

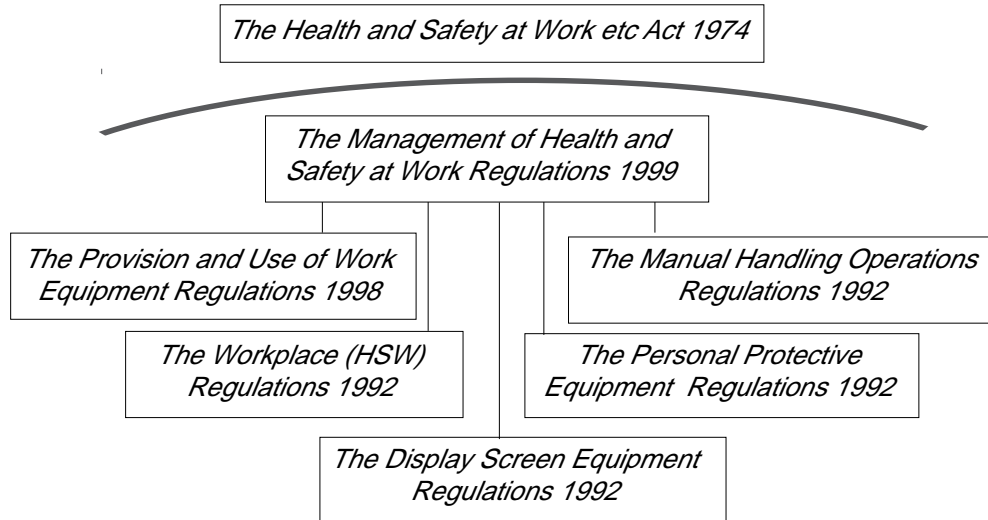


# NEBOSH Certificate NGC2/3

## Work equipment hazards and control

### Suggested answers to revision questions

A1 HASAWA / MHSWR 99 relationship + the other members of the six-pack



A2 The Provision and Use of Work Equipment Regulations 1998 defines what is and what isn't work equipment. Although you probably think that this answer is a little evasive, such a statement should form part of your answer together with some examples which fall within the definition of work equipment: lawn-mower, photocopier, hand saw and some examples which fall outside the definition of work equipment: livestock, substances, structural features such as walls.

A3 RIDDOR requires not only the reporting of accidents and illness, but also of dangerous occurrences which as far as PUWER is concerned could mean the collapse of lifting equipment or the failure of a pressure vessel.

A4 One of the main developments from the original PUWER of 1992 is the incorporation, in PUWER 98, of a section specifically on mobile work equipment. MWE includes any equipment which carries out work whilst it is travelling (dumper, fork lift truck, crop sprayer) or which travels between different locations where it is used to carry out work (compressor, trench diggers, mobile platform for inspecting street lights).

A5 PUWER 98, regulation by regulation

As we emphasise, at Certificate level you are not expected to remember the numbers of the individual regulations which make up, in this case, PUWER and you would never get a question like this in the examination - as we said earlier, these are revision questions, not examination questions. You should be able to use each regulation and its title as a 'trigger' to describe what you know about PUWER.

*PUWER 98 regulation 4 suitability of work equipment*

The workplace risk assessment will form an integral step in the selection of work equipment which will prove appropriate for a particular task, for the particular circumstances\* in question, including both day to day operation and maintenance. Employers must ensure that equipment - whether purchased as new, hired and/or adapted - must be suitable for the work it is required to do.

\* It is very important to take into consideration any hazards created by the location: if for example, equipment is being used in wet conditions on a building site, or electrical equipment is to be used in inflammable atmospheres.





*PUWER 98 regulations 5, 6, 23 maintenance operations and inspection*

*PUWER 98 lays considerable stress on the need to inspect and maintain equipment to ensure that the equipment is kept in an efficient state, in efficient working order and in good repair. The extent and complexity of maintenance will vary enormously, from simple checks on hand tools to a substantial programme for a complex system.*

*It is hard to imagine a situation where it would not be appropriate to keep a maintenance log: recording work carried out and generating triggers and timetables for future maintenance and inspection activities.*

*PUWER 98 regulation 7 specific risks, regulation 12 protection against specified hazards*

*As we explained in the study material, regulation 7 is concerned with the specific risks of whatever piece of work equipment you care to name - chisels, tractors, food mixers, milking machines - but not cows (why not?), printing machines ... PUWER 98 does not spell out the hazard potential of each and every single piece of work equipment - that is the task of the risk assessment.*

*Regulation 12 of PUWER 98 does identify a limited number of specified hazards, for example overheating and fire. Regulation 12 cross refers to other legislation which may take precedence over PUWER 98 ... can you think of some examples of such 'trump' card legislation - if not refer back to the study material.*

*PUWER 98 regulations 8, 9 information and training*

*This requirement can be related back to the HASAWA section 2(3).*

*PUWER 98 regulation 11 dangerous parts of machinery*

*... employers to take effective measures to prevent access to dangerous parts of machinery or stop their movement before any part of a person enters a danger zone. The term 'dangerous part' has been established in health and safety law through judicial decisions. PUWER 98 requires a hierarchy of controls for dangerous parts of machinery (assuming that the complete replacement of the machine by one inherently less hazardous has been considered as an option, but is not practicable). For your Certificate examination, you should be able to describe this hierarchy of controls.*

*PUWER 98 regulation 13 high or very low temperature*

*Contact with hot or cold surfaces should be reduced by engineering control - insulation, shielding, reduction in the quantities of liquids being handled, use of lids and so on; in addition to these engineering controls, personal protection may be necessary.*

