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Safe transport of roll cages

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Research Report

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Safe transport of roll cages

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Loading vehicles and transporting goods on the road may be the most dangerous work activity carried out by many companies operating in the UK. Previous research carried out for HSE by HSL highlighted the risks to operators and other parties when goods are transported on the roads and, following the publication of the research, industry stakeholders expressed concern regarding the current methods of loading and securing roll cages in single and double-deck trailers.

The profile of UK freight transport has changed significantly over the last fifty years, not only in terms of the quantity of goods moved, which has increased significantly, but also the mode of transport. The majority of the raw materials and goods used or sold by UK businesses are now transported by road rather than rail, and the road haulage industry transports a highly diverse range of goods, including food and agricultural products, bulk liquids, car components, container transport, express parcels, furniture removal, heavy haulage, and livestock. Goods such as food, drink, tobacco products, toiletries and household goods, which are often transported in roll cages, comprise over half of all goods transported on the road.

This report seeks to give an overview of current practice, legislation and guidance, identify the problems associated with transporting roll cages, and offer practical information on good practice for loading and securing roll cages for safe loading, transport and unloading.

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KEY MESSAGES

Roll cages falling from delivery vehicles and drivers falling from their vehicles during loading and unloading are the two most significant factors in accidents involving roll cages in the UK.

Over a four-year period, 59 reportable accidents in these two categories were identified. 18 accidents were defined as ‘Major’.

Aside from the human cost of accidents, even near-misses involve a significant cost to companies in terms of product, equipment and vehicle damage, and damage to reputation and business relationships.

In both categories, the initiating cause of the accident was often an uncontrolled movement of one or more of the cages during loading or unloading.

Movement of the cages in transit may be a contributory factor to uncontrolled movement of the cages during unloading. Cages that have moved in transit may be resting against the rear doors or become unstable.

Roll cages, like any load, should be secured for transport to the minimum requirements set out in the Department for Transport guidance, *Safety of Loads on Vehicles*. Thought should be given to providing restraint to forward movement when cages are not loaded to the vehicle headboard, and restraint to rearward movement so that the cages cannot contact the rear doors.

While loading of roll cages was found to often take place in relatively controlled premises such as warehouses, unloading may take place at smaller delivery sites or at the roadside, introducing risks from adverse weather conditions, restricted access and uncontrolled movement of other vehicles and pedestrians.

While drivers generally appeared to be the Injured Party in accidents where one or more roll cages fell from the vehicle, if the vehicle is being unloaded in a public space there is a significant risk of injury to members of the public.

Insufficient communication and unclear lines of responsibility between interested parties were identified as significant issues. It is suggested that drivers should be given clear information about the loads they are transporting, and that responsibility for securing and safely unloading the load should be clearly defined.

EXECUTIVE SUMMARY

Risks in the workplace are, for the most part, well-understood and subject to a range of control measures. However, for many companies, the most dangerous aspect of their operation is the loading and transportation of goods to and from their premises, and these particular risks may not be as well-understood and controlled. The risks inherent in the loading and transport of goods by road are, in the main, common to all industries and all load types. These risks, such as working at height, manual handling, and vehicle/pedestrian separation, are not unique to the transport of roll cages.

The safe transport of roll cages comprises three main elements: loading the vehicle, transportation, and unloading. Often more than one company is involved and this may lead to issues of communication and the blurring of lines of responsibility. Since goods are loaded and unloaded in the workplace, and transported on the road, there are also two regulatory frameworks that must be taken into consideration: road traffic legislation and health and safety at work legislation. However, these two areas should not be considered separately, as there is significant overlap. Roll cages that are loaded and secured properly in the workplace are less likely to become dislodged or unstable during transportation, and therefore less likely to fall from the vehicle or otherwise cause an incident on the road and during unloading.

A moving load within a vehicle on the road may cause the vehicle to become unstable and contribute to a rollover incident. Items sliding or falling from a vehicle on the road may either impact another road user - and even relatively small items will strike a pedestrian with considerable force if they slide or fall off a vehicle travelling at speed - or other road users may swerve to avoid the debris, resulting in an incident. It is not necessary for the entire load to become dislodged or unstable for an incident to occur.

Load shift incidents on the road usually occur either under braking, cornering, or the "S" manoeuvre (negotiating a roundabout, swerving to avoid an obstacle). As a general rule, if the load is secured to withstand forward and sideways movement, then it will not move rearwards, however this may not be the case for all loads and operators should assess whether additional restraint is required to prevent the load moving rearwards.

Incidents in the workplace often occur during unloading. The loading of roll cages is often carried out in a controlled environment such as a warehouse or distribution centre. The access to the site is controlled and pedestrians and vehicles can be separated. The loading operation is protected from adverse weather unloading is carried out, for the most part, on a clean and level surface. Analysis of data from reportable accidents indicates very few accidents occur when loading in such an environment, although it is difficult to draw firm conclusions from the data as often the type of site is not described.

The unloading of roll cages may be a very different operation, carried out at smaller sites or at the roadside to retail premises. This introduces a number of hazards that may adversely affect the safety of the unloading process. A load may appear to be stable on arrival but collapse or fall from the vehicle when inadequate restraints are removed. In curtain-sided vehicles, the load may have shifted so that it is resting on the curtain; it is not uncommon for such loads to fall from the vehicle when the curtain is opened. If the load has shifted to an extent that it cannot be unloaded by mechanical means such as by forklift truck, it may be necessary for workers to manually unload the vehicle, putting them at risk of falling from the vehicle or manual handling injuries.

It was noted that many roll cage accidents appeared to involve the use of a tail lift, which suggests that these accidents occurred while delivering at the roadside or smaller sites where dedicated loading facilities such as a loading dock were not available. Unloading at such sites may be carried out in adverse weather conditions, and in public areas where the uncontrolled movement of other vehicles and pedestrians may present a hazard. Drivers may also be under time constraints, if access is restricted and particularly if the vehicle is causing an obstruction while unloading is carried out.

Two types of accident were identified as particularly common in the transport of roll cages. These were the cages falling from delivery vehicles and drivers falling from the vehicles during loading and unloading. Over a four-year period, 59 reportable accidents in these two categories were identified. 18 of these accidents were defined as "Major". For those injured, an accident can be personally devastating and may have significant personal and financial repercussions for the individual and their family. Witnesses to an accident may find it personally traumatising and company morale may suffer as a result of the accident. A company may suffer financial penalties in the form of the loss of the individual's labour, damaged product, equipment and vehicles, and damage to the company reputation and business relationships with suppliers and customers.

It appeared that, generally, drivers were the Injured Party in accidents where one or more roll cages fell from the vehicle. However, if the vehicle is being unloaded in a public space, there is a significant risk of injury to members of the public. Again, aside from the personal cost to individuals, for a company there is potentially a significant penalty, both financial and reputational. Even near misses, when no injuries occur, may carry financial and/or reputational penalties for a company.

Roll cages, like any load, should be secured the transport the minimum requirements set out in the Department for Transport guidance, *Safety of Loads on Vehicles*. This states that the entire weight of the load must be prevented from moving in the forward direction, and half the weight of the load prevented from moving in the sideways and rearwards directions. Roll cages are generally transported in box-sided vehicles. The sidewalls of the vehicle will generally provide containment if the load is packed to both sides of the vehicle. If the cages are loaded to the headboard of the vehicle, the headboard will generally provide an element of forward restraint.

However, it is not always possible to load roll cages to the headboard of the vehicle. In such cases, as with any other load, it is suggested that other measures are used to help prevent forward movement. As well as helping to prevent the loads from moving during unloading, securing the load to the requirements of the Department for Transport guidance helps to reduce the risk of the load being ejected from the vehicle on the road, endangering both the driver and other road users.

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1 INTRODUCTION

Loading vehicles and transporting goods on the road may be the most dangerous work activity carried out by many companies operating in the UK. Previous research carried out for HSE by HSL highlighted the risks to operators and other parties when goods are transported on the roads and, following the publication of the research, industry stakeholders expressed concern regarding the current methods of loading and securing roll cages in single and double-deck trailers.

The profile of UK freight transport has changed significantly over the last fifty years, not only in terms of the quantity of goods moved, which has increased significantly, but also the mode of transport. The majority of the raw materials and goods used or sold by UK businesses are now transported by road rather than rail, and the road haulage industry transports a highly diverse range of goods, including food and agricultural products, bulk liquids, car components, container transport, express parcels, furniture removal, heavy haulage, and livestock. Goods such as food, drink, tobacco products, toiletries and household goods, which are often transported in roll cages, comprise over half of all goods transported on the road.

The risks inherent in the loading and transport of goods by road are, in the main, common to all industries and all load types. These risks, such as working at height, manual handling, and vehicle/pedestrian separation, are not unique to the transport of roll cages. However, roll cages do present their own problems, whether laden or unladen. By their very nature, they are likely to move in transit unless secured. Goods commonly transported in roll cages are often intended for delivery to smaller or urban sites, where the roll cages may be unloaded via the vehicle's tail lift to the kerbside rather than onto a dedicated loading dock in a warehouse. Falls from tail lifts and manual handling injuries are recognised hazards of using roll cages.

This report seeks to give an overview of current practice, legislation and guidance, identify the problems associated with transporting roll cages, and offer practical guidance on good practice for loading and securing roll cages for safe loading, transport and unloading.

2 IMPLICATIONS

Roll cages falling from delivery vehicles and drivers falling from their vehicles during loading and unloading are the two most significant factors in accidents involving roll cages. Over a four-year period, 59 reportable accidents in these categories were identified. 18 were defined as ‘Major’.

For those injured, an accident can be personally devastating and have significant repercussions for the individual’s well-being. Witnesses to an accident may find it personally traumatising and company morale may suffer. A company may suffer financial penalties in the form of the loss of the individual’s labour, damage to product, equipment and vehicles, and damage to the company reputation and business relationships.

While drivers generally appeared to be the Injured Party in accidents where one or more roll cages fell from the vehicle, if the vehicle is being unloaded in a public space there is a significant risk of injury to members of the public. Again, aside from the personal cost to individuals, for a company there is potentially a significant penalty, both financial and reputational.

Even near-misses, where no injuries occur, may carry financial and/or reputational penalties for a company. Repeatedly damaging product, for example, may damage a business relationship with a supplier or customer. Near-misses may also have an effect on drivers’ morale if they feel that they are being put at risk.

3 METHODOLOGY AND TERMINOLOGY

3.1 METHODOLOGY

To assess current practice regarding the loading and securing of roll cages/containers, the following methods were used:

- Review of current UK legislation, standards, guidance and previous research
- Review of accident and near-miss data
- Visits to companies using roll cages for goods delivery
- Informal discussion with industry groups and individual companies involved in haulage, warehousing and distribution

To encourage full disclosure of problems arising from the use of roll cages, the companies visited in the course of the research have been anonymised but their general characteristics are listed below:

- **Company 1**: Household and consumer goods, loaded in a mixture of roll cages and pallets on single and double-deck trailers.

- **Company 2**: Chilled and frozen food products, loaded in roll cages on single deck refrigerated trailers.

- **Company 3**: Household and consumer goods, loaded in a mixture of roll cages and pallets on single deck trailers.

- **Company 4**: Household and consumer goods, loaded in roll cages on double-deck trailers.

- **Company 5**: Consumer goods, loaded in rollcages and hanging rails on double-deck trailers.

3.2 TERMINOLOGY

Certain terms are used throughout this report and, to avoid confusion, will be defined here.

Load restraint – preventing the load from moving relative to the vehicle it is transported on

Load containment – preventing a load from being ejected from a vehicle

Tail lift – lifting equipment fitted to a goods vehicle to allow goods to be unloaded

4 BACKGROUND INFORMATION

BS EN 12674-1[1] defines roll containers as:

> *…equipment intended for moving goods which comprise apparatus fitted with fixed and/or swivel castors. The superstructure comprises two or more frames which provide retention for items requiring transportation and/or distribution.*

The Standard defines four styles of roll container: demountable, folding, nesting and rigid. Demountable containers are defined by the Standard as being easily disassembled for stacking. Folding containers have a floor that can be lifted so the side frames can be folded together. Nesting containers are an alternative to the folding type, while rigid containers (also known as fixed containers) are essentially a box on wheels; the superstructure cannot be removed.

Roll containers are used to transport a wide variety of goods, but are commonly used in the food and drinks industry, particularly in warehouses and shops. They are designed to allow goods to be readily moved manually.

Roll containers are also commonly used to transport goods on road vehicles. Goods may be transported between distribution centres, or between a distribution centre and one or more retail outlet. Vehicles may transport laden roll containers on one leg of their journey, and return with empty containers.

