

Preventing vehicle accidents in construction

Construction work is considered to be one of the most hazardous industrial activities in the EU. The rate of injury in the construction industry is higher than in other industries. The most frequent causes of death in the construction industry are falls from height, followed by fatal accidents with vehicles.

About one in three fatal accidents at work involve vehicles, according to Eurostat. The main types of transport accidents are:

- People are struck or run over by moving vehicles (e.g. during reversing);
- Falling from vehicles
- Struck by objects falling from vehicles
- Injured because of vehicles overturning.

It follows that by removing or reducing the risk of accidents involving vehicles on construction sites, there can be a significant reduction in the number of fatal accidents in this sector.

Introduction

Legal duties

All employers have legal duties to fulfil in their Member State, based upon European Directives, to prevent harm to workers. Perhaps the most important directives are:

- 89/391/EEC - the "framework" directive - that sets out the basic requirements for workplaces.
- 92/57/EEC on the minimum health and safety requirements for temporary and mobile construction sites.

Employers are required to assess risks and take practical measures to protect the safety and health of their workers, keep accident records, provide information and training, consult employees and cooperate and co-ordinate measures with contractors. A hierarchy of prevention is set including: avoid risks; combat risks at source; adapt work to the worker; replace the dangerous with the non-dangerous; and, give collective measures priority over individual measures. Workers have a right to receive information about the risks to health and safety, preventive measures, first aid and emergency procedures. Employees have duties to co-operate actively with employers' preventive measures, following instructions in accordance with training given and taking care of their own and workmates' safety and health.



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Preventing vehicle accidents at the pre-build phase

Accident prevention does not start when work begins on site. By good design and planning in the prebuild phase, Architects, designers, and planners can significantly reduce the risk of vehicle accidents.

Risk assessment

All employers have legal duties to fulfil in their Member State, based upon European Directives. Perhaps the most important is the Directive 89/391/EEC (the "framework" directive) that sets out the basic requirements for workplaces. Also important is Directive 92/57/EEC on the minimum health and safety requirements for temporary and mobile construction sites.

In order to protect workers' health and safety, the employer should carry out a risk assessment and cooperate with other contractors on site to ensure that all workers on site are protected. The assessment should be carried out by someone with appropriate training and experience. The complexity of the risk assessment will depend upon the size and type of site.

There are several models for carrying out a risk assessment. Here is one step-by-step approach.

1. Look for the hazards

Think about the work that is done and identify hazards that come along with the presence of vehicles at the workplace (e.g. reversing operations, loading, unloading). Remember, a hazard is anything that can cause harm (i.e. the danger); the risk is the chance (i.e. probability) of harm being done.

Among some of the factors that may make vehicle accidents more likely are:

- Exposure to difficult weather conditions
- Rough access roads
- Time pressure, and
- The presence of workers from different contractors on site.

Talk to the workers and their representatives. Involve them in the risk assessment process and tell them what you are doing to reduce risk. A further approach to tackle the problem is to have everyone involved in looking at and discussing causes of near-miss accidents and minor accidents. These reflections might give an idea of what can be improved in working procedures and the working environment or even employee behaviour to prevent future risks.

In particular the following should be considered:



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Running over pedestrians

The most common cause of death in a vehicle accident at work is where a person is run over by a vehicle. The victim may be another worker, or even the operator themselves. The most common causes of such accidents are:

- Poor visibility,
- Inadequate brakes (possibly from lack of maintenance),
- Carelessly parked vehicles (e.g. being parked on a slope without being adequately secured)
- Unsafe coupling and uncoupling of trailers, and
- Untrained drivers.

Overturning vehicles

Nearly a fifth of all deaths in workplace transport accidents are due to vehicles overturning. Forklift trucks, compact dumpers, tipper lorries and tractors are all especially prone to overturning, because of their high centre of gravity, working on uneven ground, moving on slopes or unbalanced loads

Other types of vehicle accident

Other risks on construction sites with vehicles are:

- Falls on or from vehicles when climbing on and off;
- People being struck by load, for example when using a crane or forklift truck;
- Working near overhead power lines, while lifting the trailer or working with a crane;
- Malfunctioning vehicles; and
- Collisions with objects including other vehicles.

2. Decide who may be harmed and how.

Think about everyone who may be hurt by each hazard. This means not just employees, but also contractors, self-employed persons, and members of the public. Specific attention should be paid to young workers, and vehicle movement in areas where the public can not be excluded.

3. Evaluate the risks and decide on action

Evaluate the risk for each hazard, which means calculating the likelihood that any harm occurs and how severe it will probably be. If someone could be hurt:

- Can the hazard be removed completely?
- Can the risk be controlled?
- Can protective measures be taken to protect the whole workforce?