*PUWER 98 regulations 14–18 control systems: start, stop, emergency stop*

*... it should not be possible for a machine to start without the application of a control; (particularly important in a situation where the machine has been stopped automatically by the activation of a safety device - it should be necessary to re-set the machine first). An emergency stop system should be readily available ... it may be acceptable for the system to come to a halt more rapidly than for a conventional stop. Emergency stops should never be used as functional stops during normal operation. All controls and emergency stops must be clearly visible, instantly identifiable and appropriately positioned.*

*PUWER 98 regulation 19 isolation from sources of energy*

*All work equipment should be provided with suitable means to safely isolate it from its source of energy, whatever form this source may take (you should be able to provide some examples and also to provide a definition of 'isolation').*

*PUWER 98 regulation 20 stability*

*... including: limitations on the height of, for example, a mobile tower scaffold; stabilising equipment which could topple; use of stabilisers on mobile cranes*





*PUWER 98 regulation 21 lighting*

*... suitable and sufficient lighting (suitable and sufficient - the two words which are always to be used when referring to the legal requirements for lighting)*

*PUWER 98 regulations 23, 24 markings, warnings*

*Clearly marked information giving, for example, safe working loads, maximum operating speed and so on. A warning normally takes the form of a notice or an audible signal such as a ringing bell or a flashing reversing light.*

*A6 No employee shall be carried on MWE unless it is suitable and incorporates features to prevent persons falling under wheels and tracks. Roll-over protection ... PUWER 98 includes various requirements concerning the stability of the equipment, structures to ensure that the MWE will, at worst, only fall on its side and, for such an event, occupants will have appropriate protection, seat restraints and so on.*

*Preventing unauthorised start-up; starting, stopping, emergency stopping; driver's field of vision; lighting for use in the dark; carriage of fire appliances and so on,*

*Remote / robotic controlled self-propelled work equipment must stop automatically if it leaves its control range and risks of crushing and impact must be guarded against.*

*Protection against the hazards associated with the transmitting power from one piece of work equipment to another, for example the power take-off shaft from a tractor to a hay baler.*

*A7 The three aspects of work that will need to be encompassed in a training programme will be:*

- day to day operation of the equipment - starting, stopping, loading, unloading and so on*
- foreseeable abnormal situations such as a drill bit shattering or a tyre puncturing*
- what the HSE describe as 'conclusions to be drawn from experience in using the work equipment' which means that, following training, the worker should have sufficient knowledge to be able to make constructive criticism about the equipment and its use in the workplace in question.*

*A8 It will be necessary to consider the employees' age and existing competence and hence what additional training will be necessary to enable them to use, supervise or manage the use of the work equipment with due regard to health and safety. (It is important to remember that an employer has an obligation to train not only to those who use work equipment but also to those supervising or managing.)*

*The training programme should also take account of the circumstances in which the employee is to work (alone, under close supervision of a competent person or whatever).*

*A9 Machinery motion may be described as being a combination of rotary and linear motion; (reciprocating movement can be seen as a form of linear motion).*

*A10 The mechanical hazards associated with machinery motion may be classified as follows:*

- entanglement*
- friction or abrasion*
- cutting*
- shear*
- stabbing or puncture*
- impact*
- crushing*
- drawing in, which might lead to one or more of the above hazards*

*As your next question, you should be able to provide a couple of examples under each of these eight categories. Refer back to the study material if you need help.*





#### *A11 Definitions*

- *machinery is apparatus for producing or applying power, having fixed or moving parts each with definite functions*
- *a hazard has the potential to cause personal injury or ill health*
- *risk is a measure of the likelihood that a hazard will result in harm together with the resulting severity*
- *a safeguard is a guard or device designed to protect persons from danger*
- *a guard is a physical barrier that prevents or reduces access to a danger point*
- *a safety device is a device other than a guard that eliminates or reduces danger*
- *a safe working practice or safe system of work is a method of working that eliminates or reduces the risk of injury*
- *an interlock is a safety device that interconnects a guard with the control system or the power system of the machinery*
- *failure to danger is any failure of the machinery, its associated safeguards, its control circuits or its power supply that leaves the machinery in an unsafe condition*
- *failure to minimal danger is any failure of the machinery, its associated safeguards, control circuits or its power supply that leaves the machine in a safe condition, or rather, a condition of minimal danger*
- *integrity is the ability of the devices, systems and procedures to perform their function without failure or defeat*

*A12 The hierarchy of control which is appropriate for machine safety: having assessed the risk posed by the machinery in question, the solution must then be chosen through the hierarchy of controls (we have added a few notes under each heading):*

- *substitution, the use of a safer machine .... remember that there are legal requirements for purchase of new machinery*
- *engineering control to reduce the severity of harm and the likelihood of harm arising from the hazard in question*
- *administrative control including the establishment of appropriate working procedures for day to day operation and cleaning and maintenance and emergency procedures*
- *personal protective equipment if all other measures fail to achieve sufficient control*

*A13 The eleven (s)tages of machine:*

- *design*
- *construction*
- *transport*
- *installation*
- *commissioning*
- *operation, including start-up and shut-down*
- *setting or process change-over*
- *cleaning*
- *adjustment*
- *maintenance*
- *decommissioning and dismantling*

*A14 Selection of guards: F I A T. Fixed guards being the first choice, followed by interlock guards, automatic guards and fina*

