CSA Group

Z605-16

Mobility aid securement and occupant restraint (MASOR) systems for motor vehicles

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CSA Group

Standards Update Service

Z605-16
June 2016

Title: *Mobility aid securement and occupant restraint (MASOR) systems for motor vehicles*

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Z605-16

Mobility aid securement and occupant restraint (MASOR) systems for motor vehicles

Published in June 2016 by CSA Group
A not-for-profit private sector organization
178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3

*To purchase standards and related publications, visit our Online Store at **shop.csa.ca***
or call toll-free 1-800-463-6727 or 416-747-4044.

ISBN 978-1-4883-0389-0

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Preface

This is the second edition of CSA Z605, *Mobility aid securement and occupant restraint (MASOR) systems for motor vehicles*. It supersedes previous editions published in 2003 and 1995.

This edition includes updates to definitions and to requirements for construction, marking, test procedures, performance, and crashworthiness of MASOR systems used with mobility aids in motor vehicles intended for that purpose. Non-mandatory, recommended practice for MASOR systems is covered in Annex B.

Requirements for public transportation motor vehicles with a gross vehicle weight rating (GVWR) of less than 7000 kg (15 500 lb), equipped for transporting mobility aids, are contained in CSA D409, *Motor Vehicles for the Transportation of Persons with Physical Disabilities*. It is the intent that CSA D409 be used in conjunction with this Standard.

This Standard was prepared by the Technical Committee on Motor Vehicles for Transportation of Persons with Physical Disabilities, under the jurisdiction of the Strategic Steering Committee on Health Care Technology, and has been formally approved by the Technical Committee

Notes:

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*

2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*

3) *This Standard was developed by consensus, which is defined by* CSA Policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.*

4) *To submit a request for interpretation of this Standard, please send the following information to* ***inquiries@csagroup.org*** *and include "Request for interpretation" in the subject line:*

a) *define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;*
b) *provide an explanation of circumstances surrounding the actual field condition; and*
c) *where possible, phrase the request in such a way that a specific "yes" or "no" answer will address the issue.*

Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization *and are available on the Current Standards Activities page at* ***standardsactivities.csa.ca****.*

5) *This Standard is subject to review five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to* ***inquiries@csagroup.org*** *and include "Proposal for change" in the subject line:*

a) *Standard designation (number);*
b) *relevant clause, table, and/or figure number;*
c) *wording of the proposed change;*
d) *rationale for the change.*

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Mobility aid securement and occupant restraint (MASOR) systems for motor vehicles

0 Introduction

Note: *This introduction is intended to provide a context for the reader and is not a mandatory part of this Standard.*

0.1

Providing effective occupant protection in a motor vehicle crash is a systems issue that involves the vehicle, the vehicle seat, and the MASOR system. For persons with disabilities who are unable to transfer from their mobility aids when travelling in motor vehicles, the mobility aid serves as the vehicle seat, and after-market equipment is installed to secure the mobility aid and provide effective occupant restraint.

0.2

This Standard establishes terminology and definitions and specifies the requirements for

a) design;
b) product marking and labelling;
c) performance; and
d) test methods

for mobility aid securement used to reduce the risk of occupant injury in public transportation vehicles and personal vehicles equipped for the transportation of transportable mobility aids. These public transportation vehicles and personal vehicles typically have a gross vehicle weight rating (GVWR) of less than 7000 kg (15 500 lb).

0.3

Requirements for mobility aids designed for occupancy in a motor vehicle are provided in Section 18 of ANSI/RESNA WC-4. Requirements for vehicles with a GVWR of less than 7000 kg (15 400 lb) and intended for transportation of mobility aid seated occupants are specified in CSA D409.

0.4

The term “MASOR system” refers to equipment and devices intended to control the movement of both the mobility aid and the occupant in the event of a frontal impact. Throughout this Standard, control of mobility aid movement is referred to as “securement”, while control of occupant movement is referred to as “restraint”.

0.5

This Standard applies to MASOR systems that use all types of mobility aid securement devices. It is the purpose of this Standard to promote the design, testing, installation, and use of MASOR systems that

provide effective mobility aid securement and occupant restraint in a frontal collision, and that are comparable in crash performance to seat securement provided by the vehicle manufacturer.

0.6

Key provisions of this Standard are based on the fundamental crash protection principles that a motor vehicle seat must be effectively secured so that it does not move significantly and load its occupant or other vehicle occupants in a crash, and that the seat must provide effective support for the user in order to optimize the performance of the belt-restraint system. They are also based on the following facts:

a) a belt-type MASOR system that includes both upper- and lower-torso belts is the most effective type of MASOR system in all types of crashes;
b) more than half of all serious and fatal injuries occur in frontal crashes; and
c) effective securement of the vehicle seat is necessary for effective restraint system performance.

