



SUBJECT

Automated Guided Vehicle Systems (AGVS)

PIN: 69

Effective: 9/03/2020



BACKGROUND

Transport of materials has typically been accomplished by hospital staff using carts, totes, and other wheeled equipment. Automated guided vehicle systems (AGVS) and autonomous mobile robots (AMR) are now being used more commonly for the transport of materials within hospitals (hereinafter both are identified as AGVS). An AGVS utilizes a portable robot that travels along marked lines on a floor or wires imbedded in a floor, or uses radio waves, vision cameras, magnets, or lasers for navigation. AGVS typically move clean and soiled linen, trash, regulated medical waste, patient meals and soiled food trays. An AGVS uses transporter carts that are typically 36" wide and when loaded, can weigh more than 1,000 lbs. The AGVS carts are programmed to automatically operate doors, elevators, lifts, cart washers, trash dumpers, etc. When the AGVS is integrated with automatic operation of doors, the closing of doors requires a delay to allow the passage of carts.

PURPOSE

The California Building Standards Code (CBSC) does not include provisions for the installation of robotic systems that share means of egress systems and elevators with building occupants.

The installation and use of AGVS equipment raise concerns, including but not limited to the following:

1. obstruction of the useable width of egress systems
2. potential storage of combustible materials in egress systems
3. delays in the operation of smoke and draft control assemblies and fire assemblies
4. inappropriate operation of activated fire control assemblies
5. installation of equipment in the egress system
6. interference with the operation of elevators
7. maintenance of equipment including battery-charging

The following guideline is provided to assist the industry with the installation and use of AGVS equipment while addressing these concerns.

POLICY

California Building Code (CBC), Sections 1003.6, 1018.1, 1020.3, 1024.2, 1028.4.1 and 1028.5 require that minimum egress widths be maintained and be unobstructed. California Code of Regulations, Title 19 (CCR T-19), Sec. 3.11(a) and 3.11(b) prohibit the obstruction of the required width of an exit and the installation or placement of equipment in or exposed to any exit. CBC Sec. 716.2.6 describes the requirements for the automatic closing of fire assemblies.

When AGVS are installed and used in existing buildings, in accordance with California Existing Building Code (CEBC), Section 302A.7, such buildings shall be maintained in a safe and sanitary condition. Devices or safeguards which are required by the CBC shall be maintained in conformance with the code edition under which they were installed.

In accordance with CEBC Section 302A.1, AGVS installations in existing construction are considered alterations. Except as provided for by CEBC Section 302A.4 and 302A.5, alterations to any building or structure shall comply with the requirements of the CBC for new construction. Like materials shall be permitted for repairs and alterations, provided no hazard to life, health or property is created.

Many or all the materials that are transported by an AGVS are now transported by other means. These other means of transportation have operational issues that are under the jurisdiction of the California Department of Public Health and the local fire authority. However, an AGVS requires some construction and/or remodeling and therefore the AGVS installation and use is within the scope of the CBSC. The enforcement of operational and maintenance issues is outside the scope and authority of OSHPD, Facilities Development Division. Therefore, when an AGVS installation and use is contemplated, the local fire authority must also be consulted.

The installation and use of an AGVS must be approved as an alternate design or method of construction (AMC) and an alternate means of protection in accordance with CBC Section 104.11 and CCR T-19, Section 2.02. Applicable portions of ANSI/ITSDF B56.5-2019, "Safety Standard for Driverless, Automatic Guided Industrial Vehicle and Automated Functions of Manned Industrial Vehicles," should be used as a guide in developing the AMC.

As part of the AMC the hospital must submit a plan of operational functions for review and approval of the AGVS that addresses the following issues:

- A. AGVS units may not be parked in exit corridors or corridor alcoves. The AGVS may not use an exit corridor for charging, staging, or other moderate/long term duration uses.
- B. AGVS units should be autonomous. Ensuring patient, staff, and visitor safety is the hospital's responsibility.
- C. The use of AGVS units in corridor systems serving the general public and patient care areas should be minimized. Indicate the minimum guide path clearance that will be maintained.

- D. The minimum egress width required by the building code is to be provided.
- E. Corridor systems and adjacent rooms containing the AGVS guide path system must be provided with a complete automatic smoke detection system.
- F. AGVS unit storage/recharging home room must be provided with a complete automatic smoke detection system. It should be demonstrated how the AGVS will be programmed to not open the door to the storage/recharging home room if smoke detection in the room has been activated. The door to the room must be equipped with auto-openers/auto-closers connected to the building Essential Electrical System. Smoke detection will deactivate all power operators; power operators required to activate during fire alarm for AGVS transport will require approval of the fire alarm matrix for sequence.
- G. Protection of battery storage/charging rooms shall comply with CBC 509 and Table 509.
- H. To allow the passage of AGVS units, the activation of the automatic closure or reclosure of smoke and draft control assemblies and fire assemblies should not exceed a delay of more than 10 seconds from the time of smoke detection activation. A closure or reclosure delay of 20 seconds may be permitted with a reduction in the spacing of required smoke detector protection.
- I. Where AGVS carts pass through exit doors or exit access doors, such doors should be provided in pairs. An AGVS cart must not obstruct more than one half of the required opening width of such openings, and it must not obstruct the doors from completely closing. AGVS should confirm path is clear prior to entry of door width. The status of AGVS carts during a fire alarm condition must be addressed. It should be demonstrated how AGVS carts will be programmed to proceed to holding rooms equipped with smoke detection and auto openers and auto closers connected to the building Essential Electrical System, and whether they will remain in elevators or vacate elevators. It should also be demonstrated how the AGVS unit is programmed to return to its designated holding room and not pass through cross corridor doors in response to the fire alarm when approaching cross-corridor doors that have been released by activation of smoke detection at the cross-corridor doors.
- J. When AGVS carts stop at a fire door that has closed in response to a fire alarm, a clear zone equal to at least the required minimum corridor width must be maintained at the approach to the closed fire door/s, and the AGVS should proceed to its designated holding room within the smoke compartment. AGVS should not traverse cross traffic during fire alarm; AGVS should stop momentarily and then proceed to safe home base.
- K. It must be demonstrated how the AGVS units are programmed to discontinue travel if fire is within the contents of an AGVS cart.

- L. An AGVS should not be capable of opening a fire door at a location where a smoke detector has activated. Fire alarm will shunt all power operators and door functions, any door operation during fire alarm will require approval. An AGVS cart must not interfere with the operation of elevator recall. For AGVS in a recalled elevator, programming will need to address function of AGVS at the recalled floor. This will require local fire authority approval.
- M. An AGVS cart must not exceed the weight limitations of an elevator, floors, ramps, etc. or any other spaces it traverses, stops, or is parked.
- N. The strength of structural load bearing members should be evaluated when an AGVS is considered.
- O. In accordance with CCR T-19, Section 2.02, a review of alternate designs or methods of construction or alternate means of protection involving fire and life safety issues, requires a local fire authority approval.

Original signature

9/3/2020

Paul Coleman

Date