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**D435-16**

## **Accessible transit buses**

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*Accessible transit buses*



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# Preface

This is the second edition of CSA D435, *Accessible transit buses*. It supersedes the previous edition published in 2002.

This Standard provides requirements specific to vehicles used by transit operations in their routine services. It is intended that this Standard be used to enable transit operations to integrate persons with disabilities into their normal services. This Standard is designed to complement CSA D436 which is applicable to over-the-road (inter-city) buses. It is also intended to be used in conjunction with standards issued by Transport Canada under the federal *Motor Vehicle Safety Regulations*.

The following are the significant changes made to this edition:

- a) design requirements for mobility aid securement and occupant restraint (MASOR) systems (Clause 7.4) have been modified;
- b) requirements for the positioning of MASOR systems (Clause 7.3.2) have been modified; and
- c) requirements for the anchor points for MASOR systems (Clause 7.3.3) have been modified.

This Standard was prepared by the Technical Committee on Motor Vehicles for the Transportation of Persons with Physical Disabilities, under the jurisdiction of the Strategic Steering Committee on Mechanical Industrial Equipment Safety, 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.*
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  - 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.*

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- 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](mailto: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; and*
  - d) *rationale for the change.*

# D435-16

## *Accessible transit buses*

### 0 Introduction

#### 0.1 Preamble

Since the introduction of accessible urban transit buses and the tendency to make public transit accessible to persons with mobility impairments and in particular to persons using mobility aids, discussions in Europe and North America have focused on major issues, including

- a) the level of safety provided to persons using mobility aids (the benchmark for transit buses is standing passengers and buses that do not provide safety belts for all other passengers);
- b) the forces applied to passengers in an accident in large transit buses versus lighter vehicles; and
- c) the securement of mobility aids provided in accessible transit buses (forward or rearward facing).

The securement should allow passengers using mobility aids to ride in buses independently and minimize the need for assistance from the operator.

In Canada, CSA D409 has been developed to protect passengers using mobility aids when being transported in small vehicles and special paratransit vehicles.

#### 0.2 Requirements on mobility aid securement/containment

The requirements in this Standard are based on present practice and research that has been undertaken in Germany, the UK, and Canada over the last three decades. This research suggests that

- a) *g* forces (deceleration forces) on transit buses with a GVWR of 7000 kg (15 400 lb) or over are much smaller than on lighter vehicles, e.g., small buses, vans, special vehicles, due to larger masses, and lower operating speeds; and
- b) on transit buses, mobility aid users can travel safely in the rearward facing position without securement systems, provided that adequate provision is made for the location and positioning of their mobility aids.

Evidence from transit operators in Europe and Canada on the effectiveness of these practices for operating accessible transit buses also supports the development of this Standard as well as the design of MASOR systems addressed in CSA Z605.

The following Standard provides the requirements for accessible transit buses.

#### 0.3 Basic principles

This Standard sets forth the minimum features necessary to minimize the risk of occupant injury during the boarding, transportation, and alighting phases of a transit trip taken on an accessible transit bus.

This Standard incorporates the principle of current minimum requirements in recognition of

- a) the masses and average operating speeds (generally less than 30 km/h) of the vehicles covered by this Standard;
- b) the need to preserve the fluidity of passenger boarding and alighting in the public transit context;
- c) the importance of continuing the widespread acquisition of accessible transit buses;
- d) the need to further enhance mobility options for persons with mobility impairments;
- e) the many responsibilities of the vehicle operator; and
- f) the safety record and history of transit vehicles.

## 0.4 Assumptions about occupant protection

For the purposes of this Standard, it is assumed that the protection of vehicle occupants requires that all mobility aids remain in position during transportation and are confined in the event of a frontal impact. This can be accomplished by securement that is either active, such as clamps or belts anchored to the vehicle structure, or passive such as a vehicle bulkhead or compartment intended to minimize displacement of mobility aids under vehicle operating conditions, or by a combination of these. This Standard addresses occupant restraint during frontal impacts and does not address side or rear impact situations due to the lack of available data.

Based on information available to it, the Technical Committee responsible for developing this Standard has used a maximum deceleration of 3 *g* as the basis for developing the requirements of this Standard. This is felt to be a reasonable maximum level of deceleration that is likely to be encountered in any frontal impact under normal operating conditions encountered in transit service. This is more than the European standard of 1 *g*, but is thought to provide a good balance between safety and design.

The Standard does not presume to cover all possible situations that can be encountered in day-to-day operations. Care should always be taken to ensure that vehicles acquired serve the specific needs and operating conditions that apply to the transit system and its customers.

# 1 Scope

## 1.1

This Standard applies to accessible transit buses, as defined in Clause 3.

## 1.2

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.

## 1.3

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: