M6-EN.3 MECHANICAL HAZARDS

M6-EN.3.1 Introduction

Mechanical hazards are related to the machinery being used in the workshop. In any case the machinery or equipment being purchased must meet safety requirements, and preferably be CE marked. All protection/guards, maintenance and safety instructions must be included and no extra protection should be needed for the operator. During the installation of a machine, care must be taken ensuring that all guards are properly fixed and used. It is important the safety device not to constitute an obstacle to work, and not to hamper the maintenance services of the machine. Often, accidents happen when machines are accidentally started during maintenance and repair work. Therefore, careful servicing of machines is most important when it comes to work safety.

In a motor vehicle repair workshop the main mechanical hazards are related to the:

- Lifting equipment
- Vehicle inspection pits
- Wheel alignment and balancing
- Rolling roads and brake testing equipment
- Vehicle testing
- Compressed air equipment
- Cutting and welding processes (due to the nature of the hazards related to these processes these processes they will be discussed in the Chemical hazards section)
- Grinding machines and grinding wheels **(M6.3.1.jpg, M6.3.2.jpg)**

M6-EN.3.2 Lifting Equipment

Lifting equipment being used in a motor vehicle workshop is mainly:

- Hoists (Used for raising a vehicle to an ergonomic working position)
- Lifting platforms
- Jacks in conjunction with axle stands

For safety reasons **lifting equipment must not be overloaded**. If specific parts are stressed beyond rated capacities, vital parts may become worn and finally break.

Therefore, the manufacturer's recommendations have to be respected and followed. In order to avoid worn parts **a trained operator must inspect the lifting equipment on a regular basis**.

Lifting operation involving lifting appliances always put the worker at risk. The most frequent accidents are related to:

- malfunction of the lifting apparatus
- accidental detached of the load, and
- foot injury.

Safety Precautions

When **hoists** are being used, accidents occur due to bad maintenance and the misuse of the hoists. Collapse of hoists in use leads to the fall of the vehicle under repair, and the related accident may become fatal for the mechanics near the collapsed structure. Therefore, regular inspections with established routines must be carried out at prearranged intervals. The inspections should include check of the structural soundness of the hoists, tests for the determination of the hoists' tolerance, lubrication and adjustments of the brakes and the locking positions.

A hoists' system should be equipped with:

– Two hand operation. Both hands must be used at the same time to start the machine and keep it running, below a safety position, set by the manufacturer

– Toe protection (to avoid injury of the operator standing very close to the vehicle big lowered down), and

– Automatic locking. The hoists' system must be locked at the different positions. The existence of double locks is highly recommended

Lifting platforms (M6.3.3.jpg, M6.3.4.jpg) are used to raise a vehicle. They must:

– Never be used as working areas unless proper working balconies or platforms with barrier rails are provided. An operator should never be standing on the platform be designed for a vehicle under inspection/repair

– Either include a two-hands-operation used during the lowering onto the floor, or be equipped with light beams (photoelectric cell devices). These light beams in front of a danger zone can be used for automatic cut out (the machine stops when someone or something enters the danger-zone, e.g. when the lifting platform is lowering onto the floor for the avoidance of foot injury)

Jacks (M6.5.jpg – M6.3.7.jpg) are used for raising a vehicle at a small height from the ground. However they must:

– Be used only on level and undamaged floors, with a trolley or bottle jack appropriate to lift the vehicle weight safely

– Only be used when they are kept in good condition

– Be used in conjunction with axle stands to support the vehicle weight

Mechanics must have in mind to:

– Lift the vehicle only from its correct jacking points that they can easily identify

- Keep a**xle stands** in good condition and properly positioned
- Keep the correct support pins in good condition and use them for the extendible columns of axle stands
- Never get beneath a vehicle supported only by a trolley jack or jacks

M6-EN.3.3 Vehicle Inspection Pits

Inspection pits are found in most car repair workshops where no lifting platforms exist for the repair of vehicles **(M6.3.8.jpg**).

The main **hazards** occurring at the inspection pits are related to:

- Injuries from falling into an unfenced inspection pit not in use, either of people not familiar with the premises, or of employees who instantly forget the presence of the pit
- Creation of a hazardous atmosphere inside the inspection pit, due to the concentration of flammable vapours from petrol, paints and solvents which are heavier than air and can be collected in pits in ignitable and explosive concentrations
- Injuries from fall of tools being left at the edges of the inspection pit

