PAS 2012-1:2019

BSI Standards Publication

# M1 vehicles for the carriage of one or more passengers seated in wheelchairs

Part 1: Manufacturing requirements – Specification

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WAVCA
Wheelchair Accessible Vehicle Converters Association

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**Summary of pages**

This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 69, and a back cover.

 

# Foreword

## Publishing information

This PAS was sponsored by the Wheelchair Accessible Vehicle Converters' Association (WAVCA)[1]. Its development was facilitated by BSI Standards Limited and it was published under licence from The British Standards Institution. It came into effect on 30 November 2019.

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- Society of Motor Manufacturers and Traders (SMMT)
- Vehicle Certification Agency – Department for Transport (VCA)
- Wheelchair Accessible Vehicle Converters' Association (WAVCA)

Acknowledgement is also given to the members of a wider review panel who were consulted in the development of this PAS.



This PAS is not to be regarded as a British Standard. It will be withdrawn upon publication of its content in, or as, a British Standard.

The PAS process enables a specification to be rapidly developed in order to fulfil an immediate need in industry. A PAS may be considered for further development as a British Standard, or constitute part of the UK input into the development of a European or International Standard.

## Relationship with other publications

PAS 2012 is published in two parts, as follows:

- *M1 vehicles for the carriage of one or more passengers seated in wheelchairs – Part 1: Manufacturing requirements – Specification*
- *M1 vehicles for the carriage of one or more passengers seated in wheelchairs – Part 2: Retail requirements – Specification*

## Supersession

This PAS supersedes PAS 2012-1:2015, which is withdrawn.

[1] www.wavca.co.uk

 

## Use of this document

It has been assumed in the preparation of this PAS that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

**Product certification/inspection/testing.** Users of this PAS are advised to consider the desirability of third-party certification/inspection/testing of product conformity with this PAS. Appropriate conformity attestation arrangements are described in BS EN ISO/IEC 17050. Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

**Assessed capability.** Users of this PAS are advised to consider the desirability of quality system assessment and registration against the appropriate standard in the BS EN ISO 9000 series by an accredited third-party certification body.

## Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

*Commentary, explanation and general informative material is presented in italic type, and does not constitute a normative element.*

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

## Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

## Compliance with a PAS cannot confer immunity from legal obligations.

 

# 0 Introduction

## 0.1 General

The UK wheelchair accessible vehicle (WAV) industry started in the early 1960s to assist people with a mobility impairment to travel in their wheelchair in a motor vehicle.

In the beginning most conversions were rudimentary, addressing only access and basic securing of the wheelchair. Since then, the WAV industry has grown enormously and the range of WAVs offered has also grown in response to customer demand. With an ageing population, the number of wheelchair users who require access to transport in both wheelchair accessible taxis and personal private vehicles is set to rise higher in the future.

In recent years, as a result of campaigning by UK industry, the European Commission has included WAVs as a new category of "special purpose vehicle" within the amendments of Directive 2007/46/EC [1]. However, compliance with Directive 2007/46/EC is not mandatory for all WAVs produced in the UK, as there are alternative approval routes open to manufacturers. In addition, the requirements of the Directive are, in the main, limited to the securing of the wheelchair and occupant within the WAV. They do not address accessibility issues. Furthermore, the Directive specifies certain tests based on a wheelchair mass of 85 kg, whereas electric wheelchairs substantially in excess of this mass are already routinely being carried in WAVs. Although certain basic requirements for rearward-facing wheelchair installations (such as in many UK taxis) are now included in the Directive, there is still no requirement for a head and back support. This has therefore been included in this PAS.

## 0.2 Accessibility

Minimum generic accessibility dimensions for WAVs do not take account of the varying sizes of wheelchair users and their wheelchairs, resulting in some larger wheelchair users being denied the use of a WAV and some users of smaller wheelchairs having to use WAVs which are far larger than needed, with the associated increased cost and environmental impact of running a larger WAV. Each individual wheelchair user or each particular specifier of WAVs have their own particular requirements and capabilities, so a WAV suitable for one wheelchair user might not be suitable for another.

In an attempt to address these issues, this PAS introduces a new gauge for measuring the accessibility of WAVs so that a set of key accessibility dimensions can be provided to the end user, enabling them to make an informed decision when selecting a WAV. Previous systems of providing measurements, based on simple linear dimensions taken with a tape measure, have not been able to take into account the space that might be required to manoeuvre a wheelchair from the WAV entrance to the travelling position. Potential purchasers of a WAV are usually aware of their principal dimensions when seated in their wheelchair and can compare these with a variety of potential WAVs prior to making a choice. Similarly, specifiers of WAVs for commercial duties (e.g. care homes or taxi licensing authorities) can select a particular set of minimum dimensions that satisfies their needs for any particular application.

The accessibility gauge used in this PAS was developed using data from the Department for Transport study, *A survey of occupied wheelchairs and scooters* (2006), conducted by CEDS. The survey took and catalogued various measurements of over 1 300 wheelchair users and their wheelchairs. The accessibility gauge used in this PAS is designed to be adjustable to represent the length, width and height of all sizes of occupied wheelchair ranging from the 5th percentile child at the smallest end of the scale, to a size in excess of the 95th percentile adult at the largest. In this way, this PAS aims to encompass the vast majority of wheelchair users in the UK.

 

## 0.3 Wheelchair mass

This PAS specifies performance and test requirements for securing wheelchairs of an unoccupied mass of ≤200 kg.

Whilst no requirement contained in this PAS can be regarded as a substitute for any type of approval requirement, it is recognized that in many cases, test work to satisfy the requirements of this PAS might be undertaken in parallel with test work undertaken as part of a type approval programme. It is therefore desirable to combine tests wherever possible. In some areas, this PAS specifies alternative test methods to demonstrate compliance with its requirements.