Roll containers are loaded onto vehicles and unloaded either by reversing the vehicle to a dedicated loading bay/dock, so that the containers can be rolled onto the vehicle manually, or by using a tail lift permanently fitted to the vehicle. A tail lift may be a necessity when delivering to small or urban sites, where a loading dock is not available.

Roll containers are generally transported on box-sided vehicles; that is, vehicles with rigid side walls. These should not be confused with rigid vehicles, which are vehicles with the cab and body built onto the same chassis

[1] BS EN 12674-1:1999*; Roll containers. Terminology;* British Standards Institution

5 REVIEW OF CURRENT LEGISLATION, GUIDANCE, STANDARDS AND PREVIOUS RESEARCH

5.1 LEGISLATION

The legal requirement to secure loads transported on the roads is set down in two pieces of legislation, the Construction and Use Regulations[2] 1986 and the Road Traffic Act[3] 1991.

Regulation 40A of the Road Traffic Act 1988 introduced by the Road Traffic Act 1991 states:

> *A Person is guilty of an offence if he uses, or causes or permits another to use, a motor vehicle or trailer on a road when:*
>
> *(a) the condition of the motor vehicle or trailer, or of its accessories or equipment, or*
>
> *(b) the purpose for which it is used, or*
>
> *(c) the number of passengers carried by it, or the manner in which they are carried, or*
>
> *(d) the weight, position or distribution of its load, or the manner in which it is secured,*
>
> *is such that the use of the motor vehicle or trailer involves a danger of injury to any person.*

Regulation 100 of the Road Vehicles (Construction and Use) Regulations 1986 – SI 1986 No 1078 states:

> *(1) A motor vehicle, every trailer drawn thereby and all parts and accessories of such vehicle and trailer shall at all times be in such condition, and the number of passengers carried by such vehicle or trailer, the manner in which any passengers are carried in or on such vehicle or trailer, and the weight, distribution, packing and adjustment of the load of such vehicle or trailer shall at all times be such that no danger is caused or is likely to be caused to any person in or on the vehicle or trailer or on a road.*
>
> *(2) The load carried by a motor vehicle or trailer shall at all times be so secured, if necessary by physical restraint other than its own weight, and be in such a position, that neither danger nor nuisance is likely to be caused to any person or property by reason of the load or any part thereof falling or being blown from the vehicle or by reason of any other movement of the load or any part thereof in relation to the vehicle.*
>
> *(3) No motor vehicle or trailer shall be used for any purpose for which it is so unsuitable as to cause or be likely to cause danger or nuisance to any person in or on the vehicle or trailer or on a road."*

The two Regulations are consistent in specifying that the condition of the vehicle and the weight, distribution and securing of the load must be such that no danger is caused to any person.

[2] *Road vehicles (Construction and Use) Regulations 1986 – SI 1986 No 1078*
[3] *Regulation 40A of the Road Traffic Act 1988,introduced by the Road Traffic Act 1991*

The Health and Safety at Work etc. Act 1974 states:

> *2. General duties of employers to their employees. —*
>
> *(1) It shall be the duty of every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all his employees.*
>
> *(2) Without prejudice to the generality of an employer's duty under the preceding subsection, the matters to which that duty extends include in particular—*
>
> *(a) the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health;*
>
> *(b) arrangements for ensuring, so far as is reasonably practicable, safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances;*
>
> *(c) the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is reasonably practicable, the health and safety at work of his employees;*

Employers also have duties to persons other than their employees. The Act states:

> *3. General duties of employers and self-employed to persons other than their employees. —*
>
> *(1) It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.*

Although all working situations are covered by health and safety regulations, not all workplaces are inspected by HSE. Enforcement of the Health and Safety at Work etc Act and related legislation is shared with Local Authorities who cover certain types of work activities. Work sites such as warehouses and shops will typically be inspected by Local Authorities.

5.2 STANDARDS

There are several British Standards applicable to the transport of goods by road.

BS EN 12195-1:2003[4], which is the UK implementation of a European EN standard[5] for calculating the number of lashings required to secure a load, states, as a general guiding principle:

> *The general requirements for a safe* (sic) *transport are:*
>
> - *the sum of forces in any direction equals zero*
> - *the sum of moments in any plane equals zero*

[4] BS EN 12195-1:2003*; Load restraint assemblies on road vehicles — Safety — Part 1: Calculation of lashing forces*

[5] EN standards are binding in all CEN (Comité Européen de Normalisation) member states – that is: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, and Luxembourg,

Generally, load securing consists of balancing the forces of a load by locking, blocking and/or lashing. Locking, a completely positive connection, is mainly used in the transport of containers and is not usually combined with lashings.

Blocking results in a positive connection in the blocked direction only and therefore is often combined with
lashings.

BS EN 12674-2:2002[6] gives detailed guidance on factors to be taken into consideration when designing and using roll cages and roll containers for transporting goods. For example, at the design stage, it states:

A.1 Design and manufacturing factors affecting safety are as follows:

a) the safe working load, as defined in the document in preparation prEN 12674-4, should be appropriate for the specified application;
b) material quality control should be maintained throughout the manufacturing period;
c) quality and penetration of welds should be regularly checked;
d) quality of finish, with the product free of sharp edges that could cause injury particularly at hand hold positions;
e) where the design and dimensional requirements permit, hand holds should be inset to minimise risk of injury to hands;
f) where possible all devices for securing component parts should fail in a safe mode;
g) load retaining devices, e.g. rubber and fabric straps, chains and hooks should be of a design that allows release of tension prior to unhooking to minimise the risk of eye and facial injury;
h) the design of roll containers and dollies and removable component parts should minimise the generation of noise from wheels and superstructure, particularly when in the unladen or folded condition;
i) the manufacturer should advise the user of the potential safety hazards if the roll container is misused and not maintained in good working order;
j) ensure that materials used are compatible with the working environment, e.g. wet conditions, salt laden or corrosive atmosphere (information covering use or tests in low and high temperature applications may be covered in Parts 3 and 4).

The Standard goes on to state what information should be provided by the manufacturer, and the user's responsibilities, but it does not detail methods of transporting roll containers on the road.

BS EN 12642:2006[7] is a European Standard for the construction of trailers, and sets out performance criteria for the sidewalls and headboard under certain conditions.

It is not a legal requirement in the UK to build trailers to the Standard.

[6] BS EN 12674-2:2002*; Roll containers — Part 2: General design and safety principles; British Standards Institution*
[7] BS EN 12642:2006*; Securing of cargo on road vehicles — Body structure of commercial vehicles — Minimum requirements; British Standards Institution*

5.3 GUIDANCE AND PREVIOUS RESEARCH

The recognised means of demonstrating compliance with the Road Traffic Act and the Construction and Use Regulations in the UK is following the guidance set out in the Department for Transport Code of Practice *Safety of Loads on Vehicles*[8] ('the DfT guidance'). This states:

> *Friction alone cannot be relied upon to keep the load in place. When the vehicle is moving,*
> *vertical movement caused by bumps will reduce any restraining force due to friction. This can*
> *reduce to zero if the load even momentarily leaves the bed of the truck.*

And:

> *…the combined strength of the load restraint system must be sufficient to withstand a force not*
> *less than … half the (total) weight of the load backwards and sideways.*

And:

> *The total load restraint system will generally consist of a combination of:*
>
> > *a. lashings secured to anchorage points attached to the vehicle chassis, which includes*
> > *cross bearers, outriggers etc;*
> > *b. bulking arrangements including headboards, bulkheads, spigots, transverse beams,*
> > *shoring bars etc which are securely attached to the vehicle;*
> > *c. friction between the load and the vehicle platform.*
>
> *In most circumstances it would be appropriate to obtain the majority of the total restraint required from (a), and the remaining part from (b). Benefits accrued from (c) should be regarded as a bonus.*

This means that the load restraint system must be capable of restraining the entire rated payload of the vehicle in the forward direction and 50% of the rated payload on each sidewall. If the load is loaded tight against the front bulkhead, it can be assumed that part of the restraining force is provided by the bulkhead. If a gap is left, the bulkhead cannot be considered to be part of the restraint system and the operator must ensure that other methods are used to restrain the entire rated payload in the forward direction.

If the load is loaded tight against the sidewalls in a rigid-sided vehicle, the sidewalls will generally provide the necessary 50% restraint in the sideways direction. If gaps are left to the sidewalls dunnage or airbags may be required to fill the gaps.

Ideally the load should always be loaded tight against the front bulkhead, however this is not always possible. In this case, additional methods should be used.

The DfT guidance states:

[8] *Department of Transport;* Code of Practice – Safety of Loads on Vehicles *(3rd Edition)*

If practicable … the load should be placed in contact with a headboard. Where this is not practicable then additional means of securing must be used. Possible methods include:

a. Effectively moving the headboard rearwards, i.e. fitting an obstacle across the vehicle platform which should be firmly attached to the chassis frame;
b. Blocks, scotches, bolsters or wedges to prevent individual items of a load moving in any
direction. Care must be taken to ensure that these are adequately secured to the vehicle
platform;
c. *Additional lashing*

Webbing straps are commonly used to secure loads, but can damage the load or be damaged by factors such as wear against the loads they secure, exposure to sunlight and contamination by oil and grease. The DfT guidance states:

All equipment used for securing loads should be regularly inspected for wear or damage.

Inspection arrangements should be in accordance with the manufacturer's instructions. Special attention should be paid to webbing and rope to ensure that there is no visible deterioration due to constant use, due to fraying of the strands. They should also be inspected to ensure that they have not been cut or damaged in any other way through misuse.
…

Sleeves and corner protectors should be used to prevent damage to both the load and the restraint equipment where it passes over a sharp corner.

It is considered good practice to inspect webbing straps used for load restraint at regular intervals and discard those exhibiting obvious signs of wear or damage. This would also hold true for other restraint equipment such as locking bars.

The DfT guidance states:

It is the vehicle operator's responsibility to provide suitable vehicles and securing equipment
for each load carried and to ensure that drivers and loading staff are competent and have
received sufficient instruction in its use. It is the driver's duty to check and ensure that the load
is adequately secured at all times, not just at the start of the journey.

Driving Standards Agency guidance[9] states:

Sudden acceleration forward might cause an insecure load to fall off the back of a vehicle. Similarly, if harsh braking is applied the load may attempt to continue moving forward.
…

[9] *The official DSA guide to driving goods vehicles*, DSA 2006

Any sudden steering movement may also unsettle the load and cause it to move. Any movement of the load is likely to make the vehicle unstable.

The DSA guidance deals specifically with load restraint, stating:

When securing a load you need to take into account

- *The nature of the load*
- *The suitability of the vehicle*
- *The stability of the load*
- *The type of restraint*
- *Protection from weather*
- *Prevention of theft*
- *Ease of delivery*

The object is to ensure a secure load and a stable vehicle when

- *Braking*
- *Steering*

Even in emergency situations

…

A load may consist of large heavy pieces of machinery but that doesn't mean it will stay in place throughout a journey. Fatal accidents have occurred through such items falling from a vehicle or shifting under braking or cornering, therefore they should always be secured solidly and carefully.

The *European Best Practice Guidelines on Cargo Securing for Road Transport*[10] produced by the European Commission generally echo the requirements of the DfT guidance. The Guidelines state:

Legal requirements and common sense demand that all loads carried on vehicles are secured, whatever the journey. This is to protect the people involved in loading, unloading and driving the vehicle, together with other road users, pedestrians, the load itself and the vehicle.

In terms of responsibility for load securing, the Guidelines state:

Loading and unloading should be carried out by appropriately trained staff that are aware of the risks involved. Drivers should also be aware of the additional risk of the load, or parts of the load, moving when the vehicle is being driven. This applies to all vehicles and to all types of load.

From a legal point of view, the liability for the loading/unloading operations should be assumed by the driver, within his responsibilities, and the person(s) who have executed them. In practice quite often the driver has to couple to a pre-loaded trailer or pick up a pre-loaded and sealed container.

[10] *European Best Practice Guidelines on Cargo Securing for Road Transport;* European Commission, Directorate-General for Energy and Transport

Another frequent situation is where the loading operation is carried out by the shipper's employees, even obliging the driver to wait elsewhere until the loading of the vehicle has been completed.
Therefore, all involved parties must be aware of their respective responsibilities. One cannot state that in all circumstances the driver is the sole person responsible for the load carried on his vehicle.

The Guidelines also state:

Planning is the key to achieving efficient, reliable and safe transportation of cargo.

With respect to roll cages (which are described as wheel-pallets in the Guidelines) it says:

Framed pallets are commonly used for food transportation. Securing the wheeled pallets by blocking is particularly effective; however, alternative methods may be used.

