

DEFECTIVE  
BULLETIN

*Guidance  
on the Safe  
Transportation of  
Wheelchairs*

## ACKNOWLEDGEMENTS

We are grateful to everyone who has contributed to this bulletin including: users, carers, NHS, community services, DETR, wheelchair manufacturers, tie-down and restraint manufacturers, transport services, crash test laboratories, voluntary groups, associations and other interested parties in England, Scotland and Wales.



The Medical Devices Agency helps safeguard public health by working with users, manufacturers and lawmakers to ensure that medical devices meet appropriate standards of safety, quality and performance and that they comply with the relevant Directives of the European Union.

Our primary responsibility is to ensure that medical devices achieve their fullest potential to help healthcare professionals give patients and other users the high standard of care they have a right to expect.

*The Medical Devices Agency is an Executive Agency of the Department of Health*

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# 1. EXECUTIVE SUMMARY

This Device Bulletin has been prepared in consultation with interested parties to give guidance to health services and healthcare professionals involved in the provision of wheelchairs, seating and accessories. It will also be helpful to wheelchair users.

We look at the issues affecting wheelchair users, carers, prescribers, transport providers, and vehicle and equipment manufacturers/suppliers with reference to the following:

- Medical Devices Regulations 1994 (SI 1994 No 3017)
- Disability Discrimination Act 1995
- European Union Directives on vehicle construction
- International Standards for the impact testing of wheelchairs and their tie-down and occupant restraint systems (WTORS)

These issues cross existing service boundaries, which has hindered understanding and communication between those involved.

To facilitate the safe transportation of wheelchair users, equipment and service providers need to communicate effectively. Past communication has often been ineffective or non-existent, thereby increasing the risk to wheelchair users in vehicles.

The following groups have a significant role to play:

- wheelchair users;
- carers, support staff and healthcare professionals;
- manufacturers of
  - wheelchairs/accessories/seating
  - vehicles (including conversions)
  - WTORS
- service providers of
  - wheelchairs/seating
  - transport

## 1.1 Objectives

This Bulletin aims to:

- provide sufficient information for health services and healthcare professionals to assist wheelchair users, prescribers and transport providers in making informed decisions;
- enable users seated in wheelchairs to travel as safe as is practicable in public, local authority, private or voluntary sector vehicles;
- provide guidance for the transportation of unoccupied wheelchairs.

## 1.2 Key points

### **Communication/training**

- Good lines of communication must be established and maintained between users, carers, manufacturers, and service providers;
- Information and training should be provided for:
  - users
  - carers (where appropriate)
  - transport staff
  - prescribers
  - maintenance and repair staff

### **Wheelchair provision**

- Transportation requirements should be included when considering new or reviewing existing equipment for a wheelchair user.

### **General safety guidelines for wheelchair/user transportation**

- Wheelchair users should transfer to vehicle seats whenever possible;
- Wheelchair users should not travel with the wheelchair at an angle or facing sideways;
- There should be sufficient free space around the wheelchair and user to avoid the user making contact with other vehicle occupants, unpadded parts of the vehicle, wheelchair accessories or WTORS anchor points;
- Wheelchairs should have their parking brakes applied and their power units switched off during vehicle movement. Powered wheelchairs should not be left in freewheel mode;
- Wheelchairs should not block gangways and exits for other passengers in the vehicle;
- A headrest should be provided for a wheelchair user when travelling in a vehicle where other seated passengers have headrests;

### **Wheelchair tie-down and occupant restraint system (WTORS)**

- The need for WTORS should be determined by the vehicle type;
- The number of large public service vehicles with a designated space/compartments **without** tie-downs specifically designed for wheelchair passengers is increasing;
- Wheelchair users should not travel in cars, taxis or minibuses, unless the wheelchair is tied down and the user is appropriately restrained;
- Sufficient WTORS should be carried to allow safe transportation of the intended wheelchair seated passengers (one type of WTORS is unlikely to accommodate all types of wheelchairs and users);
- Consideration should be given to the most suitable type and positioning of restraint for the user, both in normal travel and during an impact;
- Lap and chest belts attached to wheelchairs or seating units are usually provided to assist posture and are **not** vehicle occupant restraints;
- Using a lap belt as the only occupant restraint during travel is **not** recommended;
- The user restraint should have a clear path from the user to the anchor point and should not be interfered with by any part of the vehicle, wheelchair, seating or accessory;

### **Seating units**

- Seating units require an appropriate fixture or interface to the wheelchair when being transported;
- Seating units should incorporate a headrest or allow the use of a separate headrest;

### **Accessories**

- Accessories for use during transportation should be adequately secured to the wheelchair and may require padding to avoid user contact in normal vehicle movement or in an impact. If this is not possible, they should be removed to avoid potential contact with the user or other passengers in an impact;

### **Transporting wheelchairs etc. unoccupied**

- If the wheelchair is to be transported as luggage, restraining straps may be required to stop it contacting the user or other passengers during normal vehicle movement or in an impact;
- Scooters should always be transported unoccupied, unless the manufacturer has provided specific instructions for occupied transportation;

### **Maintenance**

- Wheelchairs should be regularly maintained. Function and tyre pressures should be frequently checked in line with the manufacturer's guidance;
- Puncture-proof tyres should be considered to reduce tyre pressure and brake problems for wheelchair users.

