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Examiners' Report

NEBOSH National Diploma in Occupational Health and Safety - Unit C

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NEBOSH NATIONAL DIPLOMA IN OCCUPATIONAL HEALTH AND SAFETY

Unit C: Workplace and work equipment

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Introduction

NEBOSH (The National Examination Board in Occupational Safety and Health) was formed in 1979 as an independent examining board and awarding body with charitable status. We offer a comprehensive range of globally-recognised, vocationally-related qualifications designed to meet the health, safety, environmental and risk management needs of all places of work in both the private and public sectors. Courses leading to NEBOSH qualifications attract over 25,000 candidates annually and are offered by over 400 course providers in 65 countries around the world. Our qualifications are recognised by the relevant professional membership bodies including the Institution of Occupational Safety and Health (IOSH) and the International Institute of Risk and Safety Management (IIRSM).

NEBOSH is an awarding body to be recognised and regulated by the UK regulatory authorities:

- The Office of the Qualifications and Examinations Regulator (Ofqual) in England
- The Department for Children, Education, Lifelong Learning and Skills (DCELLS) in Wales
- The Council for the Curriculum, Examinations and Assessment (CCEA) in Northern Ireland
- The Scottish Qualifications Authority (SQA) in Scotland

NEBOSH follows the *"GCSE, GCE, VCE, GNVQ and AEA Code of Practice 2007/8"* published by the regulatory authorities in relation to examination setting and marking (available at the Ofqual website www.ofqual.gov.uk). While not obliged to adhere to this code, NEBOSH regards it as best practice to do so.

Candidates' scripts are marked by a team of Examiners appointed by NEBOSH on the basis of their qualifications and experience. The standard of the qualification is determined by NEBOSH, which is overseen by the NEBOSH Council comprising nominees from, amongst others, the Health and Safety Executive (HSE), the Confederation of British Industry (CBI), the Trades Union Congress (TUC) and the Institution of Occupational Safety and Health (IOSH). Representatives of course providers, from both the public and private sectors, are elected to the NEBOSH Council.

This report on the Examination provides information on the performance of candidates which it is hoped will be useful to candidates and tutors in preparation for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content and the application of assessment criteria.

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General comments

Many candidates are well prepared for this unit assessment and provide comprehensive and relevant answers in response to the demands of the question paper. This includes the ability to demonstrate understanding of knowledge by applying it to workplace situations.

There are always some candidates, however, who appear to be unprepared for the unit assessment and who show both a lack of knowledge of the syllabus content and a lack of understanding of how key concepts should be applied to workplace situations.

In order to meet the pass standard for this assessment, acquisition of knowledge and understanding across the syllabus are prerequisites. However, candidates need to demonstrate their knowledge and understanding in answering the questions set. Referral of candidates in this unit is invariably because they are unable to write a full, well-informed answer to the question asked.

Some candidates find it difficult to relate their learning to the questions and as a result offer responses reliant on recalled knowledge and conjecture and fail to demonstrate any degree of understanding. Candidates should prepare themselves for this vocational examination by ensuring their understanding, not rote-learning pre-prepared answers.

Common pitfalls

It is recognised that many candidates are well prepared for their assessments. However, recurrent issues, as outlined below, continue to prevent some candidates reaching their full potential in the assessment.

- Many candidates fail to apply the basic principles of examination technique and for some candidates this means the difference between a pass and a referral.
- In some instances, candidates are failing because they do not attempt all the required questions or are failing to provide complete answers. Candidates are advised to always attempt an answer to a compulsory question, even when the mind goes blank. Applying basic health and safety management principles can generate credit worthy points.
- Some candidates fail to answer the question set and instead provide information that may be relevant to the topic but is irrelevant to the question and cannot therefore be awarded marks.
- Many candidates fail to apply the command words (also known as action verbs, eg describe, outline, etc). Command words are the instructions that guide the candidate on the depth of answer required. If, for instance, a question asks the candidate to ‘describe’ something, then few marks will be awarded to an answer that is an outline.
- Some candidates fail to separate their answers into the different sub-sections of the questions. These candidates could gain marks for the different sections if they clearly indicated which part of the question they were answering (by using the numbering from the question in their answer, for example). Structuring their answers to address the different parts of the question can also help in logically drawing out the points to be made in response.
- Candidates need to plan their time effectively. Some candidates fail to make good use of their time and give excessive detail in some answers leaving insufficient time to address all of the questions.
- Candidates should also be aware that Examiners cannot award marks if handwriting is illegible.