While HSE workplace transport guidance[11] states:

By law, employers have a general duty to ensure that the health and safety of their employees and members of the public is not put at risk as a result of the work that they do.
...
The law requires that health and safety risks at work are controlled as far as is 'reasonably practicable'.
...
By law, every employer must make sure that work equipment (including vehicles) is suitable for the purpose for which it is provided or used.
...
Vehicles should be suitable for any loads carried, and there must be well-placed anchor points that are strong enough to allow the load to be properly secured.

Workplace transport guidance does not cover transport on the public highway, however it does cover large goods vehicles off the public highway, for example during loading and unloading.

Existing HSE guidance identifies two particular areas of concern when using roll cages: manual handling and falling/toppling roll cages, particularly when using tail lifts.

HSE manual handling guidance[12] states:

Roll cages are commonly involved in manual handling injuries. Ensure rollcages are sensibly loaded, properly secured in the vehicle and that pavement access at the delivery end is relatively level and free from potholes and obstructions

The HSE information sheet *Roll cages and wheeled racks in the food and drink industries: Reducing manual handling injuries*[13] states:

Comprehensive industry data is not available but some companies that use roll cages continuously have found up to a third of their accidents are roll-cage-related. Musculoskeletal and other injuries arise from:

[11] Workplace transport safety – An overview; *Health & Safety Executive (2005)*
[12] http://www.hse.gov.uk/haulage/handling.htm
[13] http://www.hse.gov.uk/pubns/fis33.pdf

● *pushing/pulling loaded roll cages, especially up slopes or over steps;*
● *trying to prevent roll cages overbalancing (and crush injuries where this was not successful);*
● *repetitive loading and unloading of roll cages;*
● *trapping hands while assembling/dismantling cages;*
● *trapping hands and other parts of the body between the roll cage and a wall, side of vehicle etc;*
● *feet being trapped under the castors; and*
● *roll cages falling off lorries (eg from the tail lift) during loading and unloading, often causing the most serious injuries.*

Scott *et al* (2006)[14] identified tail lifts as a high-risk area for falls from vehicles. Vehicles transporting goods in roll cages are often delivering at the kerbside and unloading using a tail lift, rather than unloading onto a dedicated loading dock in a warehouse.

Day *et al* (2008)[15] identified a number of issues with current UK load securing practice on curtain sided vehicles, such as not loading to the headboard to prevent forward movement and over-reliance on friction between the load and the trailer bed. Poor communication between parties was also identified as a risk factor for load shift incidents.

BOMEL Ltd carried out research for DfT to investigate the link between company safety culture and work-related road accidents[16]. The research found that, although smaller companies often lacked the safety management systems of larger companies, the larger companies were not necessarily better at addressing driver safety management.

Time pressure was identified as a significant risk factor for HGV drivers, along with road design, other road users and loading/unloading restrictions. The three most significant factors for risk reduction for HGV drivers were found to be planning, fatigue and management/supervision.

Case studies in the research report identified issues such as poor route planning, carried out in an ad hoc fashion, and confused lines of responsibility for self-employed contract drivers.

PSL carried out research for HSE[17] to investigate drivers' perceptions of the hazards surrounding loading and unloading of HGVs and LGVs. The report identified a number of issues, including manual handling, vehicle/pedestrian segregation, load security and training. Lack of communication was also identified as an issue, particularly in terms of identifying possible hazards such as restricted access for unloading in advance and passing that information on to the driver.

Middlesex University Business School carried out research for HSE[18] to investigate health and safety attitudes and behaviour in small businesses. The report identified that although awareness of specific health and safety legislation and guidance in small businesses was considered to be low, this did not necessarily correlate with poor practice and/or an unwillingness to operate

[14] SCOTT, A; MILLER, M; HALLAS, K*; RR437 The underlying causes of falls from vehicles associated with slip and trip hazards on steps and floors* (HSE 2006)
[15] DAY, NCM; WHITE, GP; MCGILLIVRAY A*; RR662 Load security on curtain sided lorries;* (HSE 2008)
[16] BOMEL LTD; *Road Safety Research Report No. 51 – Safety Culture and work-related road accidents*; Department for Transport, 2004
[17] PSL; *Safe sites: Driver's perceptions*; HSE Research Report 276 (2004)
[18] Middlesex University Business School; *Cultural influences on health and safety attitudes and behaviour in small businesses*; HSE Research Report 150 (2003)

safely. Risk assessment and health and safety management tended to be more informal and less structured, however, than the more systematic approach that might be adopted by a larger company. Cost was considered to be a significant issue for small businesses in complying with health and safety requirements.

While the focus of this report is primarily on loading and unloading safety, load shift on the road can also have serious consequences. The TRL research report, *The Security of Cross Loaded Round Timber*[19], identified that, between 1991 and 1994, there were 1,202 incidents in the UK where a dislodged vehicle load in the carriageway caused an accident leading to injury.

[19] TRL Limited for HSE; *Research report 077: The security of cross loaded round timber*; 2003

6 METHODS OF SECURING ROLL CAGES FOR ROAD TRANSPORT

Generally, loads transported on the road are secured through a combination of the vehicle structure, chocks, blocks or dunnage, and lashings in the form of webbing straps or chains. The most common means of securing loads is to use a lashing passing over the load and attached to the vehicle chassis or attachment points; this is known as frictional lashing.

However, frictional lashing is not practicable for roll cages. Since cages are generally transported in box-sided vehicles, the vehicle structure itself will provide an element of load securing as long as the cages are in close contact with the structure. Loading the vehicle so that the load is placed up against the headboard, and packed tightly to both sides, is a recognised method of securing known as positive fit or positive locking.

Figure 1 – Side rails in a box-sided trailer

A common method of securing cages is shown in the photograph above. Side rails are fitted to the side walls; these can be used with either webbing straps or locking bars, as shown in the photograph below.

Figure 2 – side rails used with bars

A combination of straps and bars may also be used, as shown in the photograph below:

Figure 3 – combination straps and bars

Day *et al* [20](2010) found that, overall, straps with a long return (that is, where the strap was affixed to the side rail at a point some way behind the trailing edge of the cage) were the best method of preventing movement of roll cages. Cross-strapping the load, as shown in Figure 3, was also more effective at securing the cages than simply looping a strap around the rear of the cages. Issues with using bars were identified: it was difficult to get a close "fit" between the bars and the load, leading to damage to the bars, and they were often rated for relatively low loads compared to webbing straps.

On some trailers, it is not possible to load to the headboard. To prevent the load from starting to roll forward, additional measures would be needed to secure or block the load. Bars, in this case, would make a suitable bulkhead to prevent forward movement.