### **Vehicle impact**

- Wheelchairs and seating units involved in a vehicle impact should not be used again until checked by the manufacturer or his approved repair agent;
- Older wheelchairs may not have been designed to withstand the forces generated during a vehicle impact when used as a seat in a vehicle. However in practice they appear to work well and few incidents have been reported.

## 2. INTRODUCTION

There are over 750,000 wheelchair users in the UK. Although thousands travel in vehicles every day, very few problems are reported. However, in the small number of injuries and fatalities recorded, investigations reveal that the cause is rarely attributed to a piece of faulty equipment. The majority are the result of inappropriate, inadequate or incorrectly used equipment, which can pose as much risk to wheelchair users as a vehicle impact.

### 2.1 Considerations

Wheelchairs and seating systems vary widely depending on the age, needs and physical characteristics of the user and carers.

Many older wheelchairs have not been designed to withstand the force of a vehicle impact when used as a seat in a vehicle. In practice, however, they appear to work well and few incidents have been reported.

The majority of newer wheelchairs are designed for use during transportation. In such cases, the manufacturer provides written guidance on this.

Transport services are provided by many different sources: public transport operators, local education authorities, social services, community services, health services, private companies and the voluntary sector etc. Vehicle types include ambulances, cars, people carriers, taxis, minibuses, large buses, coaches, trains and trams.

### 2.2 Main Problems

The main problems identified are:

- lack of communication between the parties involved, notably with transport service providers before a wheelchair/seating unit is prescribed or purchased;
- lack of comprehensive risk analysis for users;
- lack of clear product information;
- inadequate information and training for users, carers, prescribers, service providers and drivers;
- wheelchair tie-down systems (WTORS) that are inappropriate, incomplete or misused;
- inappropriate occupant restraint systems;
- incorrect use of tail lifts and ramps;
- lack of care in boarding/alighting from vehicles;
- wheelchairs blocking gangways and exits during transportation;
- transportation of unoccupied powered/non-powered wheelchairs without being secured.

**2.3 Provisions of  
existing  
Acts/Regulations**

**Disability Discrimination Act 1995**

The transport provisions in this Act require vehicle manufacturers and transport providers to ensure that vehicles will be able to accommodate wheelchair users safely. The Mobility and Inclusion Unit of the Department of Environment, Transport and the Regions (DETR) works closely with vehicle manufacturers and transport operators to develop appropriate strategies and legislation.

**Medical Devices Regulations 1994 (SI 1994 No 3017)**

These Regulations, in force from June 1998, relates to wheelchairs and associated seating as medical devices. Manufacturers are required to consider all risks associated with the usage of their wheelchairs. This includes being carried in a vehicle either occupied or as an item of luggage.

**Manual Handling Operations Regulations 1992 (SI 1992 No 2793)**

These specify the extreme care that must be taken by carers and users when making adequate risk assessments before lifting or transferring a user to or from a wheelchair. As very few vehicles are equipped with lifting equipment for transferring users, it is often difficult for wheelchair users to transfer to a vehicle seat, requiring them to travel in their wheelchairs.

### 3. TRANSPORT ASPECTS OF PRESCRIPTION PROCESSES FOR WHEELCHAIRS AND SEATING UNITS

During the wheelchair prescription process, it is essential to consider all forms of usage, including transportation. Risk analysis should include every type of transport to which the user has regular access (see section 4).

The process should take into account the Public Service Vehicles Accessibility Regulations 2000 (SI 2000 No 1970), which set technical requirements for vehicle access and wheelchair space. However specifications are not provided for all types of vehicles and wheelchairs (see sections 8, 9).

Relevant information must be passed on to those responsible for specialist or statutory transport provision. Without such information, transport providers are unlikely to have sufficient detail to allow them to provide safe services.

In some cases (e.g. headrests), two or more budget holders may need to consider joint funding in order to provide the user with the most appropriate services.

#### 3.1 Securing unoccupied equipment

Wherever possible, users should transfer to a vehicle seat. This may depend on the capability of the user to transfer and to fold, dismantle and secure the equipment unaided or with assistance.