As an example, Annex C (a dynamic test) or Annex E (a static test), are both intended to determine the strength of wheelchair tie-down and occupant restraint anchorages for wheelchairs weighing ≤85 kg. Either method is acceptable as a means of satisfying the requirements of this PAS and WAV manufacturers may choose whichever test method provides the most convenient and cost-effective method of demonstrating compliance, when combined with their chosen type approval route.

However, none of the currently available type approval routes cater for wheelchairs weighing >85 kg, and when testing the strength of wheelchair tie-down and occupant restraint anchorages for such wheelchairs, the PAS specifies only a dynamic test method.

## 0.4 Forward and rearward-facing installations

Most privately-owned WAVs provide a forward-facing designated travelling position. However, some WAVs, such as accessible UK taxis, might have a rearward-facing designated travelling position. This PAS differentiates between the testing requirements for forward and rearward testing by providing separate test methods for each case. The strength requirements for the back and head support for a rearward-facing wheelchair occupant closely mirror those currently applicable to accessible buses, and are primarily intended to provide comfort and stability for a rearward-facing wheelchair occupant rather than crash protection.

## 0.5 Assisted and unassisted entry WAVs

This PAS is not applicable to completed drive-from-wheelchair WAVs, because such WAVs are always bespoke, taking into account an individual's ability to access and drive the WAV. Wheelchair tie-down arrangements and driving controls for these WAVs would be difficult to standardize, however, some of the requirements of this PAS can be usefully applied to drive-from-wheelchair WAVs insofar as their basic level of accessibility is concerned. Two definitions are used in this PAS – "AWAV" (assisted entry wheelchair accessible vehicle), (see **3.1.3**) and "UWAV" (unassisted entry wheelchair accessible vehicle) (see **3.1.21**) to cover the two basic types of WAV. In some parts of the PAS, separate requirements apply to each.

## 0.6 Tie-downs

This PAS is limited to WAVs in which the wheelchair is restrained using four-point strap-type tie-downs, due to the lack of technical data to support the drafting of requirements for other types of wheelchair tie-down equipment. In particular, when securing the wheelchair with a docking station, there are difficulties in standardizing the attachment method of the docking station interface pin to the surrogate wheelchair (SWC), especially when ballasted to masses well in excess of 85 kg. In addition, the bespoke nature of installations involving docking stations makes each WAV fitted with a docking station different, and therefore impractical to test destructively. However, the general principles of the test methods in this PAS may also be applied to other types of WTORS and WTORS anchorages, subject to it being possible to make suitable modifications to the SWC used for testing.

 

# 1 Scope

This part of PAS 2012 specifies design and manufacturing requirements for a wheelchair accessible vehicle (WAV) of EC Category M1, in which one or more passengers travel, each seated in a wheelchair that is secured in the WAV using four-point strap-type tie-downs.

*NOTE 1 Some four-point strap-type tie-downs are wheelchair-specific, and are designed to be used with only one particular model of wheelchair. Care should be taken when selecting appropriate tie-downs, as not all four-point strap-type tie-downs might be suitable for test in accordance with the requirements of this PAS. For example, it might not be possible to attach some wheelchair-specific tie-downs to a SWC and some wheelchair-specific WTORSs include wheelchair occupant restraint anchorages that attach to the wheelchair itself rather than the WAV structure.*

It specifies:

a) a gauge-based method for measuring the key accessibility dimensions of WAVs capable of transporting occupied wheelchairs ranging from 775 mm to 1 350 mm long, 500 mm to 830 mm wide and 975 mm to 1 550 mm high;

b) a separate method for measuring the key accessibility dimensions of WAVs capable of transporting occupied wheelchairs in excess of 1 350 mm long, 830 mm wide or 1 550 mm high;

c) requirements for wheelchair access devices (where fitted), including:

   1) ramps;

   2) lifts;

   3) winches;

d) requirements for wheelchair tie-down and occupant restraint system (WTORS) anchorages for securing wheelchairs ≤200 kg in mass, and wheelchair users, within the WAV, including:

   1) static and dynamic test methods, (either of which can be used), for determining the strength of WTORS anchorages for forward-facing wheelchairs ≤85 kg;

   2) a dynamic test method for determining the strength of WTORS anchorages for forward-facing wheelchairs >85 kg to ≤200 kg;

e) requirements for rearward-facing wheelchair installations including:

   1) static test method for WTORS anchorages;

   2) static test method for wheelchair occupant head and back support;

f) structural integrity; and

g) requirements for service elements, for example, a user manual (including WAV technical specification to facilitate direct comparisons between WAVs) and re-call procedures.

It does not specify requirements for securing an occupied wheelchair in the driving position of a WAV.

*NOTE 2 The securing of an occupied wheelchair in the driving position of a WAV tends to be a bespoke solution for which appropriate design and test requirements have not yet been fully developed.*

It does not specify requirements for securing the wheelchair other than with four-point strap-type tie-downs.

*NOTE 3 PAS 2012-1 is limited to four-point strap-type tie-downs due to the lack of technical data to support the drafting of requirements for other, more bespoke types of wheelchair tie-down equipment. However, the general principles of the test annexes may be applied to other types of wheelchair tie-down equipment, subject to it being possible to make appropriate modifications to the SWC.*

This part of PAS 2012 does not specify requirements for the retail of WAVs.

*NOTE 4 PAS 2012-2 specifies requirements for the retail of WAVs conforming to PAS 2012-1.*

*NOTE 5 In cases where items or features fitted to a WAV are optional, the requirements applicable to them only apply where fitted.*

 