

ANSI MH24.2-2016



Power-Operated Vertical Carousels and Vertical Lift Modules



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American National Standard

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Power-Operated Vertical Carousels and Vertical Lift Modules

Automated Storage Retrieval Systems (AS/RS)

An Industry Group of MHI

Approved December 6, 2016

American National Standards Institute, Inc.

FOREWORD. This standard, which was developed under the American National Standards Institute (ANSI) Canvass method and approved by ANSI on December 6, 2016, represents suggested design practices and operational requirements for power-operated vertical carousels and vertical lift modules. It was developed by MHI, along with Automated Storage and Retrieval Systems ("AS/RS"), one of its Industry Groups, and is intended to provide useful information and guidance for owners, users, designers, purchasers or specifiers of material handling equipment or systems. It is advisory only and should only be regarded as a simple tool that its intended audience may or may not choose to follow, adopt, modify, or reject. A standard may be part of, but does not constitute a comprehensive safety program that cannot guard against pitfalls in operating, selecting and purchasing such a system, and should not be relied upon as such. Such a program should be developed by a qualified professional.

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The Automated Storage Retrieval Systems (AS/RS), an Industry Group of MHI, comprises a substantial portion of the major companies that design and manufacture automated storage and retrieval systems in the United States. AS/RS recognized the need to develop a comprehensive standard that establishes minimum design and performance criteria for the proper application and use of automated storage retrieval systems. This resulting standard was formulated according to ANSI procedures.

At the time this standard was approved, AS/RS consisted of the following member companies:

- Daifuku America
- Dematic Corp.
- Hanel Storage Systems
- Integrated Systems Design - ISD
- Kardex Remstar
- Knapp Logistics Automation
- Lenze Americas
- MIAS, Inc.
- MURATEC - Logistics & Automation Division
- Retrotech, Inc.
- SencorpWhite
- SICK, Inc.
- Swisslog Logistics, Inc.
- Symbotic LLC
- System Logistics Corporation
- Viastore Systems, Inc.
- Westfalia Technologies, Inc.

Suggestions for improvement and questions regarding interpretation of this standard are welcome. Suggestions should be sent to: MH24.2 Committee (AS/RS), MHI, 8720 Red Oak Blvd., Suite 201, Charlotte, NC, 28217; or to standards@mhi.org.

Power-Operated Vertical Carousels and Vertical Lift Modules

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Preface

This standard is a Type C standard as defined in ANSI/ISO 12100-2012.

The machinery concerned and the extent to which hazards, hazardous situations, and hazardous events are covered are indicated in the scope of this standard.

The following statement applies to machines designed and built according to the specifications of this Type C standard:

“When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of this type C standard.”

When this standard was prepared, it was assumed that:

- a) only trained staff would operate, inspect, repair or maintain the machine;
- b) components without special requirements are:
 - 1) sized in accordance with good engineering practice and calculation methods, including all types of failure;
 - 2) correctly constructed mechanically and electrically;
 - 3) made of materials that have adequate loading capacity, are of suitable quality, and are fit for that purpose;
- c) components are kept in a good repair and operating condition so that the required characteristics can be maintained despite wear and tear;
- d) details of particular conditions of use and the installation site are agreed upon between user and manufacturer or manufacturer's authorized representative;
- e) the working area is adequately illuminated; and
- f) the installation site affects the proper operation of the machine.

Power-Operated Vertical Carousels and Vertical Lift Modules

1 Purpose and Scope

1.1 Purpose

The purpose of this standard is to serve as a guide for designers, manufacturers, sellers, installers, users, and governing bodies associated with power-operated vertical carousels and vertical lift modules.

1.2 Scope

The scope of this standard is to eliminate or minimize the hazards described in Clause 4 which can arise during installation, start up, operation, maintenance, testing, and dismantling of power-operated vertical carousels and vertical lift modules.

The scope presumes that the power-operated vertical carousels and vertical lift modules would be installed and operated indoors in an environment that does not contribute to hazards. When evaluating hazards, considerations for environmental or external factors should be taken into account, including, but not limited to:

- outdoor installations;
- hot or cold temperatures or temperature fluctuations;
- corrosive or explosive environments;
- magnetic fields;
- radioactive conditions;
- hazardous materials storage;
- floods, earthquakes, or other natural disasters; or
- food contact.

Examples of power-operated vertical carousels and vertical lift modules to which this standard applies are shown in Annex A.

1.3 Limitations

This standard applies to buildings and parts of buildings only insofar that the hazards and risks of interfaces with the power-operated vertical carousels and vertical lift modules are assessed.

Power-operated vertical carousels and vertical lift modules that uses human labor or gravity as the power source is excluded from the scope of this standard.

Power-operated vertical carousels and vertical lift modules and their components are intended to handle and store goods or material. They are not designed as passenger lifts and are not intended for human occupancy or transport.

This standard does not take into account hazards that arise from noisy environments or environments subject to electromagnetic interference as defined in IEEE C63.14-2009 and which are outside the range quoted in IEC 61000-6-2:2005.

2 Normative References

The following referenced documents are indispensable to the application of this document. For dated references, only the edition cited applies; for undated references, the latest edition of the referenced document (including any amendments) applies.

- ANSI B11.19-2010, *Performance Criteria for Safeguarding*
- ANSI/AGMA 2001-D04 (R2010), *Fundamental Rating Factors and Calculation Methods for Spur and Helical Gear*
- ANSI/AGMA ISO 6336-6-A08, *Calculation of Load Capacity of Spur and Helical Gears - Part 6: Calculation of Service Life Under Variable Load*