An unoccupied wheelchair must be adequately secured within the vehicle. In a family car this is likely to be in the luggage or boot space. If the passenger area (usually the back seat) is used, luggage straps will usually be required. Heavy equipment should not be carried behind a folding seat, such as the rear seat of an estate car, unless it is restrained by luggage straps.

In larger vehicles, luggage straps may be required if a suitable confined luggage area/compartments is not available. Safe access for other passengers should be taken into account. Gangways and access to exits should not be obstructed in any way.

### 3.2 Special considerations for wheelchair types

#### **Larger non-folding wheelchairs**

Whenever possible, information should be given to the transport operator before a user starts regularly using a transport service. This will highlight the need for increased space for the wheelchair, storage space or luggage straps. It also enables the operator to advise the user/prescriber of any space restrictions that could limit the transportation of wheelchairs.

#### **Powered wheelchairs**

For transportation, gel type batteries are safer than the older wet lead acid type that may, if not confined within a spill proof box, present a hazard in an accident.

### 3.3 Transporting wheelchair accessories

Accessories fitted to wheelchairs, such as waist belts, should be clearly labelled to indicate if they are not intended to be used as part of a vehicle occupant restraint system (see also MDA SN 1999(35)). If equipment attached to a wheelchair could injure the occupant or other passengers on impact, the transport provider should be able to remove it and store it as luggage. If an item cannot be easily removed, or is needed for use during the journey (e.g. fixed tray, in-built control gear, communication aid etc.), padding the item should be considered.

### 3.4 Communication with transport providers

If possible, regular liaison between prescribing services and transport providers should be set up before individual prescription clinics take place. This will help ensure that the capabilities of each service are adequately considered. Discussions at meetings could include:

- Staff training needs, including opportunities for joint or reciprocal training;
- Future changes in types of wheelchair, seating units, WTORS and vehicles, to assist setting specifications for future transport service contracts.

When the prescription is finalised, full details (including transportation aspects) should be given to the user and, if appropriate, their carer. Regular transport providers should also receive a copy of the transportation aspects, if lines of communication have been established.

Details should cover the wheelchair (and where appropriate seating and accessories) and highlight any special requirements for WTORS and stowage of removable items/accessories.

Occasionally, a complex supportive seating unit for indoor use and a simpler unit for transportation may be required. This helps meet transport needs in the short term, until the more complex equipment needs can be fully accommodated.

### 3.5 Occupant restraint considerations

#### **Degree of upper body control**

The prescription should specify the type of occupant restraint required in a vehicle, e.g. a lap and diagonal belt or full harness. The amount of upper body control that the user has during normal vehicle movement should be taken into account. 'Normal' movement includes braking and cornering, which has a considerable effect on someone with limited upper trunk control. Some users may be able to maintain an upright posture when using a wheelchair indoors, but not whilst travelling in a vehicle. Such considerations apply equally to lower limb amputees and users in supportive seating units, who may also have limited upper body control.

#### **Positioning of the restraint**

The positioning of the occupant restraint can be critical, depending on an individual's shape, size, disability or ability to withstand increased spine load forces. Restraints that loop over the shoulders and are anchored to the vehicle floor should be avoided, as they can cause a heavy downward load on the wheelchair user during an impact.

The positioning of vehicle anchored lap belts, as part of a WTORS, also requires careful consideration. Lap belts should fit snugly over the occupant's pelvis and should not be allowed to ride up into the abdominal area.

A lap belt should not be used as the sole means of restraint. Severe braking or impact could push the upper body forward into other parts of the wheelchair or vehicle, potentially damaging the user's head, internal organs or lower limbs.

#### **Ease of fastening/unfastening**

Wheelchair users and, where necessary, transport operators should be able to easily fasten/unfasten the restraints. Users should be able to reach the release mechanism unaided, except for the small minority who might interfere with the release mechanism during transportation. Users are unlikely to be able to fit or release simple belt systems anchored to the floor without the assistance of a carer or attendant.

## 4. RISK ANALYSIS FOR WHEELCHAIR TRANSPORTATION

Wheelchair and seating prescribers, together with transport providers, should aim to minimise any risk to users, carers, passengers and transport staff. A comprehensive risk analysis should be undertaken, taking into account individual users' requirements and the type of transport they plan to use.

This risk analysis process can be considerably shortened if the user plans to travel only on large public transport vehicles, such as buses or trains. These vehicles provide specific access and wheelchair space without wheelchair tie-downs and occupant restraint systems (WTORS). The availability of generic risk analysis, based on recorded experience, should highlight any increased or new risk for a user.

