OPERATOR & ELECTRONICS DIVISION

DASMA TECHNICAL DATA SHEET

#353

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GATE OPERATORS AND THE UL 325 STANDARD

(NOTE: This Technical Data Sheet is based on an article that appeared in the Spring 1999 edition of Door & Access Systems magazine.)

Introduction

The standard that addresses the automatic operation of garage doors also contains provisions related to the automatic operation of gates. In this Technical Data Sheet, we will provide you with some background information about UL and UL standards and will notify you of the current gate-related contents of UL 325.

What is UL?

Underwriters Laboratories, Inc., a not-for profit organization established in 1894, is self-described as "the leading third-party certification organization in the United States and the largest in North America." UL's primary stated mission is "to evaluate products in the interest of public safety." Note that while UL declares it is the "leading" third-party certification organization, it is not the only one. There are other testing laboratories and certification organizations in the United States.

What is a UL Standard?

UL standards are voluntary standards that establish minimum requirements and are developed via an open, non-exclusionary process. "Voluntary" means that the standard has not been initiated through any government or similar regulatory agency mandate. "Minimum" means that the industry and those who developed the standard believe that the requirements should be met by all participants affected by the standard, and that more stringent provisions may be adopted by some in the industry. Finally, an "open, non-exclusionary process" indicates that any interested party can participate in the development of a UL standard. In addition, a number of UL standards have undergone a "canvass" (ballot) process in order to obtain recognition as American National Standards. The purpose of this process is to gain a wider acceptance of a specific standard. The canvass process typically includes interested individuals and organizations that may have direct or material interest in a particular standard. UL 325 is one of the standards that have attained the ANSI (American National Standards Institute) designation.

What is the UL 325 Standard?

For products within the scope of the standard, UL 325:

1. Contains the basic qualifying factors that products must meet in order to be documented (listed) and marked (labeled) as complying with the requirements of the UL 325 voluntary Listing and Labeling program.
2. Provides methods for testing products, primarily related to safety performance.
3. Covers installation of products in accordance with the National Electrical Code, which is maintained by the National Fire Protection Association (NFPA) and is in force nationwide. UL 325 is to be harmonized with this Code.
4. Addresses safety concerning potential fire and electrical hazards, as well as the safety of the general public.

How is UL 325 Used?

UL 325 is used as a basis to test products at a nationally recognized testing laboratory. Gate operators that choose to participate in a listing and labeling program submit their products for testing. If they are found to be in compliance with the UL 325 standard, they are "Listed" and receive a "Mark." It is very important to remember two facts:

- There are laboratories other than UL that are capable of listing and labeling products. A "UL label" is not a generic term. For example, many people use "Kleenex" or "Band-Aids" as generic terms when in fact they are specific brand names. UL is a brand name, and "UL label" should not be used generically.

- Products are not approved by UL or other laboratories. Approval implies acceptance of responsibility for compliance with standards. This responsibility lies with the listing and labeling applicant and not with the laboratory. The burden of proof regarding data always lies with the manufacturer.

Development of UL 325

The first edition of UL 325 was released in 1973. That edition was primarily focused on the electric operation of garage doors and did not contain provisions for gates. After federal laws were enacted in the early 1990's, citing the provisions of UL 325 as applicable to garage door operation, DASMA members of the gate operator industry initiated the inclusion of electric gate operator provisions in UL 325. Some government agencies and other interested groups have monitored the standard's progress and have provided input on the final format of the provisions of the standard that relate to gate operators.

Overview of UL 325 and Gates

Highlights of UL 325 include the following:

- A glossary which defines each type of operator
- Different "classes" of gate operators
- Entrapment* protection criteria for each "class" of operator
- Entrapment* alarm criteria
- Requirements for gate construction and installation
- Instructional requirements placing increased responsibility on installers

*In the document, "entrapment" is defined as "the condition when an object is caught or held in a position that increases the risk of injury."

A key part of the UL 325 standard is a table that summarizes the entrapment device options for different classes of operators of the various types of gates included in the standard. The table, labeled "Table 30A.1," is reproduced below from the 4th edition of the *Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems*, UL 325. It is reprinted with the permission of Underwriters Laboratories, Inc. Refer to the table as you read about the provisions that are described in the following sections.

