Interpretation: **5-12**

Subject: ANSI/ITSDF B56.5-2005, Section 8.10.2 g), Vehicle Emergency Controls and Devices

Date Issued: March 21, 2007

Question (1): Is a mechanical bumper considered part of the vehicle structure and does it therefore need additional sensors are required in section 8.10.2. g)?

Answer (1): A bumper is defined in the glossary of terms as "a mechanically actuated device which, when depressed, causes the vehicle to stop." A bumper is a sensing device designed as part of a system to sense contact with an object and stop the vehicle in the event of contact. A bumper as defined in the glossary would not be considered part of the vehicle structure and would therefore not need additional sensors.

Interpretation: **5-13**

Subject: ANSI/ITSDF B56.5-2005, Section 8.10.2 g), Vehicle Emergency Controls and Devices

Date Issued: August 27, 2007

Question (1): When the bumper of an AGV hits an obstruction (like a tool box or chair left in the path) the vehicle comes to a stop. Is automatic restart of travel allowed once the obstruction is removed?

Answer (1): If the bumper is being used as a vehicle emergency control, automatic restart is prohibited and local manual intervention is required to return to normal operating conditions.

Interpretation: **5-14**

Subject: ANSI/ITSDF B56.5-2005, Section 8.10, Vehicle Emergency Controls and Devices, Section 8.11, Vehicle Nonemergency Controls and Devices

Date Issued: November 1, 2007

Question (1): Does 8.10.2(g) require a minimum of one emergency control as defined in 8.10.1?

Answer (1): The emergency controls must be, as a minimum, able to carry out functions described in 8.10.2. Since one of these functions is an emergency stop switch (e.g., red mushroom), it seems unlikely that a single control can accomplish all of the required functions.

Question (2): Can the emergency control be a bumper as described in 8.10.3.1 or a noncontact sensing device as described in 8.10.3.2?

Answer (2): Yes.

Question (3): Are vehicle nonemergency controls and devices as described in 8.11.1 mandatory?

Answer (3): Nonemergency controls are application dependent. However, without nonemergency controls, every function outside of normal would be considered an emergency function.

Question (4): Can vehicle nonemergency controls and devices be used as vehicle emergency controls and devices?

Answer (4): Yes, for object detection, so long as the requirements of 8.10.2 are met.

Interpretation: 5-15

Subject: ANSI/ITSDF B56.5-2005, Section 4.7, Aisles and Doors

Date Issued: April 25, 2008

Question (1): The section states that the floor space boundary [in nonrestricted areas] shall be clearly marked for the load and train. If the AGV will be sharing or co-existing in an existing and clearly marked fork truck lane, does a separate path or boundary need to be marked as long as the existing aisle is free of any obstructions, doorways, etc.?

Answer (1): The wording in the current standard does not address sharing floor space boundaries with other types of fork trucks or vehicles.

A nonrestricted area is defined in the ANSI/ITSDF B56.5-2005 glossary as an area in which the guidepath is installed which is shared by personnel. Webster's Dictionary defines personnel as persons. B56.5 is, therefore, silent on sharing a floor space boundary with other vehicles.

Interpretation: 5-16

Subject: ANSI/ITSDF B56.5-2005, Section 8.10.1 Vehicle Emergency Controls and Devices

Date Issued: July 24, 2009

Question (1): In the sentence "Local manual intervention is required to return to normal operating conditions.", what does "local manual intervention" imply?

Answer (1): Local manual intervention is the input or direct contact of an authorized and trained person (See clause 7.2.2 and clause 7.3) at the truck.

Question (2): Would this mean that all laser bumper trips must be latched, and that a trained operator initiate a manual vehicle reset once the object is removed before the truck is allowed to resume?

Answer (2): The required action depends on whether the laser bumper trips are defined as an emergency or a non-emergency condition.

- Emergency controls and devices are defined in clause 8.10.
- Non-emergency controls and devices are defined in clause 8.11.

Also, see the definition of “Emergency Stop” in the glossary.

Question (3): Does "local manual intervention" mean that some person has to remove the object before the vehicle is allowed to automatically resume?

Answer (3): See Answer (2).

Interpretation: 5-17

Subject: ANSI/ITSDF B56.5-2012. Sections 4.7.2 and 5.1 Floor Marking

Date Issued January 11, 2018

The following paragraphs in ANSI/ITSDF B56.5-2012 require floor space boundary markings.

4.7.2 In non-restricted areas, the floor space boundary required for the vehicle and its intended load and/or train shall be clearly marked, including the clearance necessary for turns and maneuvering.

5.1 (*b*) Permanent aisles, roadways, and passageways shall be marked by the user as a warning to personnel of existing or impending automatic guided industrial vehicle traffic and to indicate that these vehicles have the right of way.