### **Potential risk areas**

The process of risk analysis/management should consider the following potential risk areas:

- user transferring from a wheelchair to a fixed vehicle seat;
- wheelchair/seating unit transported unoccupied as luggage;
- user occupying a wheelchair/seating unit during transportation;
- ability of a WTORS to hold the wheelchair and/or seating unit and to restrain the user during vehicle movement or impact;
- effect of normal vehicle manoeuvres, such as braking, accelerating, and cornering on the wheelchair user;
- effects of the occupant restraint on the user, both in normal vehicle use and in an impact;
- effect of the seating unit, wheelchair or accessories on the action of a vehicle anchored occupant restraint in an impact;
- suitability of the interface that connects the seat unit to the wheelchair;
- effect on other passengers if the user, wheelchair/seat or accessories become separated from the wheelchair during impact;
- postural support or belt/harness that is not sufficiently strong to withstand the force of an impact;
- requirement for a headrest to restrict rearward movement of the head during vehicle motion or impact.

## 5. VEHICLES USED IN THE TRANSPORTATION OF WHEELCHAIR USERS

The following is intended as a very brief summary. Fuller details are available from the Mobility and Inclusion Unit of the DETR (see section 12).

### 5.1 Vehicle classifications

Vehicle definitions, as used in the International Road Vehicle Construction Regulations, are based on the number of passengers and vehicle mass. Vehicles that carry up to eight passengers in addition to the driver are 'cars'; those with more than eight passengers are 'buses'. These definitions are now widely used in national legislation.

**TABLE 1 – Vehicle classifications**

M1	Passenger vehicles with up to eight seats in addition to the driver's seat. e.g. private cars, taxis.
M2	Vehicles with more than eight seats in addition to the driver's seat. Mass up to 5 tonnes. e.g. minibuses, non-emergency ambulances.
M3	Passenger vehicles with more than eight seats in addition to the driver's seat. Mass exceeding 5 tonnes. e.g. larger buses, coaches.

Wheelchair users travel in many different types of vehicles, including:

- private cars (as the driver or passenger);
- taxis and private hire vehicles;
- public service or voluntary sector minibuses;
- some types of non-emergency ambulances;
- larger buses and coaches;
- trams and trains.

Each is constructed and used in different ways, giving rise to different considerations for carrying people in wheelchairs.

Cars, minibuses, ambulances and taxis require suitable boarding aids and WTORS when carrying seated wheelchair users.

## 5.2 Access and space requirement in vehicles

### Access to different vehicle types

- Cars and taxis usually have manual ramps operated by the driver.
- Minibuses, ambulances and other high floor vehicles generally use entry lifts operated by the driver or other transport staff.
- Low floor buses provide access by a ramp, operated by power or manually by the driver.
- For trains, manual ramps are available on the platform, or occasionally on the train itself.

### Access requirements for public service vehicles

There should be at least one designated entrance and exit for wheelchair users. Care should be taken to ensure that wheelchair users, when correctly positioned, do not obstruct gangways and access passageways to exits. Wheelchair users should be able to move freely between the designated entrance/exit and the specified wheelchair space.

Unless there is level boarding, such as a raised platform at a tram stop, a boarding aid should be provided at the wheelchair access door. This can be a ramp – either portable, fixed to the vehicle or power-operated – or a lift. Ideally the gradient of a boarding device, used unaided by a wheelchair user, should not exceed 7° (1 in 8).

Lift platforms should provide:

- over-ride edges to prevent a wheelchair rolling off;
- sufficient space for an attendant to assist with entry or exit;
- an overall load capacity adequate for lifting the wheelchair and its occupant.

(For further information, see MDA Device Bulletin DB 9606).

### Space requirements in public service vehicles

Many mainline trains and buses have a space designated for users travelling in their wheelchair. In a low floor bus this space faces to the rear of the vehicle and incorporates protection behind the user. Seat belts are not provided for other passengers, neither are WTORS fitted for wheelchair users (see section 9).

The draft International Standard ISO 10542 Part 1 (see section 8) specifies the amount of clear space that must be provided around a wheelchair occupant. The minimum space is 400mm behind the occupant's head and 950mm in front of the head. Free space on each side of a wheelchair depends on the user's shape, size and degree of upper body control.

The Public Service Vehicles Accessibility Regulations 2000 (SI 2000 No 1970) specifies the minimum space for a wheelchair:

- 1300 mm measured along the length of the vehicle;
- 750 mm measured along the width of the vehicle;
- 1500mm measured vertically from any part of the floor in the wheelchair space.

Note: these measurements have been increased from those recommended in VSE 87/1 (1200mm, 700mm, 1400mm respectively; see section 11).

These measurements can be used as a guide for other vehicles and can be adjusted for specific types of wheelchairs or WTORS.

Sufficient space must be provided around the wheelchair to permit the correct positioning and tension of the WTORS (see section 6).

## 6. WHEELCHAIR TIE-DOWN AND OCCUPANT RESTRAINT SYSTEMS (WTORS)

All vehicles that are intended to carry wheelchair users should include suitable WTORS. The exception is large public service vehicles, which provide a designated wheelchair space.