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- Is personal protective equipment needed to protect the worker from a risk that cannot be adequately controlled by collective preventive measures?

Consider if the precautions that are already in place are adequate (e.g. workplace design, traffic routes, signs and signals etc.) and what additional OSH activities can be implemented.

4. Take action

After completing the risk assessment, list the preventive measures needed in order of priority, then take action, involving the workers and their representatives in the process. Actions should be focused on preventive measures (to stop the accident or ill health occurring in the first place), but consideration should also be given to measures to minimise harm in the event of an accident, ill health, or emergency.

As part of preventive actions, it is important to ensure that all workers receive appropriate information, education, and training. Provide good documentation of hazards and risks discovered, of groups harmed most often and the kind of injury, of measures to improve OSH and avoid the specific hazards and risks and their effectiveness.

When considering preventive actions, look at the:

- Workplace
- Work equipment (e.g. the vehicle)
- Worker
- Work management

Safe workplaces

- Establish a traffic plan for the site
- Ensure all visiting drivers report to site management before entering the site
- Ensure that vehicles and pedestrians are segregated where possible
- Check that the layout of routes is appropriate for vehicle and pedestrian activities. Where possible segregate pedestrian and vehicle traffic routes. Provide a physical barrier to achieve the segregation. If not, adequate warnings must be in place. Ensure there are suitable pedestrian crossing points on vehicle routes.
- Avoid the need for reversing by: better design of the workplace; if unavoidable, use safe systems of work for reversing, and, where risks can not be eliminated by other means, and provide and use a trained signaller to assist the vehicle driver.



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- Consider introducing a one-way traffic system to reduce the risk of collisions.
- Check that vehicle traffic routes are suitable for the types and quantity of vehicles that use them. Ensure they are wide enough and that floor and road surfaces are kept in good condition. Remove obstructions where possible, otherwise, make sure they are clearly visible. Avoid including sharp bends in road layouts. Provide suitable fixed mirrors at blind corners.
- Check that suitable safety features are provided. Direction, speed limit and priority signs may be needed. Determine whether physical speed restrictions such as speed bumps are necessary. Edges of loading bays, pits etc must be clearly marked and fitted with a barrier if possible.
- Put in clear road markings
- Take steps to improve visibility, for example, by the installation of mirrors
- Where necessary, install speed ramps and warning signs
- Provide supportive structures where necessary to prevent collapse and to prevent vehicles running off the roadway
- Check that lighting and visibility provide safe passage through the work site (both inside and outside). Potential hazards, e.g. road junctions, pedestrians and obstructions must be clearly visible.
- Ensure that traffic routes are safe

Safe vehicles

- Ensure that a safe and suitable vehicle is being used.
- Vehicles should be purchased with appropriate safety features and comply with required standards.
- Carry out regular inspections and maintenance on all vehicles
- Apply speed limiter on vehicles where necessary
- Apply control systems to prevent vehicles from moving when fork lift trucks are loading or unloading
- Apply radar sensors to warn drivers if reversing too near to an object where necessary;
- Ensure that loads are properly secure
- Check that there is a safe means of access to and exit from the vehicle.
- Check whether the vehicle requires audible warning devices e.g. on reversing lorries, and flashing beacons on vehicles to increase their visibility.
- Check whether the driver has adequate protection against overturning or being hit by falling objects. Apply rollover protective systems ROPS and falling-object protective structures FOPS to protect the driver where necessary



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Workers

- Check that selection and training procedures ensure that drivers are capable of working safely.
- Drivers should be competent to operate their vehicles and carry out daily maintenance.
- Drivers should be medically fit, with good mobility, hearing and vision. Only people who have been selected, trained and authorised to do so should be allowed to drive vehicles.
- High visibility clothing should be worn if pedestrians and vehicles cannot be segregated adequately.

Management of workplace transport

- Apply operational procedures (safe systems of work) to protect the driver during unloading/loading of heavy goods vehicles
- Display a plan of the workplace at entrance and appropriate points showing vehicle routes, one way systems etc
- Restrict access of personnel from reversing areas, where it is unavoidable, with the exception of a trained signaller to assist the driver, if required.
- Make sure that drivers are trained competent to operate the vehicles safely
- Check driving licenses and training certificates
- Develop working procedures for vehicle maintenance, refuelling, etc. and check that they are respected
- Ensure that delivery vehicle drivers are correctly briefed on site rules
- Ensure safe systems of work for loading and unloading vehicles.