[20] DAY, NCM; WHITE, GP; NASH, K; TURNER, S; STANWORTH, P*; Load security on box-sided trailers* (HSE 2010)

7 ACCIDENT AND NEAR-MISS DATA

7.1 RIDDOR ACCIDENT DATA

Employers, the self-employed, or someone in control of work premises, have legal duties under The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) to report and record some work-related accidents by the quickest means possible.

RIDDOR accident data for the time period 2001/02 to 2004/05 was supplied to HSL by HSE and the data was filtered for roll cages and roll containers.

Accident reports with insufficient detail to positively identify roll cages as the load type were discounted, as were those where the accident was unrelated to any movement of the cages (for example, a driver whose foot became stuck between the vehicle and the tail lift).

HSE defines ‘Major’ injuries as:

- *fracture, other than to fingers, thumbs and toes;*
- *amputation;*
- *dislocation of the shoulder, hip, knee or spine;*
- *loss of sight (temporary or permanent);*
- *chemical or hot metal burn to the eye or any penetrating injury to the eye;*
- *injury resulting from an electric shock or electrical burn leading to unconsciousness, or requiring resuscitation or admittance to hospital for more than 24 hours;*
- *any other injury: leading to hypothermia, heat-induced illness or unconsciousness; or requiring resuscitation; or requiring admittance to hospital for more than 24 hours;*
- *unconsciousness caused by asphyxia or exposure to harmful substance or biological agent;*
- *acute illness requiring medical treatment, or loss of consciousness arising from absorption of any substance by inhalation, ingestion or through the skin;*
- *acute illness requiring medical treatment where there is reason to believe that this resulted from exposure to a biological agent or its toxins or infected material.*

While ‘Over 3-day’ injuries are defined as one which is not "major" but results in the injured person being away from work OR unable to do their full range of their normal duties for more than three days.

“Hit by falling object”, in this case, meant that one or more roll cages had fallen from the vehicle.

2001/2002

	Over 3 day	Major
Hit by falling object	3	4
Slip/trip	3	0
Fall up to and including 2m	0	0
Fall over 2m	5	1

2002/2003

	Over 3 day	Major
Hit by falling object	14	3
Slip/trip	0	1
Fall up to and including 2m	1	1
Fall over 2m	0	0

2003/2004

	Over 3 day	Major
Hit by falling object	7	5
Slip/trip	2	2
Fall up to and including 2m	5	0
Fall over 2m	0	0

2004/2005

	Over 3 day	Major
Hit by falling object	5	3
Slip/trip	0	1
Fall up to and including 2m	1	1
Fall over 2m	0	0

Causative factors for the over 3-day and major accidents are shown graphically on the following page.

Chart 1: Major injuries reported under RIDDOR 2001/02 - 2004/05

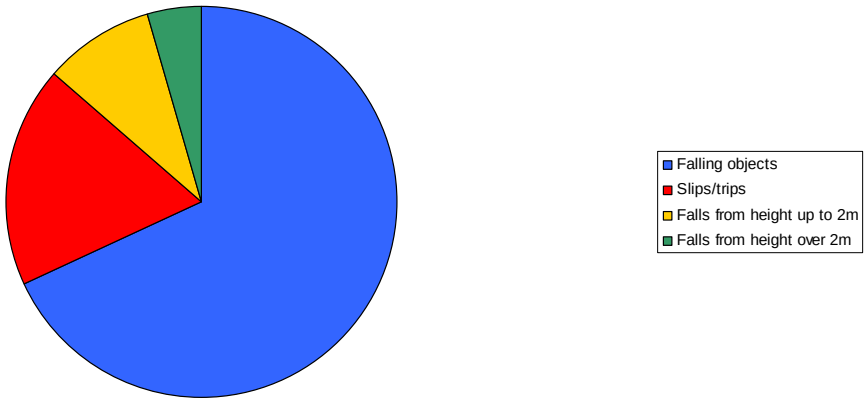


Chart 2: Over 3-day injuries reported under RIDDOR 2001/02 - 2004/05

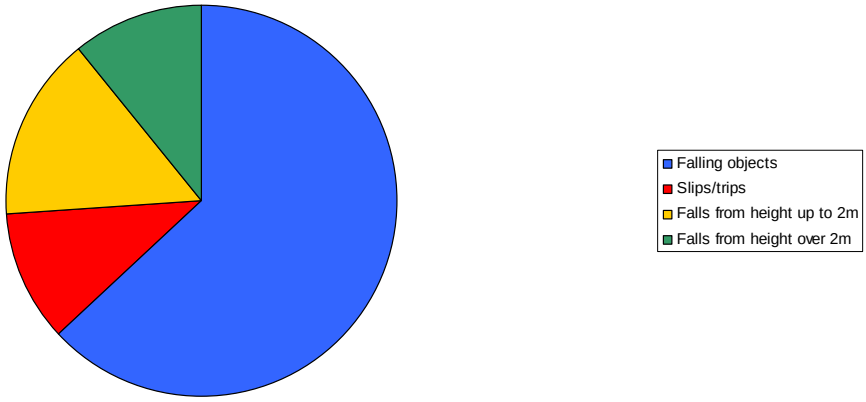
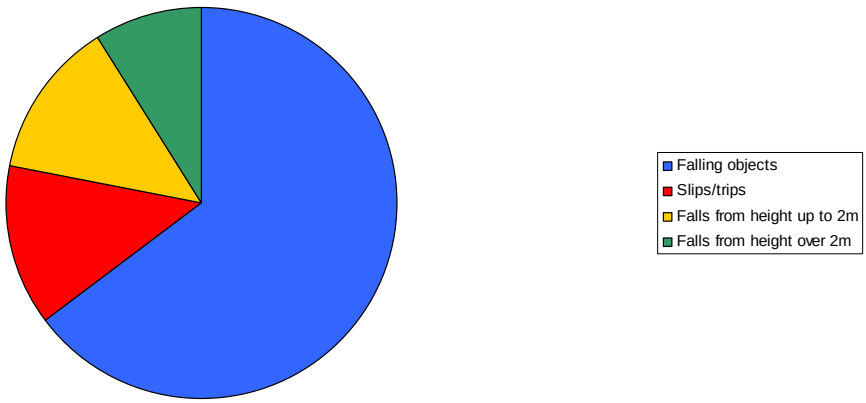


Chart 3: All injuries reported under RIDDOR 2001/02 - 2004/05



From the RIDDOR data, roll cages falling from the vehicle during loading or unloading is a significant causative factor in accidents involving roll cages. A sample of comments from the RIDDOR reports is reproduced below:

He was unloading a roll cage from a lorry using the taillift. The rollcage unbalanced and fell on top of him. An ambulance was called and he was taken to hospital.