### 6.1 Selecting the correct WTORS

It is unlikely that one type of WTORS will be suitable for all types of wheelchairs and users. Some WTORS are designed for a specific type of wheelchair and should not be used on other wheelchairs. Vehicles should therefore carry sufficient equipment to ensure safe WTORS for the intended wheelchair passengers. The range required should be agreed following consultation with wheelchair users, carers, prescribers and manufacturers.

Clamp type tie-downs are usually only suitable for non-powered wheelchairs, owing to their method of attachment. Other types of tie-downs also have limitations. In all cases, the WTORS manufacturer's instructions should be carefully followed.

All those involved should receive training in the correct choice, assembly and fitting of WTORS, and should know where to obtain correct information.

### 6.2 Space requirements for WTORS

Sufficient space is required to allow the tie-down system to be correctly fitted to the wheelchair and the occupant restraint to be fitted to the user. Four point belt type tie-down systems generally require more free space to achieve the required anchorage points than clamp or docking systems that operate close to the wheelbase or frame of the wheelchair.

### 6.3 Storage of WTORS

When not in use, WTORS should be stored away from areas used by wheelchairs and from other vehicle occupants, to avoid accidents or damage to the WTORS. The storage area should be far enough away from the vehicle's occupants to avoid any contact during normal vehicle movement or an impact.

#### 6.4 Information supplied by WTORS manufacturers

WTORS manufacturers should provide sufficient information to allow their equipment to be used safely.

Manufacturers' instructions should also describe the required anchorage system to the vehicle, for example tracking systems built into the vehicle floor. Instructions should be provided for display inside the vehicle so that visual checks can be made during fitting.

#### 6.5 WTORS labelling/instructions

WTORS should be labelled to show the level to which they have been tested. Labels or instructions, including diagrams, should be displayed within the vehicle as reference for carers and transport staff when fitting/removing WTORS.

WTORS instructions should clearly indicate:

- Specific methods and positions for attachment.
- The location of WTORS and wheelchairs, with or without seating units. This is normally facing forward, unless the vehicle and WTORS system is designed for rearward facing wheelchair users against a padded bulkhead, as in some purpose-built taxis.
- The amount of free space required to the front, rear and side of the wheelchair in order to minimise the risk of occupant contact inside the vehicle during normal vehicle movement or an impact.
- Any maintenance requirements.

## 7. INFORMATION PROVIDED BY WHEELCHAIR, SEATING AND ACCESSORY MANUFACTURERS

The Medical Devices Regulations require manufacturers of wheelchairs, seating and accessories to provide sufficient information to allow their equipment to be used safely.

### 7.1 Scope of information provided by manufacturers

Such information should include transportation of outdoor use wheelchairs, either occupied or unoccupied. If the equipment has been designed for indoor use only, the manufacturer's pre-sales literature should clearly state that it should not be used as a seat or part of a seat in a vehicle. In some cases it is obvious that the equipment is not intended for outdoor use (e.g. wheeled commodes). But in less obvious cases, the manufacturer's label should clearly indicate that the equipment should not be used whilst occupied in a vehicle.

The manufacturer may intend the wheelchair to be transported unoccupied, either dismantled or folded, or may recommend that accessories are removed before transportation. In such cases, the manufacturer should provide guidance on how to transport the equipment safely. For equipment that is dismantled, the information should help ensure that parts removed during dismantling are not lost and are not free to move about inside the vehicle, potentially causing injury to other passengers. Re-assembly instructions should also be provided.

Information should be provided in pre-sales literature so that the points can be considered during the prescription and purchase process. It should be passed on to the wheelchair user, carer and, if direct lines of communication are in place, the regular transport provider.

### 7.2 Wheelchair, seating and accessory labelling

Labelling on wheelchairs, seating units and accessories should clearly show:

- whether or not they should be used in transportation;
- if a specific or restricted range of WTORS is required;
- the location points for tie-downs or restraints.

Most lap belts fixed to wheelchairs are intended for posture control only and therefore a separate occupant restraint is required in vehicles. Posture belts should be clearly labelled (see MDA SN 1999(35)).

A small number of wheelchairs have occupant restraints anchored to them. In these cases, the anchor points and restraint should be clearly labelled to ensure that users, carers and transport providers are aware of the equipment's capabilities and limitations.

Some accessories, for example feeding trays, are not suitable to remain on the wheelchair during transportation. They should be removed when an occupied wheelchair is being transported.

The information and labelling on older wheelchairs may be inappropriate for modern transportation methods. In many cases, WTORS manufacturers have designed systems to allow older wheelchairs to be transported when occupied. Many users travel seated in older wheelchairs and very few incidents have been reported.