Table 30A.1 Protection against Entrapment

VEHICULAR USAGE CLASS	GATE OPERATOR CATEGORY			
	HORIZONTAL SLIDE VERTICAL LIFT VERTICAL PIVOT		SWING GATE VERTICAL BARRIER (ARM)	
	PRIMARY TYPE	SECONDARY TYPE	PRIMARY TYPE	SECONDARY TYPE
Class I & II	A	B1, B2, or D	A or C	A, B1, C, or D
Class III	A, B1, or B2	A, B1, B2, D, or E	A, B1, or C	A, B1, C, D, or E
Class IV	A, B1, B2, or D	A, B1, B2, D, or E	A, B1, C, or D	A, B1, C, D, or E

NOTE – The same type of device shall not be utilized for both the primary and secondary entrapment protection means. Use of a single device to cover both the opening and closing directions is in accordance with the requirement; however, a single device is not required to cover both directions. A combination of one Type B1 for one direction and one Type B2 for the other direction is the equivalent of one device for the purpose of complying with the requirements of either the primary or secondary entrapment protection means.

Entrapment protection types:

Type A – Inherent entrapment sensing system. See 30A.1.2

Type B1 – Provision for connection of, or supplied with, a non-contact sensor (photoelectric sensor or the equivalent). See 30A.1.4, 30A.1.5, 30A.1.6, 30A.1.7, and 30A.1.8

Type B2 – Provision for connection of, or supplied with, a contact sensor (edge device or the equivalent). See 30A.1.6, and 30A.1.9 - 30A.1.11

Type C – Inherent adjustable clutch or pressure relief device. See 30A.1.12

Type D – Provision for connection of, or supplied with, an actuating device requiring continuous pressure to maintain opening or closing motion of the gate. See 30A.1.14 and 30A.1.15

Type E – An inherent audio alarm. See 30A.1.16, 30A.1.17, and 30A.1.18

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Gate Definition and Types

UL 325 defines a gate as "a moving barrier such as a swinging, sliding, raising, lowering, rolling, or the like, barrier that is a stand-alone passage barrier or is that portion of a wall or fence system that controls entrance and/or egress by persons or vehicles and completes the perimeter of a defined area." The main types of gate operators/systems addressed in UL 325 are barrier, vertical pivot gate, horizontal slide gate, swing gate and vertical slide gate. It is important to note that all gates included in UL 325 are defined as vehicular gates and NOT PEDESTRIAN GATES. Property owners are expected to provide a separate entrance for pedestrian access.

Gate Operator Classifications

Four distinct types of classifications have been established:

- Class I: Residential usage, covering one to four single-family dwellings.
- Class II: Commercial usage where general public access is expected; a common application would be a public parking lot entrance or gated community.
- Class III: Industrial usage where limited access is expected; one example is a warehouse property entrance not intended to serve the general public.
- Class IV: Restricted access; this includes applications such as a prison entrance that is monitored either in person or via closed circuitry.

The classes are defined by the entrapment protection requirements included in UL 325. These requirements are that: 1) each class must have primary and secondary entrapment provisions; 2) each class must have different types of protection for the different classes of operators as well as for the different categories of operators; and 3) the same type of device cannot be used for both primary and secondary protection.

An exception to compliance with the provisions of Table 30A.1 has also been noted in the standard. An operator considered exempt would require all of the following: 1) operates a vehicular barrier (arm) that is not intended to move toward a rigid object closer than 2 feet; 2) does not have a pinch point between moving parts by virtue of the operator's design or complying installation; and 3) is not required to be provided with means to protect against entrapment.

Provisions of Note Regarding Gate Operators

We have identified nine notable provisions recently included in UL 325 that affect gate operators and related safety devices.

1. *Class I and Class II operators must have an audio alarm which shall function if 2 sequential activations of the entrapment protection device occur*. The "2 sequential activations" is noteworthy in that it is hoped

that "nuisance" alarms will be kept to a minimum while still enhancing safe operation.

2. *Class I and Class II slide gate operators shall not exceed a speed of 1 foot per second.* Since both classes listed involve general public usage, the maximum established speed strikes a balance between any perceived security issue (a person immediately following the party controlling the gate) and any danger from a person being struck by a gate.

3. *A Type B1 or B2 device serving as a Primary Safety Device shall be monitored for the presence and correct operation of the device, including the wiring to it, at least once during each open and close cycle.* This requirement is included because these types of safety devices are often used as backup safety devices.

4. *Manufacturers will be required to specify a brand and model number of external sensors compatible for connection to an operator.* This provision arose from concern over the gate operator external devices acting in tandem as a system, with a fault rate of 6 failures in 1 million hours of use (which equates to 115 years of continuous operation).

5. *After sensing an obstruction, reversing must begin within 2 seconds.* This requirement is intended to keep a person from being entrapped in a stationary position by the gate system. After the first contact the gate must reverse and travel a minimum of 2 inches. If there is a second contact, the gate must stop, and requires a wired device to reset the operator.

