

ASCE STANDARD

American Society of Civil Engineers

Automated People Mover Standards—Part 1

Operating Environment

Safety Requirements

System Dependability

Automatic Train Control (ATC)

Audio and Visual Communications

ASCE 21-96

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Abstract:

This standard, Automated People Mover Standards, establishes the minimum set of requirements necessary to achieve an acceptable level of safety and performance for an automated people mover (APM) system. An APM is defined as a guided transit mode with fully automated operation, featuring vehicles that operate on guideways with exclusive right-of-way. This standard, which has been divided into three parts, includes minimum requirements for the design, construction, operation, and maintenance of APM systems. This volume, Part I of the Standard, provides general information and definitions followed by discussions of the operating environment, safety requirements, system dependability, automatic train control subsystems, and audio and visual communications.

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STANDARDS

In April 1980, the Board of Direction approved ASCE Rules for Standards Committees to govern the writing and maintenance of standards developed by the Society. All such standards are developed by a consensus standards process managed by the Management Group F (MGF), Codes and Standards. The consensus process includes balloting by the balanced standards committee made up of Society members and non-members, balloting by the membership of ASCE as a whole and balloting by the public. All standards are updated or reaffirmed by the same process at intervals not exceeding five years.

The following standards have been issued:

- ANSI/ASCE 1-82 N-725 Guidelines for Design and Analysis of Nuclear Safety Related Earth Structures
- ANSI/ASCE 2-91 Measurement of Oxygen Transfer in Clean Water
- ANSI/ASCE 3-91 Standard for the Structural Design of Composite Slabs and ANSE/ASCE 9-91 Standard Practice for the Construction and Inspection of Composite Slabs
- ASCE 4-86 Seismic Analysis of Safety-Related Nuclear Structures
- Building Code Requirements for Masonry Structures (ACI530-95/ASCE5-95/TMS402-95) and Specifications for Masonry Structures (ACI530.1-95/ASCE6-95/TMS602-95)
- Specifications for Masonry Structures (ACI530-95/ASCE6-95/TMS602-95)
- ANSI/ASCE 7-95 Minimum Design Loads for Building and Other Structures
- ANSI/ASCE 8-90 Standard Specification for the Design of Cold-Formed Stainless Steel Structural Members
- ANSI/ASCE 9-91 listed with ASCE 3-91
- ANSI/ASCE 10-90 Design of Latticed Steel Transmission Structures
- ANSI/ASCE 11-90 Guideline for Structural Condition Assessment of Existing Buildings
- ANSI/ASCE 12-91 Guideline for the Design of Urban Subsurface Drainage
- ASCE 13-93 Standard Guidelines for Installation of Urban Subsurface Drainage
- ASCE 14-93 Standard Guidelines for Operation and Maintenance of Urban Subsurface Drainage
- ANSI/ASCE 15-93 Standard Practice for Direct Design of Buried Precast Concrete Pipe Using Standard Installations (SIDD)
- ASCE 16-95 Standard for Load and Resistance Factor Design (LRFD) of Engineered Wood Construction
- ASCE 21-96 Automated People Mover Standards—Part 1

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FOREWORD

An Automated People Mover (APM) is defined as a guided transit mode with fully automated operation, featuring vehicles that operate on guideways with exclusive right-of-way.

This standard has been prepared by the ASCE Automated People Mover Standards Committee. It establishes the minimum set of requirements necessary to achieve an acceptable level of safety and performance for an APM system. As such, it may be used in the safety certification process. The overall goal of this standard is to assist the industry and the public by establishing standards for APM systems.

This standard includes minimum requirements for the design, construction, operation, and maintenance of APM systems.

This standard has no legal authority in its own right but may acquire legal standing in one or more of the following ways:

- (1) Adoption by an authority having jurisdiction
- (2) Reference to compliance with the standard as a contract requirement
- (3) Claim by a manufacturer or manufacturer's agent of compliance with the standard

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ACKNOWLEDGMENTS

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WG3 – Automatic Train Control, Charles Martin with Robert Good
WG3B – Safety Requirements, James Hoelscher with Ronald Kangas, William Hathaway and Charles Martin
WG5 – System Dependability, J. Sam Lott
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CHAPTER 1

General

1.1 Scope

This standard has been divided into three parts to expedite the approval and release process as well as to facilitate ease of use. This document constitutes Part 1 of the Standard.

Part 1 consists of:

- (1) General
- (2) Operating Environment
- (3) Safety Requirements
- (4) System Dependability
- (5) Automatic Train Control (ATC)
- (6) Audio and Visual Communications

Part 2 consists of:

- (1) General
- (7) Vehicles
- (8) Propulsion and Braking

Part 3 consists of:

- (1) General
- (9) Electrical
- (10) Stations
- (11) Guideways

1.2 Existing Applications

Existing installations and projects in progress prior to the effective date of this standard need not comply with the new or revised requirements of this edition, except where specifically required by the authority having jurisdiction. Existing APMs, when removed and reinstalled, shall be classified as new installations.

1.3 New Applications

New installations begun after the effective date of this standard shall comply with the new or revised requirements of this edition.

1.4 Reference Standards

The following documents or portions thereof are incorporated by reference in this Standard.

ANSI Publications: American National Standards Institute, Attn: Customer Service, 11 West 42nd Street, New York, NY 10036, Phone (212) 642-4900

ANSI S1.4–1983, *Specification for Sound Level Meters* (cited in 2.2.1)

ANSI S3.29–1983, *Guide to the Evaluation of Human Exposure to Vibration in Buildings* (cited in 2.2.2)

ANSI S3.2–1989, *Method for Measuring the Intelligibility of Speech Over Communication Systems* (cited in 6.1)

NFPA Publication: National Fire Protection Association, Customer Service Department, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101, Phone (800) 344-3555

NFPA 130–1995, *Fixed Guideway Transit Systems*, (cited in 6.1)

UL Publication: Underwriters Laboratories, Publications, 333 Pfingsten Road, Northbrook, IL 60062, Phone (847) 272-8800

UL96A–10th edition–*Installation Requirements for Lightning Protection Systems* (cited in 2.1.4)

UL813—1993–*Commercial Audio Equipment* (cited in 6.1.3)

Code of Federal Regulations: U.S. Government Printing Office, Superintendent of Documents, 732 North Capitol Street, N.W. Washington, DC 20401, Phone (202) 512-1800

CFR, Title 47, Chapter I, Part 15, *Radio Frequency Devices* (cited in 2.2.3)

CFR, Title 47, Chapter I, Part 90, Subparts S and T, *Private Land Mobile Radio Services* (cited in 2.2.3)

Military Standards: Defense Printing Service, Building A, 700 Robbins Avenue, Philadelphia, PA 19111, Phone (215) 697-2179 or 2667

MIL-STD-461D, *Requirements for the Control of Electromagnetic Emissions and Susceptibility* (cited in 2.1.8)

MIL-STD-810E, *Environmental Test Methods and Engineering Guidelines* (cited in 2.1.5)

MIL-STD-882C, *System Safety Program Requirements* (cited in 3.1.1, 3.2.1, and 3.1.2.1)

NOAA Publication: National Climatic Data Center, 151 Patton Ave., Room 120, Ashland, NC 28801-0900, Phone (704) 271-4800

Local Climatologic Data, Annual Summary with Comparative Data, National Oceanic and Atmospheric Administration, 1994 (cited in 2.1)

Gale Research Publication: Gale Research Company, P.O. Box 33477, Detroit, MI 48232, Phone (800) 877-4253, Ext. 5477