### 7.3 Maintenance and repair

The suitability of the equipment prescribed relies upon it being regularly maintained to ensure it operates in line with the manufacturer's instructions. Without regular maintenance and repair a wheelchair, seating unit, accessories or WTORS may be unable to withstand the forces imposed on it during transportation.

## 8. STANDARDS FOR WHEELCHAIRS

### 8.1 International standards

The International Standards Organisation (ISO) has a Technical Committee (ISO TC 173 SC1) which compiles standards for wheelchairs and seating. Standards are being drawn up for the impact testing of wheelchairs and of WTORS (see ISO 7176 Part 19 for Wheelchairs and ISO 10542 Parts 1-5 for WTORS).

These draft standards are based on extensive testing and simulated impacts at laboratories worldwide. They are approaching final draft stage and the agreed standards are expected to be issued in 2001. However, these standards are already widely accepted by the industry and for several years have been used in wheelchair and WTORS testing.

Under the standards, impact testing is based on a forward facing wheelchair and occupant with the wheelchair tied down to the test impact sled in a similar manner to the configuration that would be found in a vehicle. A diagonal upper body and a pelvic belt restrain the dummy in the wheelchair. In most cases, the pelvic belt is secured to the floor of the sled and the upper body restraint is secured to an anchor point above the shoulder, similar to a front seat belt for a car driver.

The speed and deceleration of the sled during the impact test are set at a level appropriate for a private car, but higher than that required for a slower, larger vehicle such as a public bus. As wheelchairs are likely to be used in both types of vehicles, the higher level impact appears appropriate. Wheelchair manufacturers have also expressed a preference for the higher level testing, as they cannot regulate how their wheelchairs will be used.

The standards being drawn up for WTORS (ISO 10542 Parts 1-5) have set a base standard (ISO 10542 Part 1) using the same impact test as wheelchairs (ISO 7176 Part 19). Additional WTORS standards are now being drawn up to cover strap type tie-downs, clamps, auto docking systems and systems for specific wheelchairs, such as children's and lightweight types.

These draft standards have resulted in a much closer working relationship between many UK wheelchair, wheelchair seating and WTORS manufacturers, which extends beyond their work on compiling and reviewing standards.

New work on standards is concentrating on the transport of occupied supportive seating units in wheelchairs. Rear and side impact testing, in line with present vehicle testing, will then be considered.

## 8.2 European and British standards

These standards produce results that can be compared across different manufacturers and provide a base level of safety, similar to that for vehicle seat belts. They cannot, however, produce results or equipment that guarantee the complete safety of a wheelchair occupant in every type of vehicle impact.

The European (CEN) and British (BSI) groups have input to the ISO group, but are not currently working on any other wheelchair transport-related standards. Regular meetings are held by the BSI Wheelchair Standards Group (CH/40) to review progress in ISO. It is likely that both CEN and BSI will choose to adopt the majority of the ISO standards when they are finalised.

## 9. LEGISLATION

This section provides only a very brief summary. Further details are available from:

- MDA Wheeled Mobility Section (for wheelchair issues).
- Mobility and Inclusion Unit of the DETR (for vehicle issues).

See section 12 for details

### Effect on UK manufacturers of wheelchairs and seating units

These regulations, in force from June 1998, and MDA Guidance Bulletins have led UK wheelchair and seating manufacturers to review the potential risks involved in using their equipment before CE marking their products.

One area of risk regularly identified is the transportation of equipment following issue to an individual user.

Many older wheelchairs were not designed to be tied down in a vehicle with a user seated in them or, in some cases, even for outdoor use. Manufacturers therefore made little change to the equipment post-June 1998, although they did include clear statements in the pre-sales and user instructions describing these limitations.

Manufacturers have accepted that many users consider transportation in their own wheelchair an essential part of everyday life. They therefore considered how the risks involved could be removed or reduced to an acceptable level. Many manufacturers are now updating the design of their existing equipment or information, and taking transport needs into account when designing new models.

It is important to note that the DDA does **not** give wheelchair users a right of access to transport vehicles. The transport provisions in Part V of the Act give Ministers the power to make accessibility regulations for land based transport to enable disabled people to travel in safety and reasonable comfort. For wheelchair users, this includes travel seated in their wheelchair.

The first set of regulations covers new rail rolling stock. A DETR consultation on draft regulations for buses and coaches took place in 1999.

9.1 Medical Devices  
Regulations SI  
1994 No 3017

9.2 Disability  
Discrimination  
Act 1995 (DDA)

The DDA also gives powers to make regulations on the access for disabled people to taxis. The results of an informal consultation carried out by the DETR is being used to prepare regulations and a further consultation exercise will follow.

### 9.3 Rail vehicle Accessibility Regulations 1998

These regulations (SI 1998 No 2456) set standards for disabled people, including wheelchair users, for access to rail vehicles brought into service after 31 December 1998. They specify the size of the entry door, access to facilities on the train and specify the required space for a wheelchair.

