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21-21

Automated People Mover Standards

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PREFACE

This standard is a revision of ASCE 21-13, *Automated People Mover Standards.* 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.

Chapters 1 to 11 cover requirements for design of an APM system, and Chapters 12 to 16 cover requirements for an APM in passenger operation, including chapters on security; emergency preparedness; system verification and demonstration; operation, maintenance, and training; and operational monitoring.

The standard also includes

- One mandatory appendix on system safety program plan (SSPP) requirements;
- One nonmandatory reference bibliography of examples and guidance for other SSPPs;
- One nonmandatory informative appendix on inspection and test guidelines;
- Five nonmandatory appendixes: Recommended Practice for Acceptance of an APM System Application; Recommended Practice for Working Safely near APM Systems; Recommended Practice for Accommodating Luggage Carts in APM Systems; Recommended Practice for Measuring Service Availability; and Recommended Practice for Independent Safety Assessment; and
- One commentary on emergency egress provisions.

The provisions of the nonmandatory appendixes and recommended practices are written in permissive language and, as such, offer the user a series of options or instructions, but do not prescribe a specific course of action. Significant judgment is left to the user of these appendixes and recommended practices.

This revision includes substantive changes and additions of mandatory requirements in a number of chapters. This includes new requirements that address separation assurance for Automated Transit Networks (ATN), revised requirements for the structural design of APM specific guideways, revised requirements for the application of safety provisions, and four new appendixes (F, G, H, and I).

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

- Adoption by an authority having jurisdiction,
- Reference to compliance with the standard as a contract requirement, or
- Claim by a manufacturer or manufacturer's agent of compliance with the standard.

This standard will be beneficial to transportation engineers, civil engineers, safety engineers, and contractors of APM systems. Also, anyone who owns, operates, builds, maintains, designs, tests, insures, oversees, or certifies APMs or other innovative technology transit systems, such as magnetic levitation, air cushion, personal rapid transit, and monorail systems, will benefit.

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ACKNOWLEDGMENTS

The ASCE APM Standards Committee formed nearly three decades ago as a volunteer group of individuals sharing a common belief that the fledgling APM industry would benefit by the development of a minimum set of requirements necessary to achieve an acceptable level of safety and performance for the public.

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CHAPTER 1
GENERAL

1.1 SCOPE

This standard is the revision of ASCE 21-13, which was previously combined from Parts 1, 2, 3, and 4 of ASCE 21-05 and 21-08. The previous numbering system is retained (with additions):

Part 1 of ASCE 21-05 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 of ASCE 21-08 consists of
7. Vehicles
8. Propulsion and Braking

Part 3 of ASCE 21-08 consists of
9. Electrical Equipment
10. Stations
11. Guideways

Part 4 of ASCE 21-08 consists of
12. Security
13. Emergency Preparedness
14. System Verification and Demonstration
15. Operations, Maintenance, and Training
16. Operational Monitoring

Appendix A. System Safety Program Requirements
Appendix B. Bibliography
Appendix C. Recommended Practice for Acceptance of an APM System Application
Appendix D. Inspection and Test Guidelines
Appendix E. Recommended Practice for Working Safely near APM Systems

1.2 EXISTING APPLICATIONS

Existing installations and projects in progress before 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 completely 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:

AASHTO: American Association of State Highway and Transportation Officials

AASHTO LRFD Bridge Design Specifications, 8th Ed. (2017) (cited in Sections 11.9, and 11.9.2)

AASHTO Standard Specifications for Highway Bridges, 17th Ed. (2002) (cited in Section 11.9.2)

ACGIH: American Conference of Government Industrial Hygienists

ACGIH Publication 7 DOC-648 (2016). *Whole Body Vibration: TLV Physical Agents,* 7th Ed. 2016 "Documentation" (cited in Section 7.7.3.2.1)

ANSI: American National Standards Institute

ANSI B11.19-2010 (2010). *Performance Requirements for Safeguarding* (cited in Section 8.5)

ANSI S1.4-1983 (1983a). *Specification for Sound Level Meters* (cited in Sections 2.2.1 and 7.7.4)

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

ANSI B77.1-2006 (2006). *Passenger Ropeways—Aerial Tramways, Aerial Lifts, Surface Lifts, Tows and Conveyors—Safety Requirements* (cited in Sections 8.2.2 and 11.0)

ANSI Z97.1-2004 (2004). *Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test* (cited in Sections 10.2.1 and 10.2.2)

ANSI Z26.1-1997 (1997). *American National Standard, Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways* (cited in Section 7.9)

ANSI 117.1-2003 (2003). *Guidelines for Accessible and Usable Buildings and Facilities* (cited in Section 11.5)

APTA: American Public Transportation Association

APTA SS-E-010-98 (1998). *Standard for the Development of an Electromagnetic Compatibility Plan* (cited in Section 2.1.8)

ASHRAE: American Society of Heating, Refrigeration and Air-Conditioning Engineers

ASHRAE Handbook Fundamentals Volume. (2017). Chapter 14 and data provided with edition (cited in Section 7.7.1)

ASTM International: Formerly American Society for Testing and Materials

ASTM D635-06 (2006a). *Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position* (cited in Section 9.3.6)

ASTM C1036-06 (2006b). *Standard Specification for Flat Glass* (cited in Sections 10.2.1 and 10.2.2)

ASTM C1048-04 (2004). *Standard Specification for Heat Treated Flat Glass* (cited in Sections 10.2.1 and 10.2.2)

Austrian Standards Institute

EN 60204-1:2014-10 (2014). *Safety of Machinery – Electrical Equipment of Machines – Part 1: General requirements* [IEC 44/709/CDV:2014] (cited in Section 7.12.5)