5. Review the findings

Ways of working, along with equipment and chemicals change. When a significant change takes place, check to make sure that there are no new hazards that need controlling. There are potentially many types of vehicles on site, including:

- Heavy goods vehicles delivering onto site;
- Dumper trucks;
- Cranes;
- Fork lift trucks
- Bulldozers;
- Graders;
- Bobcats; and
- "JCBs"



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When new vehicle types come onto site, the assessment should be reviewed to ensure that there are no additional risks than need controlling.

Common causes of accidents, and action to stop them

Vehicles or their loads striking people, particularly when reversing

- Separate vehicle and pedestrian routes;
- Provide signage to warn pedestrians of hazards
- Apply site procedures relayed to all visitors/contractors
- Check reversing lights and sound on vehicles
- Check that nobody is at risk of injury before moving off, particularly in the area obscured by the skip when going forward, and behind the vehicle when reversing;

Vehicles striking services and obstructions

- Foresee traffic routes away from vulnerable or potentially hazardous structures
- Foresee sufficient and wide enough traffic routes
- No blind spots or tight corners on traffic routes
- Design one way system
- Provide crash barriers
- Protect overhead power cables that cannot be relocated away from traffic routes, such as by providing "goal posts" so that vehicles cannot make contact with them.
- Situate loading bays away from overhead cables
- Locate traffic routes away from high wiring, lighting/shielded pipes/ electric cables. If unavoidable provide safe systems to avoid contact.
- Keep to designated vehicle routes and follow site rules and safe systems of work;
- Drive at appropriate speeds for site conditions;

Manufacturers' instructions for safe use being disregarded

- Follow the manufacturer's guidance regarding the capacities of each vehicle
- Read the manufacturer's instruction book before operating an unfamiliar vehicle;

Inadequate training of drivers and signallers

- Suitable selection process for drivers



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- Regular vision tests
- Impairment testing of drivers (drink/drugs)
- Skills training for drivers
- Provision of information and instruction for drivers
- Basic vehicle maintenance training
- Supervision of vehicles and drivers

Unsafe loading and transportation of materials on vehicles

- Set parking brakes when vehicles are parked and chock the wheels if they are on an incline
- Understand the differences in performance when loaded and unloaded, particularly relating to braking and stability on slopes;
- Get off the dumper when it is being loaded and ensure that the skip is not overloaded;
- Check that loads are evenly distributed and that they do not obscure visibility from the driving position;
- Drive at appropriate speeds for site conditions;
- Load only on level ground with the parking brake applied

Checklists

Safe driving checklist

- Do you reduce your speed when entering areas where there are pedestrians?
- Do you watch your surroundings while working or driving?
- Are you away of doorways, passages or pathways where pedestrians or vehicles may suddenly appear?
- Are you familiar with the characteristics of the vehicle in all weather conditions?
- Did you check tyres, brakes, etc, to ensure that all parts and accessories are in safe operating condition before starting work?
- Are you wearing your seat belt?
- Did you check that nobody is at risk of injury before moving off, particularly in areas where you visibility is obstructed?
- Do you keep to designated vehicle routes and follow site rules and safe systems of work?
- Do you respect the appropriate speeds for site conditions?
- Do you follow traffic signs and signallers' instructions?
- Do you load only on level ground with the parking brake applied?
- Do you ensure that the vehicle's rated load or lift capacity is not exceeded?
- Do you get off dumper trucks when they are being loaded and ensure that the skip is not overloaded?



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- Do you check that loads are evenly distributed and that they do not obscure visibility from the driving position?
- Do you avoid slopes which exceed the vehicles capacity
- Do you descend significant slopes down the gentlest gradient in low gear or reverse down slopes to ensure good stability and traction?
- Do you apply the parking brake, switch off the engine and remove the keys?
- Do you lower or block bulldozer and scraper blades, end-loader buckets, dump bodies, etc., when not in use, and leave all controls in neutral position?
- Do you operate vehicles in a safe, courteous manner?
- Are the traffic routes clear of obstructions and movable obstructions?

Drivers' checklist

- Do not drive when your abilities are impaired, e.g. by ill health or poor vision
- Make sure you understand the operating procedures and safe operating limits of your vehicle
- Carry out daily checks and report all problems
- Know and comply with site rules and procedures, including those for emergencies
- Understand the system of signals
- Keep your speed within safe limits. Take care when approaching bends
- If reversing cannot be eliminated, ensure it is carried out safely complying with site rules.
- If pedestrians cannot be excluded from the area a trained signaller may be required to assist.
- If there is restricted visibility from your driving position, use visibility aids (e.g. mirrors) or a person to signal. If you lose sight of the signaller or the visibility aid becomes defective -STOP!
- Turn the engine off before making any adjustments or removing guards