0.7

This Standard requires that MASOR systems be dynamically strength-tested in a simulated frontal impact test. Since manufacturers of MASOR systems are generally not able to control or specify the size of vehicle in which the MASOR system is installed, or the sizes of mobility aids and occupants for which the MASOR system is used, this Standard requires that MASOR systems demonstrate effective performance under nominal “worst-case” frontal-impact loading conditions. These conditions involve subjecting the MASOR system to the dynamic loading produced by a midsize-male anthropomorphic crash test device seated in an 85 kg surrogate mobility aid during a 48 km/h (30 mph) velocity change (ΔV) for a 20 g (44 lb) deceleration pulse that falls within a specified deceleration-time corridor. These requirements are based on a MASOR system installed within a vehicle of less than 7000 kg (15 500 lb) GVWR. Fundamentally, this Standard seeks to provide protection similar to that provided by Motor Vehicle Safety Regulations (MVSR) 208.

0.8

MASOR systems that comply with this Standard will enhance effective securement of mobility aids and restraint of mobility aid occupants in a frontal collision, thereby providing a level of crash protection that is comparable to that offered by occupant restraints installed by the original vehicle manufacturer. It is also anticipated that MASOR systems that comply with this Standard will increase occupant safety and comfort during normal travel. However, MASOR systems that conform to the requirements of this Standard are not necessarily equivalent to restraint systems installed by the original vehicle manufacturer. Transfer from the mobility aid to the vehicle seat and use of the original vehicle restraint systems are therefore recommended, whenever feasible.

0.9

Finally, it is recognized that it will take time for manufacturers and transportation providers to develop and acquire equipment meeting the requirements of this Standard. In the meantime, this Standard is not intended to discourage people with disabilities from using motor vehicle transportation or to limit access to, and of availability of, motor vehicle transportation for mobility aid users.

1 Scope

1.1

This Standard specifies

a) general design requirements;
b) performance requirements;
c) test methods;
d) requirements for product marking and labelling; and
e) requirements for instructions and warnings

for MASOR systems intended for use with forward-facing mobility aids occupied by children and adults with mass of 22 kg (48 lb) or greater, travelling in personally licensed and public motor vehicles having a gross vehicle weight rating (GVWR) of less than 7000 kg (15 500 lb).

1.2

The requirements of this Standard apply to MASOR systems that use all types of mobility aid securement systems, including four-point strap-type systems, as well as docking and clamping devices.

1.3

This Standard places particular emphasis on the requirements for the dynamic performance of MASOR systems in a 48 km/h (30 mph), 20 g (44 lb) frontal impact and does not determine suitability for side or rear vehicle impact, or impacts of lesser or higher magnitude. It also specifies test procedures and performance requirements regarding

a) webbing slippage at adjustment devices for strap-type securement systems; and
b) partial but ineffective engagement of restraints and their components that could be perceived to be effectively engaged.

1.4

While the primary focus of this Standard is MASOR systems that are packaged by the manufacturer as a complete system, manufacturers of MASOR systems components and subassemblies may certify their equipment as being in compliance with this Standard provided that

a) the subassemblies and components intended to be used together to create a MASOR system meet all the appropriate requirements of this Standard; and
b) the separately sold components and subassemblies are provided with instructions in accordance with Clause 5.6, where the word “compatible” means tested together to comply with this Standard.

1.5

The values given in SI units are the units of record for the purposes of this Standard. The values given in parentheses are for information and comparison only

1.6

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

2 Reference publications

This Standard refers to the following publications, and where such reference is made, it shall be to the edition listed below.

CSA Group

D409-16
Motor Vehicles for the Transportation of Persons with Physical Disabilities

ANSI/RESNA (Rehabilitation Engineering and Assistive Technology Society of North America)

WC-4:2012,
American National Standard for Wheelchairs — Volume 4: Wheelchairs and Transportation

SAE International

J211/1 (March 2014)
Instrumentation for Impact Test — Part 1 — Electronic Instrumentation

Transport Canada

Motor Vehicle Safety Act, S.C. 1993, c. 16

Motor Vehicle Safety Regulations:

207-CRC, Revision 0R, 2010
Anchorage of seats

208-CRC, Revision, 2013
Seat Belt Installation Guidelines

209-CRC, Revision 2R, 2012
Seat Belt Assemblies

210-CRC, Revision 0R, 2010
Seat Belt Anchorages

302-CRC, Revision 0R, 2007
Flammability of Interior Materials

United States Code of Federal Regulations (CFR)

U.S. Department of Transportation, “Anthropomorphic Test Devices”, 49 CFR, Part 572, Subparts B (“50th Percentile Male”), E (“Hybrid III Test Dummy”), and I (“6-Year-Old Child”).