6. *After any obstruction reversal by either an A or B2 device, the timer-to-close is disabled until reset.* Both *A* and *B2* devices sense direct gate contact with an obstruction, and the devices must perform their intended function without interference from a timer-to-close action.

7. *Stop the gate upon sensing a second sequential obstruction, and then not operate until an intended hard wired input is received.* A person within the line of sight of the gate must see what has caused the second sequential obstruction and must resolve this obstruction before operating the gate.

8. *If a Type C device is chosen, swing gates must not exert more than 40 pounds of force after initial start-up.* The reasoning here is similar to the reasoning given for the speed limitation for horizontal slide gates.

9. *Edges on swing gates are not permitted.* Many interested parties, including DASMA, do not agree with this provision. It may be modified in the future.

Effect on Installations

The new provisions will have several effects on gate and fence dealers:

1. Gate and fence dealers should look for an indication of the Class of each operator, which will be specified by the gate operator manufacturer.

2. Fence dealer sales personnel must match the site application with the Class of operator. The gate operator manufacturer should be contacted if there is any question about the site application.

3. Both primary and secondary safety devices must be provided and matched to both the operator and site conditions. Although the gate operator manufacturer will either provide or specify these devices, the gate/fence dealer should insure that they are installed and correctly matched. Any questions should again be directed to the gate operator manufacturer.

4. Warning signs must be permanently affixed to the gate panel. UL 325 includes specific requirements on the format, content, and placement of these signs.

Factors Related to Gate Construction and Installation

- Vehicular gate operators should ONLY be used on vehicular gates and never pedestrian gates.
- Adequate clearance should be provided between a swinging gate and adjacent structures to reduce risk of entrapment.
- A sliding gate should work smoothly with easy rolling/movement in both directions, prior to the installation of the operator.
- Controls should be as far away from the gate as possible to prevent “reach-through” occurrences.
- Warning signs and placards must be installed and be visible in the area of the gate.

Device-Specific Installation Instructions

There are also specific installation requirements for certain types of entrapment protection devices. These specific requirements emphasize the care and attention that each device must be given prior to and during installation.

For gate operators utilizing non-contact sensor devices (Type B1), instructions should be consulted for placement for each application, care should be exercised to reduce the risk of nuisance tripping, and one or more of these devices must be installed where the risk of entrapment or obstruction exists.

For gate operators utilizing contact sensor devices (Type B2), several requirements are spelled out in UL 325. One or more contact sensors shall be located:

- at the leading edge, the trailing edge, and also postmounted both inside and outside of, a vehicular horizontal slide gate;
- at the bottom edge of a vehicular vertical slide gate; and
- at the entrapment point of a vehicular vertical pivot gate.

A wired contact sensor shall be located, and its wiring arranged, so that communication between sensor and gate operator is not subjected to mechanical damage. A wireless contact sensor shall be located where the transmission of the signals is not obstructed or impeded by building structures, natural landscaping or similar obstructions, and shall function under the intended end use conditions.

For gate operators utilizing a continuous pressure activating device (Type D), controls must be placed so that user has full view of the gate area when the gate is moving. A placard must be placed adjacent to the controls and no other activation device shall be connected. Most importantly, an automatic closing device shall not be employed.

Statements in Manufacturer's Instructions Concerning Installation

Gate and fence dealers can expect to see in gate operator instructions the following statements:

1. *The operator must be appropriate for the construction of the gate and the usage class of the gate.* The appropriate primary and secondary safety devices to be used are a major consideration to support this requirement.
2. *All openings of a horizontal slide gate, and the portion of the fence where the slide gate passes, must be guarded or screened.* These specific requirements in UL 325 that govern this provision were developed to address "reach-through" occurrences. For example, slide gates must have a protective cover 48 inches in height extending from the bottom of the gate/fence panel.
3. *All exposed entrapment points must be eliminated or guarded.* It is up to individual gate and fence dealers to identify these points on a product-by-product basis, or on a job-by-job basis.
4. *Guarding must be supplied for exposed rollers.* Exposed rollers are regarded as potential pinch points.

Gate and Fence Dealer Documentation Suggestions

In dealing with the effects of the new provisions, here are some suggestions gate and fence dealers may consider to expand their documentation of gate projects. One possibility is to visually document, either via photography or videotape, the complete gate installation including applicable signs and labels, and the owner receiving the instruction manual from the installer. Other options could include the development and use of an installation checklist, a customer sign-off form, and a service/preventive maintenance contract.

Conclusion

This article and presentations to other associations are intended to educate industry representatives and make them aware of changes that will affect their businesses. We will continue to provide information about UL 325 and other issues pertinent to gates and gate operators. For more information, you may contact DASMA by phone at (216) 241-7333 or by e-mail at dasma@dasma.com