Safety Precautions

- Cover pits when not in use, and line paint them for direct space identification
- Place temporary barriers around exposed sections of pits in use to prevent falls
- Never leave tools or parts close to the edge of a pit since they can be accidentally fallen in the pit injuring the person working in it
- Cover the steps in the inspection pit with on-slippery material to avoid injury from slips
- Never step into closed inspection pit in a service station, to avoid possible poisoning from accumulated vapours
- Use electrical equipment that is explosion protected, since an explosive atmosphere might be created inside the inspection pit. This type of equipment is bulky and expensive, therefore, air powered portable tools are recommended
- Lighting must be placed **one meter** from the pit floor, must be sealed lights glazed with toughened plastic (polycarbonate), or wire armoured, laminated or toughened glass
- Lighting should be placed flush with the pit walls to avoid damages from falling objects, and/or obstruction of the operator’s work, or injury of the worker
- It is essential that pits have two clear access/exit routes to enable employees to get out in case of an emergency
- Pits should have enough width for the worker to work easily and for the car to move without hitting the edges (0,8-1m)
- The pit wall is recommended to be glazed with white tiles and to be kept clean. This way the need for additional lighting will be avoided
- Use portable tools, including hand lamps, in the pit that are strong enough to survive drops from a height and of an explosion-protected type. Low voltage hand lamps do not offer protection from the risk of igniting flammable vapours

M6-EN.3.4 Wheel Alignment and Balancing

Wheel alignment and balancing are important for safety and maximum mileage from the tires. However, these operations include several hazards: contact with rotating wheels during wheel balancing may cause friction burns or other injuries, while air blasts from the over-inflation of car tyres can also cause injuries.

Safety Precautions

- Raise and support vehicles safely
- Remove the valve core from tyre to be repaired to ensure it is fully deflated
- Use the right tools for removing wheel nuts and levering tyres off wheels
- Protect against back injuries by using good lifting techniques to lift tyres and wheels from vehicles **(M6.3.9.jpg)**
- Inflate tyres to the correct pressure, as indicated on the tyre itself
- Use a well-maintained accurate pressure gauge with at least two meters of air line between gauge and clip-on chuck
- Stand clear of tyres during inflation
- Never weld or flame-cut a wheel to which a tyre is still fitted

For the proper mounting of tires, it is recommended for a worker to take some basic precautions, such as:

- Ensure that the wheel is securely seated on the hub face
- All lugs have proper torque
- No build-up of dirt exists between the hub and the wheel
- Never bend the wheel
- Ensure that both tire beads are securely seated on the rim

M6-EN.3.5 Rolling Roads and Brake Testing Equipment

Rolling road is a standard “tool” in a vehicle repair workshop and the way to be used should be straightforward. However serious injuries may occur when it is not maintained properly, or when other adjustments are being made while in operation. Therefore:

- Do not make other testing or adjustments to a vehicle while the rolling road is moving
- Ensure that the rolling road is equipped with a “dead man’s” control system and that it is working appropriately
- Prevent unauthorized personnel to access the area where the testing is taking place. If access cannot be prevented fit guards at the sides of the rolls

M6-EN.3.6 Vehicles Testing

Accidents can occur during the movement of vehicles on the site and inside the workshop, and as well during the vehicles’ testing on road. Very often, this happens due to the involvement of unqualified, inexperienced and unauthorised drivers.

Safety Precautions

- Never allow non-competent persons to test a vehicle. Only licensed drivers can move vehicles
- Mark clearly the routes in and out the workshop
- Supervise vehicle movements near blind corners and when reversing
- It is advisable not to keep the keys on the engine while the vehicles are not in use, in order to avoid accidental start of the engine
- Never allow non authorized personnel or customers to move around the repair workshop, to avoid accidents with moving vehicles

M6-EN.3.7 Compressed Air Equipment

Compressed air is being used in a vehicle repair workshop either to power tools or to apply materials, such as oil, grease and paints to vehicles. The accidental injection of compressed air or of material either through the skin or into a body orifice can cause injuries or be fatal, since the compressed air equipment injects material at very high pressures (e.g. a painting gun inject paint at 3000 – 7000psi). Ordinary working clothes do not restrict the penetration of compressed air into the body.

Safety Precautions

- A competent technician must examine compressed air equipment regularly
- Be very careful and alert when compressed air equipment is being used in confined spaces such as the inspection pit or inside a vehicle, or in awkward situations, such as beneath vehicles
- Be careful when clearing or cleaning guns being used in conjunction with compressed air equipment
- Compressed air guns should be directed away from face and goggles should be used to protect operator’s eyes from flying dust particles.
- If compressed air is used as a source of breathing air for respirators or breathing apparatus then ensure that the air meets the necessary standards and passes through the appropriate filters
- Ask for medical advice in cases of accidental compressed air penetration, since the degree of injury is not always apparent immediately
- Keep in mind that you need to be aware of the hazards related to the compressed air equipment

M6-EN.3.8 Steam and Water Pressure Cleaners

Safety Precautions

- Keep all air and high pressure hoses properly coiled, when not in use
- Ensure the good repair of couplings and valves. The ends must be tightly clamped in order for not to be pulled loose, allowing the lines to whip around dangerously
- Do not point high pressure spray wand at another person.

- Always wear rubber boots, thick gloves and face protection to protect from burns, while working near steam cleaning operations
- Always wear eye protection during use
- In order to avoid any electrical hazards when using steam/water cleaners:
  - Use a residual current device or an earth monitoring device, with cleaners that have flexible cables, and check that it is working daily
  - Check flexible cables and plugs daily for visible signs of damage and do not use them if they look damaged or faulty