### 9.4 Public Service Vehicles Accessibility Regulations 2000

These regulations (SI 2000 No 1970) sets standards for disabled people, including wheelchair users, for access to buses and coaches. They apply initially to new vehicles; buses brought into service after 31 December 2000 and coaches after 1 January 2005. Smaller buses and other types of public service vehicles will be included at a later stage.

The first vehicles that will be made accessible are buses and coaches that carry over 22 passengers on local or scheduled services. The regulations include:

- technical requirements for boarding aids;
- provision for access from the door to a designated wheelchair space;
- safety provisions to secure the wheelchair and user.

Vehicles are inspected by the DETR before entering service and an accessibility certificate is issued for compliance with the regulations.

On public service vehicles (PSVs) designed to carry an unrestrained occupied wheelchair (buses with a rearward facing designated wheelchair space), measures should be taken to limit the movement of the wheelchair and user, as follows:

- A device on each side of the wheelchair space to prevent lateral movement (stanchion, partition, retractable rail or vehicle side wall).
- A bulkhead or backrest to prevent forward movement.
- A device, such as a fixed stanchion, to prevent the wheelchair swinging into the gangway.
- A handrail adjacent to the wheelchair space.
- The longitudinal axis of the space should be parallel to the direction of travel.

If the bus or coach is required to provide seat belts for other passengers, then the wheelchair should be secured and an occupant restraint provided for the user. The restraints should:

- be adequate for a combined wheelchair/passenger mass of 160kg;
- be capable of withstanding crash forces;
- be fitted to anchorage points in the vehicle, which can sustain the forces of an impact. These will vary according to the vehicle category (see table 1) and the type of restraint.

Note:

Where a dedicated transport service is provided, or a vehicle is specially designed for an individual wheelchair user, it may be necessary to deviate from the mass and dimensional constraints outlined in the PSV Accessibility Regulations or VSE 87/1. However, occupant safety provision should be of a similar standard to that provided in public transport.

## 9.5 Vehicle construction and use regulations

The basic regulations governing the construction and use of vehicles in the UK are the Road Vehicles (Construction and Use) Regulations 1986 (SI 1986 No 1078). Although these have frequently been amended, they do not contain any specific provisions on the carriage of disabled people or of passengers in wheelchairs. However Regulation 100 includes a general requirement for vehicles to be maintained and used in a manner so as not to be a danger or nuisance to any person in the vehicle or on a road.

The construction and operation of PSVs is controlled by the Public Service Vehicles (Conditions of Fitness, Equipment, Use and Certification) Regulations 1981 (SI 1981 No 257) and the Public Service Vehicles (Carrying Capacity) Regulations 1984 (SI 1984 No 1406).

## 9.6 European Directives and Standards

The European Union (EU) has developed a system of directives on vehicle construction. For M1 vehicles (see table 1) there is a mandatory Type Approval regime. However, the directives do not deal with securing passengers in wheelchairs, nor with occupant restraints for disabled people. The EU is continuing to develop standards for the bodywork aspects of M2 and M3 vehicles (see table 1) and the current draft documents contain provisions for wheelchair users. This Directive should be finalised this year and will initially be optional.

The United Nations Economic Commission for Europe (UNECE) also produces construction standards for the Type Approval of vehicles which aims to remove barriers to trade and to set world standards for vehicle construction. Amendments to bus construction regulations have recently been proposed and discussion on these is ongoing.

## 10. ADVERSE INCIDENTS

### 10.1 Reusing wheelchairs after vehicle impact

If a wheelchair is involved in a vehicle impact, the wheelchair and WTORS should not be used again until the manufacturer or his approved repair agent has checked them. If there is any doubt, the wheelchair or WTORS should be scrapped.

### 10.2 Reporting adverse incidents

Adverse incidents should be reported to the Medical Devices Agency. If a public service vehicle is involved, and the incident may have a bearing on passenger safety, the DETR must also be informed. This is a statutory requirement under the Public Passenger Vehicles Act 1981 (Section 20). MDA and DETR collaborate on reports and investigate accordingly.

Incidents should be reported in the following circumstances:

- wheelchair users or their carers have been injured or killed during transportation;
- no injury has occurred, but injury is likely if the situation recurs;
- safety-related equipment is faulty or has inadequate user information or labelling.

The Medical Devices Agency provides guidance on which incidents should be reported and the process. Details are available from:

- MDA website: <http://www.medical-devices.gov.uk>
- MDA Adverse Incident Centre – tel: 020 7972 8080.