IP was on tail gate of lorry and an unsecured cage fell off the back of the lorry on to the tail gate landing on top of IP forcing him off the tail gate on to the floor beneath him to have the roll cage collapse on top of him.

IP was off loading a delivery in the yard. A roll cage fell off the lorry onto him and trapped him. Contacted the store which had loaded the lorry regarding the way it had loaded the lorry and the danger of cages toppling.

IP was taking off a delivery of cheese and butter when the roll cage fell off the lorry landing on IP.

(IP) *had noticed on opening up the back of his lorry that one of the roll cages for delivery had fallen over and was leaning at approx 45 degrees against another delivery. He tried to stand the cage up but the cage seemed to bounce off the side of the lorries curtain and flew over onto the IP's leg removing his knee cap from the usual position.*

The IP was at the site to drop off some scrap trolley's (sic) *and he was on the back of the lorry ready to unload , some of the trolleys moved when he removed the restraints and they knocked him out of the back of the lorry approx 4 foot landed on the floor.*

Roll cage fell from tailgate at rear of delivery lorry. Cage contained empty plastic town trays. IP was standing with his back to the lorry. The cage hit his lower back area.

A cage fell off the tail lift of another lorry striking him on his left leg.

IP was helping unload the delivery lorry and he went to help (driver) *they managed to pull the cage back up so far but then the cage toppled forward again and hit the IP in the stomach.*

Whilst assisting the lorry driver to unload roll cages from the rear of the vehicle using a tail lift. He was on the ground level about to push one roll cage into the warehouse when a light cage toppled form the raised tail gate pushing him into the roll cage he was pushing.

IP was assisiting (sic) *a delivery driver move cages of laundry off the back of the delivery lorry when a cage fell from the rear of the lorry and struck him, pinning him to the floor and bruising his right leg in the process.*

IP was unloading a frozen delivery off lorry a cage of frozen food tipped over and trapped IP underneath it. He was bruised on chest and twisted right ankle.

Unloading a cage from tail lift of lorry the cage fell off and struck the IP in the back.

It was noted that, where the method of unloading was mentioned, almost all of the reported incidents involved the use of a tail lift.

An example of a slip/trip accident report is reproduced below. Previous research carried out by HSL on load securing has indicated that load movement is often the initiating cause on an accident later reported as a slip or trip.

IP was unloading a lorry at the store due to the layout of the store the trailer tips slightly towards the rear the IP released the load lock bar and as he did the cages in the load started to shift. He put the load lock bar down at his feet stabilised the cages then when he did that he went to walk forward his legs had become entangled in the retaining leads in one of or more of the load lock bars on the trailer so he fell forward as he did he put out his arms to break his fall and fell awkwardly onto his left arm which was fractured.

According to the HSE publication *Health & Safety in Road Haulage*[21], almost all deaths in the haulage and distribution industry are due to four types of accident – being struck by a moving vehicle, falling loads, falls from vehicles and collapsing or overturning vehicles. It also states than more than seven out of ten major injuries are due to slips and trips, being struck by moving or falling objects, falls from less than 2 metres and manual handling. The statistics for roll cage accidents would therefore appear to be generally in line with general trends in the industry.

7.2 NEAR-MISS REPORTS

Three companies provided sight of their near-miss reports, completed by drivers. In all three cases, loads were transported from a regional distribution centre (RDC) to one or more smaller sites.

All three companies were using roll cages to transport their goods; two were using roll cages exclusively and one was using a mixture of roll cages and pallets. All three companies used tail lifts to unload the roll cages at the delivery sites.

The roll cages were loaded at the RDCs by warehouse staff. The drivers did not witness the loading and were not expected to inspect the loads prior to taking the vehicles onto the road. However, the drivers did unload the roll cages at most sites, using the tail lift to lower the cages to ground level.

[21]INDG379 - *Health and safety in road haulage*; http://www.hse.gov.uk/pubns/indg379.pdf; HSE

Common issues were noted with all three companies. Drivers reported near-misses on opening the rear doors of the vehicle as cages toppled or rolled towards them. Because of the enclosed cargo area, there was no warning of impending movement before the doors were opened.

It was noted that some delivery sites and locations were inclined, and this could present particular difficulties in manoeuvring heavily-laden cages. Near-misses involving cages rolling off the tail lift seemed particularly common at such sites.

Further informal discussion with a small number of drivers in each company identified particular areas of concern. Some drivers felt that loading staff did not fully appreciate the dangers to the driver if the load was not secured properly inside the vehicle. Others felt that their management did not fully appreciate the importance of loaders following good loading practice.

The drivers also identified other issues they felt were risk factors: unloading at the roadside with members of the public in close proximity; pressure to unload quickly; lack of assistance from staff at the delivery site; unloading in the rain/snow, which was felt by some to make working on the tail lift particularly hazardous.

Although the drivers identified varying concerns in relation to their loads, it was noticeable that, almost without exception, they appeared to feel that they had no power to implement improvements in working practices.

7.3 AN EXAMPLE OF MOVEMENT OF ROLL CAGES ON THE ROAD

The incident shown in the photograph above occurred outside a distribution centre near Rochdale. The trailer was loaded with empty roll cages, which were not loaded to the headboard. As the vehicle braked for the junction, the roll cages rolled forwards and smashed through the headboard.

This incident illustrates the importance of either loading to the headboard, or blocking the load so that it cannot roll forward. It is much easier to stop a load from moving in the first place than to try and “catch” it once it is in motion.

The consequences of this accident for the company were primarily financial: damage to the vehicle and damage to equipment. However, this type of accident – where cages are ejected from the vehicle on the road – has the potential to cause a serious accident, for example if the cages strike pedestrians or other vehicles. For a company there is a significant business risk in a load being ejected from a vehicle on the road.

8 ISSUES AND CONCERNS REPORTED BY INDUSTRY

The issues raised by the companies studied as part of this project were broadly similar, despite transporting different load types on different vehicles. Since the issues raised were generic and echoed concerns raised across the wider industry during previous research, they are discussed in general terms rather than by individual company.

8.1 ACCESS TO THE VEHICLE

Access to the vehicle, specifically during unloading, was identified as a concern by both drivers and companies. Loading did not generally appear to be considered problematic, as it was often carried out in a controlled environment in a warehouse.