Some autonomous vehicles can automatically reroute around obstacles temporarily located in the normal travel path. The new path opportunity includes the available space around the obstacle.

Question (1): Will signage posted in the facility stating that an automatic vehicle is in operation satisfy this requirement for floor space marking since the entire facility is the operating area?

Answer (1): If the intended path of an AGV is the entire floor surface of a facility, signs posted around a facility satisfy the requirements of 4.7.2 and 5.1 (b). Note that there are additional requirements that must be met including training of personnel, safeguarding of personnel, and possible speed reductions of an AGV in areas with inadequate clearances.

Question (2): Can a light projected forward on the floor in the direction of travel from the automatic guided industrial vehicle satisfy this requirement?

Answer (2): The means of marking floor space boundaries is not specified by ANSI/ITSDF B56.5-2012. Note that the boundaries to be marked are not just direction of travel, but also clearances on all sides of the vehicle and load including clearances for turns and maneuvering.

Interpretation: 5-18

Subject: ANSI/ITSDF B56.5-2012, Section 8.17.1 Load Handling Devices

Date Issued: January 4, 2018

The following paragraphs in ANSI/ITSDF B56.5-2012 refer to a load handling device.

8.17 Load Handling Devices

8.17.1 Each vehicle-powered load handling device shall have emergency stop switch(es) on the vehicle accessible to operators, which can be the same as the vehicle emergency stop switches.

8.17.2 When the load handling device is not in a position designated as safe for transport, the vehicle load handling devices shall have an appropriate interlock to restrict vehicle movement to that required for safe positioning.

8.17.3 Powered load handling devices shall have an interlock when used in conjunction with powered load handling stands or devices external to the vehicle. Proper vehicle alignment and confirming signal shall be required prior to activation of load transfer mechanism(s). This interlock shall be capable of inhibiting movement of both the vehicle and the fixed equipment, when activated.

Question (1): What is the definition of a “load handling device”?

Answer (1): ANSI/ITSDF B56.5-2012 does not provide a definition for “load handling device”. The intent of the wording is to describe requirements for a mechanism that provides any lifting, lowering, load transfer, and load manipulation (e.g. rotation, reach, tilting, clamping and towing).

Question (2): Do these paragraphs apply only to a “vehicle-powered load handling device” and, therefore, do not apply to an unpowered load handling device?

Answer (2): 8.17.1 applies to vehicle-powered load handling devices only. 8.17.2 applies to all load handling devices. 8.17.3 applies to all powered load handling devices.

Interpretation: **5-19**

Subject: ANSI/ITSDF B56.5-2012 Section 4.7.4, 8.11.2 Hazardous Zones

Date Issued January 7, 2019

Question (1): Considering the following wording in ANSI/ITSDF B56.5-2012:

4.7.4 A minimum clearance of 0.5 m (19.7 inches) shall be maintained between obstructions and vehicles (including loads). All other areas having reduced clearance shall be considered hazard zones or restricted areas and be clearly marked by signs, stripes, lights, or other designations. (see Part III, para 8.11.2)

8.11.2 Hazardous Zones. Areas which cannot be protected by an object detection device(s), as well as areas of inadequate clearance in which vehicles operate, shall be designated hazard zones by the user and system supplier and marked accordingly by the user using suitable signs or preferably floor markings. (See para 4.7.4.1) Confusion with other markings and signs shall be avoided.

8.11.2.1 Areas of clearance of less than 0.5 m to a height of 2.1 m may be a risk to personnel. (see para 8.9.3) Before the vehicle enters such areas, speed shall be reduced and an audible warning shall be activated.

8.11.2.1.1 If there is an escape route for a pedestrian the maximum travel speed shall be limited to 0.3 m/s and the vehicle path shall be considered a hazard zone.

Is an area considered a hazard zone if 0.5 m can only be maintained on one side of the aisle? If a vehicle is heading down an aisle with walls on both sides where with one side up again a wall and the other side is maintaining the 0.5m clearance, does the vehicle have to slow down to 0.3 m/s?

What if more than 0.5m clearance is maintained on one side of the vehicle? If the vehicle is traveling parallel to a wall, and there is minimal clearance between the vehicle and the wall but a large amount of clearance on the other side of the vehicle, does the vehicle need to slow down to 0.3 m/s?

Answer (1): As the standard is currently written, if a vehicle was traveling along a wall with less than 0.5m clearance on any side and there is no escape route for a pedestrian in the vehicle path, it is considered a restricted area and the user and system supplier shall agree on appropriate protection measures for this situation (see 8.11.2.1.2). If there is an escape route for a pedestrian, it is considered a hazard zone and the speed shall be limited to 0.3 m/s (see 8.11.2.1).

The same applies even if only one side of a vehicle has less than 0.5m clearance and the other side has more than 0.5m clearance.