## 11. FURTHER READING

### Legislation

Public Passenger Vehicles Act 1981.  
Disability Discrimination Act 1995.  
Medical Devices Regulations 1994 (SI 1994 No 3017).  
Manual Handling Operations Regulations 1992 (SI 1992 No 2793).  
The Public Service Vehicles (Conditions of Fitness, Equipment, Use and Certification) Regulations 1981 (SI 1981 No 257).  
The Public Service Vehicles (Conduct of Drivers, Inspectors, Conductors and Passengers) Regulations 1990 (SI 1990 No 1020).  
The Road Vehicles (Construction and Use) Regulations 1986 (SI 1986 No 1078).  
The Rail Vehicle Accessibility Regulations 1998 (SI 1998 No 2456).  
The Public Service Vehicles Accessibility Regulations 2000 (SI 2000 No 1970).

*Available from:*

*The Stationery Office, PO Box 29, Norwich NR3 1PD  
Tel: 0870 600 5522 Fax: 0870 600 5533  
website: <http://www.ukstate.com>*

### Standards

ISO 10542 Parts 1 to 5 – Wheelchair Tie-down and Occupant Restraint Systems  
ISO 7176 Part 19 – Wheeled Mobility Devices for Use in Motor Vehicles  
BSEN ISO 14971 Risk Management

*Available from:*

*British Standards Institute, Customer Services, 389 Chiswick High Road, London W4 4AL  
Tel: 020 8996 9001 Fax: 020 8996 7001  
website: <http://www.bsi-global.com>*

### **MDA publications**

Safety Notice SN2001(01)	Reporting of Adverse Incidents Relating to Medical Devices.
Safety Notice SN1999(03)	Unwin Wheelchair Clamps – Improved User Instructions.
Safety Notice SN1999(34)	Wheelchair Seating and Wheelchair Accessories – Inappropriate Use.
Safety Notice SN1999(35)	Safety of Wheelchair Passengers in Vehicles.
Safety Notice SN1999(15)	Electrically Powered Wheelchairs & Scooters.
Safety Notice SN9803	Quicklok Wheelchair Clamps.
Device Bulletin DB9606	Wheelchair and Vehicle Passenger Lifts: Safe Working Practices.

### **Other guidance and information**

DETR Disability Discrimination Act – Transport Bulletins and Consultation Documents.

VSE 87/1 – The Safety of Passengers in Wheelchairs on Buses – (available from DETR).

\*Minibus Safety – CTA/ROSPA (1996).

\*Accessible Minibuses – CTA (2000).

\*CTA Midas Training Material – (available to Midas members from CTA).

*\*Available from:*

*Community Transport Association, Highbank, Halton Street, Hyde, Cheshire SK14 2NY*

*Tel: 0161 366 6685 Fax: 0161 351 7221*

*E-mail: ctauk@communitytransport.com*

## 12. CONTACTS

### **Wheelchair related enquiries**

Medical Devices Agency (MDA)  
Wheeled Mobility Centre  
241 Bristol Avenue  
Bispham  
Blackpool  
FY2 0BR

Tel: 01253 596 000  
Fax: 01253 596 177  
E-mail: [Julie.Gerrard@doh.gsi.gov.uk](mailto:Julie.Gerrard@doh.gsi.gov.uk)

### **Vehicle related enquiries**

Department of Environment Transport and the Regions (DETR)  
Mobility and Inclusion Unit  
Great Minster House  
76 Marsham Street  
London  
SW1P 4DR

Tel: 020 7944 4923  
Fax: 020 7944 6102  
E-mail: [miu@detr.gsi.gov.uk](mailto:miu@detr.gsi.gov.uk)

## **DISTRIBUTION**

This Device Bulletin should be brought to the attention of those involved in the provision of wheelchairs, seating and accessories. This includes: clinical engineers; consultants in rehabilitation medicine; occupational therapists; physiotherapists; rehabilitation engineers; rehabilitation technicians; wheelchair and/or seating service managers. Transport providers and wheelchair users would also benefit from reading this Bulletin.

## **TECHNICAL ENQUIRIES**

Enquiries concerning the content of this Device Bulletin should be addressed to:

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Wheeled Mobility Centre  
241 Bristol Avenue  
Bispham  
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FY2 0BR

Tel: 01253 596 000

Fax: 01253 596 177

## **HOW TO OBTAIN COPIES**

Copies of this Device Bulletin are free to health and social care providers and may be obtained on written request from:

Department of Health  
PO Box 777  
London  
SE1 6XH

Fax: 01623 724 524

Quoting reference MDA DB2001(03)

Otherwise, copies of the bulletin at a charge of £25.00 per copy may be obtained from:

Medical Devices Agency  
Business Services  
Hannibal House  
Elephant & Castle  
London  
SE1 6TQ

Fax: 020 7972 8124

Tel: 020 7972 8360

Our website lists all current Device Bulletins and safety warnings: [www.medical-devices.gov.uk](http://www.medical-devices.gov.uk)