There were a number of factors perceived as affecting the risks of unloading. The lack of a controlled environment was cited: drivers may be unloading at the side of a busy road, with other vehicles and pedestrians in the vicinity. Unloading may be carried out in adverse weather conditions.

For companies there appeared to be uncertainty over how best to protect drivers when accessing the trailer bed: whether guarding or high-friction floor surfaces should be used on tail lifts, whether drivers should unload alone or whether delivery site staff should assist. The latter issue appeared to be particularly contentious: drivers had struggled to unload unassisted at some sites but at others the intervention of delivery site staff had potentially introduced risks to the unloading process.

8.2 COMMUNICATION

Lack of communication was cited by both drivers and companies as a significant issue. There was criticism of some delivery sites for not providing information on hazards such as restricted access and camber to the delivery area. Equally, where more than one company was involved in the distribution process, communication about and responsibility for the security of the load was often not optimal.

Communicating the importance of loading the vehicle correctly and securing the load to loaders was identified as an issue by both drivers and companies. Warehouse staff, in particular, often did not have English as a first language and, while some companies had taken steps to address this with illustrative loading methods, they had internally identified ongoing issues with the securing of loads because loaders had not fully understood the importance of doing it correctly.

8.3 RESPONSIBILITY

Drivers interviewed almost without exception considered themselves to be responsible for the safety of their vehicle on the road, even if they had not been involved in the loading.

For companies, responsibility for the load remaining in a safe condition could become somewhat more blurred if more than one party was involved in the process. Load security was seen primarily as a road traffic issue for the driver and/or haulier to address, and not necessarily something that would fall under existing company health and safety policies.

This perception is not specific to the transport of roll cages yet for companies it is an issue, as they have responsibilities under the Health & Safety at Work Act to ensure, as far as reasonably practicable, that their activities do not put their employees and/or members of the public at risk.

8.4 TIME CONSTRAINTS

Loading and unloading were both generally carried out under time constraint. Distribution centres are, by their very nature, high-volume sites. Unloading may be carried out at a site with restricted access, or where the vehicle is causing an obstruction while it unloads. In these circumstances there is little margin for delay and it was noted that drivers, in particular, were reluctant to raise concerns if it would mean slowing or stopping the process. Concerns were also raised regarding the time taken to fit and remove load securing measures such as straps and bars.

8.5 ADDRESSING ISSUES IN ISOLATION

Companies identified that load security should not be looked at in isolation but rather in the context of other loading bay issues. For example, investing in high-friction flooring for trailers to reduce the risk of slipping when loaders were loading the vehicles would appear to reduce risk. However, the high-friction surfaces made it difficult to unload the roll cages at delivery sites, leading to an increase in manual handling accidents. Drivers, in particular, identified systems of work brought in to address other issues as potentially introducing new risks into the unloading process.

9 IMPROVING THE SAFETY OF ROLL CAGE DELIVERIES

Roll cages, like any other loads transported on the road, should be loaded and secured so that they remain in a safe and stable condition at all times. Roll cages toppling from the trailer, or the driver falling from the vehicle during unloading, were identified as significant risks for roll cage transport: falling objects were cited as the root cause of 44 RIDDOR-reportable accidents between 2001/02 and 2004/05 and falls from height were cited as the root case of 15 RIDDOR-reportable accidents over the same time period. The causative factor in many of these accidents appeared to be uncontrolled movement of one or more roll cages.

The issues identified by industry are generally consistent with issues identified by previous research: lack of clarity over securing methods, communication and responsibility, addressing load security in conjunction with other loading bay issues, and concerns over the time and cost implications of fitting and removing load securing measures. However, there were other issues that appeared to be particularly relevant to the transport of roll cages: the use of tail lifts, delivering to smaller sites and at the kerbside, and the inherent propensity of cages to roll, particularly on cambered sites.

The following measures are suggested as means of improving the safety of roll cage deliveries but they do not comprise an exhaustive list and it is suggested that companies involved in the loading and transport of roll cages should consider these suggestions in the context of their own operation.

1. Identify an appropriate means of securing the load to achieve the minimum standard set out in the Department for Transport Code of Practice, *Safety of Loads on Vehicles*, taking into account the nature of the load (roll cages alone or a mixture of roll cages and pallets/other goods), the vehicles used (cages on the top deck of a double-deck trailer may need additional restraint in the forward direction), and any manual handling or access issues. Restraint at the rear of the load should be considered to prevent cages rolling back onto the driver when the rear doors are opened.

2. Carry out a risk assessment of the entire transport operation, from loading the cages onto the vehicle to unloading them at individual sites. The risk assessment should cover areas such as manual handling, working at height, use of the tail lift, and characteristics of the delivery site/s (such as restricted access or camber).

3. Near-miss reporting, regularly reviewed, can help identify problems before an accident occurs. Drivers should be encouraged to report near-misses so that systems can be improved.

4. Communication between all parties and a clear division of responsibility is very important for safe transport. Whatever system is followed, everyone involved should be aware of their own responsibilities and employers should ensure that their employees are adequately trained to fulfil them.

5. Drivers are often not involved in the loading of roll cages, though they may unload them. There are good reasons for the driver not to be involved in loading where the vehicle is loaded in a distribution centre, but if the driver is not involved it is suggested that he or she should be provided with information about the load and how it has been secured inside the trailer. This could be in the form of a loading docket completed by the loader, showing diagrammatically where the load is and how it has been restrained.

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Safe transport of roll cages

Loading vehicles and transporting goods on the road may be the most dangerous work activity carried out by many companies operating in the UK. Previous research carried out for HSE by HSL highlighted the risks to operators and other parties when goods are transported on the roads and, following the publication of the research, industry stakeholders expressed concern regarding the current methods of loading and securing roll cages in single and double-deck trailers.

The profile of UK freight transport has changed significantly over the last fifty years, not only in terms of the quantity of goods moved, which has increased significantly, but also the mode of transport. The majority of the raw materials and goods used or sold by UK businesses are now transported by road rather than rail, and the road haulage industry transports a highly diverse range of goods, including food and agricultural products, bulk liquids, car components, container transport, express parcels, furniture removal, heavy haulage, and livestock. Goods such as food, drink, tobacco products, toiletries and household goods, which are often transported in roll cages, comprise over half of all goods transported on the road.

This report seeks to give an overview of current practice, legislation and guidance, identify the problems associated with transporting roll cages, and offer practical information on good practice for loading and securing roll cages for safe loading, transport and unloading.

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