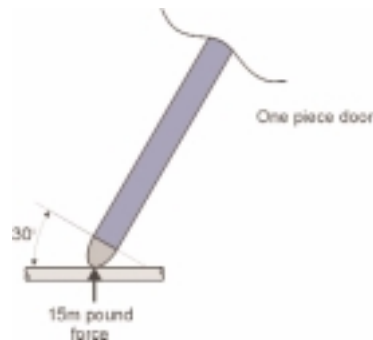
- The Obstruction is to be centered under the door or gate perpendicular to the plane of the door or gate when in the closed position.



- An edge sensor shall actuate upon the application of a 15 pound force or less in the direction of the application. For an edge sensor intended to be used on a sectional door, the force is to be applied by the longitudinal edge of a 1-7/8 inch diameter cylinder placed across the sensor so that the axis is perpendicular to the plane of the door.



- For an edge sensor intended to be used on a one piece door, the force is to be applied so that the axis is at an angle 30 degrees from the direction perpendicular to the plane of the door. The test is to be repeated at various representative points of the edge sensor across the width of the door.



Exception: The edge sensor need not be sensitive to actuation 2 inches or less from each end of the intended width of the door opening.

REQUIREMENTS

ENTRAPMENT PROTECTION

The level of entrapment protection is derived from the combination of types of location and types of Safety Devices.

Types of Location

Class 1	Residential
Class 2	Commercial or General Public Access
Class 3	Industrial or Limited Access
Class 4	Restricted Access

Types of Safety Devices

Type A	Inherent in Operator (Page 40A, §30A.1.2)	Provided in design of the Gate Operator
Type B-1	Non-contact (Page 40A, § 30A.1.4)	Photoelectric Sensors or equivalent
Type B-2	Contact (Page 40B, § 30A.1.9)	Edge device or equivalent also read §. 34 – Edge sensor
Type C	Swing – Inherent (Page 40B, § 30A.1.12)	Inherent adjustable clutch (mechanical) or pressure relief device (for hydraulics)
Type D	Constant Contact (Page 40C, § 30A.1.14)	Manual activation of device which stop the unit when button released
Type E	Audio Alarm (Page 40C, § 30A.1. 16)	Bells, horns, sirens or buzzers at 100dB also read § 34A – Audio Alarms

The following table underlines the major Entrapment protections Types
Minimum levels of safeguarding at main edge

Vehicular Usage Class	Protection against entrapment Gate operator category			
	Horizontal Slide, Vertical Lift Vertical Pivot		Swing Gate, Vertical Barrier (arm)	
	Primary Type	Secondary Type	Primary Type	Secondary Type
Class 1&2	A	B1,B2 or D	A or C	A, B1, C or D
Class 3	A, B1 or B2	A,B1,B2,D or E	A, B1 or C	A,B1,C,D or E
Class 4	A,B1,B2,or D	A,B1,B2,D or E	A, B1,C or D	A,B1,C,D or E

- A gate operator utilizing entrapment protection designated **Type B1** (refer to the previous Table) by having provision for connection of, or providing with the operator, a non-contact sensor (photoelectric sensor or equivalent) shall, when the sensor is actuated:
 - a) Stop or reverse the gate within a maximum of 2 seconds of sensing an obstruction in both the opening and closing directions,
 - b) Stop the gate upon sensing a second sequential obstruction in the opposite direction while in the process of reversal as described in (a),
 - c) Result in a gate at rest remaining at rest unless a Type D device is actuated, and
 - d) Return to normal operation when the sensor is no longer actuated

- A gate operator utilizing entrapment protection designated **Type B2** (refer to the previous table) by having provision for connection of, or providing with the operator, a contact sensor (edge sensor or equivalent) shall, when the sensor is actuated:
 - a) Stop and initiate the reversal of the gate within a maximum of 2 seconds of sensing an obstruction in any direction. The gate operator shall reverse the gate a minimum of 2 inches (50.8 mm),
 - b) Stop the gate upon sensing a second sequential obstruction in the opposite direction, while in the process of reversal as described in (a),
 - c) Result in a gate at rest remaining at rest, unless a Type D device is actuated, and
 - d) After the sensor is actuated no more than 2 times during a single closing cycle, or once in a single opening cycle, require a renewed intended input (via wired or wireless control or integral control, a loop sensor, a card reader, or a similar device) prior to enabling any automatic activation devices such as a timer or any other maintained input that was present when the reversing function occurred.

- A gate operator installed in accordance with the manufacturer's instructions utilizing entrapment protection designated **Types B1 and B2** (refer to the previous table) as the primary device by having provision for connection of such device, or providing such device with the operator, shall monitor for the presence and correct operation of the device, including the wiring to it, at least once during each open and close cycle.

The operator shall function as required in the event the device is not present or a fault condition occurs which precludes the sensing of an obstruction.

A fault condition includes an open or short circuit in the wiring that connects the external entrapment protection device to the operator and the device's supply source.

USA & CANADA PRODUCT SPECIFICATIONS

There are specific requirements according to both US and Canadian Markets for the Product Certifications.

USA:

FDDR2.E234263

*Door, Drapery, Gate, Louver and Window Operators and Systems
- Component*

CANADA:

FDDR8.E234263

*Door, drapery, Gate, Louver And window Operators And Systems
Certified For Canada*

E 234263 is file number of Carlo Gavazzi Industri