ASCE 21-98

ASCE STANDARD

American Society of Civil Engineers

Automated People Mover Standards—Part 2

Vehicles

Propulsion and Braking

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This document uses both Système International (SI) units and customary units.

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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 2 of the Standard, provides general information and definitions followed by discussions of vehicles, propulsion, and braking.

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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 nonmembers, 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 5 years.

The following Standards have been issued.

ANSI/ASCE 1-82 N-725 Guideline 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 ANSI/ASCE 9-91 Standard Practice for the Construction and Inspection of Composite Slabs

ANSE 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)

ANSI/ASCE 7-98 Minimum Design Loads for Buildings 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 10-97 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 17-96 Air-Supported Structures

ASCE 18-96 Standard Guidelines for In-Process Oxygen Transfer Testing

ASCE 19-96 Structural Applications of Steel Cables for Buildings

ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations

ASCE 21-96 Automated People Mover Standards—Part 1

ASCE 21-98 Automated People Mover Standards—Part 2

ASCE 22-97 Independent Project Peer Review

ASCE 23-97 Specification for Structural Steel Beams with Web Openings

ASCE 24-98 Flood Resistant Design and Construction

ASCE 25-97 Earthquake-Actuated Automatic Gas Shutoff Devices

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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's agent of compliance with the standard

This standard has been prepared in accordance with recognized engineering principles and should not be used without the user's competent knowledge for a given application. The publication of this standard by ASCE is not intended as warrant that the information contained therein is suitable for any general or specific use, and the Society takes no position respecting the validity of patent rights. The user is advised that the determination of patent rights or risk of infringement is entirely his/her own responsibility.

ACKNOWLEDGMENTS

The American Society of Civil Engineers (ASCE) acknowledges the devoted efforts of the Automated People Mover Standards Committee under the Lifeline Standards Council of the Codes and Standards Activities Committee. This group comprises individuals from many backgrounds including: consulting engineering, research, transit agencies, airports, transit system design and manufacturing, education, government, and private practice.

This standard was prepared through the consensus standards process by balloting in compliance with procedures of ASCE's Codes and Standards Activities Committee. Those individuals who serve on the Automated People Mover Standards Committee are:

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Automated People Mover Standards—Part 2

1.0 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 2 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) 642-4980, Fax (212) 302-1286.

ANSI S1.4—1983, *Specification for Sound Level Meters* (cited in 7.7.4)

ANSI/ASME B15.1—1996, *Safety Standard for Power Transmission Apparatus* (cited in 8.5)

ANSI B77.1—1998, *Passenger Tramways—Aerial Lifts, Surface Lifts and Tows, Safety Requirements* (cited in 8.2.2)

ANSI/SAE Z26.1—1966, *Safety Materials for Glazing Motor Vehicles and Motor Equipment Operating on Land Highways—Safety Standard* (cited in 7.9)

ISO 2631-1:1997, *Mechanical vibration and shock—Evaluation of human exposure to whole-body vibration—Part 1: General requirements* (cited in 7.7.3.2)

ANSI/SAE J673—APR93, *Automotive Safety Glazing* (cited in 7.9)

ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers, 1791 Tullie Circle NE, Atlanta, GA

1993 Fundamentals Volume, Handbook and Product Directory, Chapter 23, Table 1 (cited in 7.7.1)

IEEE: Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, P.O. Box 1331, Piscataway, N.J.

IEEE 32—1972 (R1991): *Neutral Grounding Devices, Standards Requirements, Terminology and Test Procedures* (cited in 7.12.5)

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 70, 1996, *National Electrical Code* (cited in 7.12.2.2)

NFPA 130, 1998, *Fixed Guideway Transit Systems* (cited in 7.10, 7.12.2.1, 7.12.3)

1.5 DEFINITIONS

Automated People Mover (APM): A guided transit mode with fully automated operation, featuring vehicles that operate on guideways with exclusive right-of-way.