UNIT C – Workplace and work equipment

Section A – *all questions compulsory*

Question 1 *Exothermic chemical processes rely on efficient control of temperature and pressure to prevent the phenomenon of 'runaway reaction' (thermal runaway) when mixing chemicals in a reactor.*

Outline** the methods used to control temperature and pressure in such circumstances.* ***(10)

An important method to control temperature and pressure would be the installation of high integrity temperature detection linked to the cooling and reactant addition systems with pressure rise detection linked to cooling, venting or auto shut-down. Consideration could also be given to the external cooling of the reactor by chilled water jacketing, an air cooled heat exchanger or the use of material with high heat conductivity in the construction of the reactor or internal cooling by the use of water or fluid refrigerant cooled coils. A further method would involve the control of the reactant by pre-chilling it, limiting the rate of its addition to the reactor, controlling the subsequent reaction by high efficiency temperature detection loops and the depth and level of reaction by pocketed thermal probes. The prevention of reactant bulk insulation can be prevented by efficient mixing with a mechanical stirrer while it would be advisable to locate the reactor away from external sources of heat and to introduce a system of regular internal cleaning to prevent the build up of insulating residues.

There were very few good answers provided for this question with many candidates showing a lack of technical understanding of the subject area and an inability to suggest credible measures to control temperature and pressure. Some outlined the process of thermal runaway and measures to be taken to reduce its effect rather than the control methods that were required. Some candidates thought the question referred to the unloading of chemicals from a tanker rather than a batch process and referred to matters such as coupling arrangements.

Question 2

(a) *In relation to automatic fire detection and alarm systems,* ***outline*** *the basic principles of operation of:*

(i) *heat detectors;* ***(4)***

(ii) *smoke detectors.* ***(4)***

(b) ***Identify** the circumstances in which **EACH** type of detector would be inappropriate.* ***(2)***

For heat detectors, candidates were expected to refer both to the fixed temperature and the rate of temperature rise detector. A fixed rate heat detector has a sensing element fixed at a particular temperature. By means of a thermocouple, it detects when the predetermined temperature is reached. A rate of rise heat detector detects abnormally fast temperature rises by means of electronic resistors.

Smoke detectors are of two main types: ionising and optical or photoelectric. The chamber of an ionising type has two plates set apart, one charged negatively and the other positively. A small radioactive source is used to ionise the chamber into which smoke may enter in the event of fire. The detector reacts to the change in electrical current caused by the neutralisation of ions by the smoke particles. The optical type of detector responds either to the obscuration or scattering of focused light rays by smoke particles. Answers to this part of the question were generally to a good standard though a few candidates were able to offer only the names of the detectors but not the basic principles of their operation.

Good answers to part (b), and there were many of these, would have identified that a smoke detector would be inappropriate in situations where smoke, steam or vapour might normally be expected such as in kitchens while a heat detector might be considered inappropriate in situations where sudden temperature changes might be experienced in normal circumstances or in situations where slow burning materials are involved which would have an effect on the speed of response. A few candidates identified circumstances for heat detectors that were more relevant for smoke detectors and vice versa.

Question 3

(a) ***Outline*** *the principles of gamma radiography.* ***(3)***

(b) ***Outline*** *the advantages and disadvantages of gamma radiography as a form of non-destructive testing.* ***(7)***

For part (a), candidates were expected to outline that gamma radiography uses the transmission of gamma rays from a sealed ionising radiation source through a test object on to a film placed on the opposite side. The film records the intensity of the radiation received and since cracks and flaws are hollow, a greater intensity of rays pass onto the film and the defects are shown up as darker regions. Some candidates showed much confusion between x-rays and gamma radiation whilst others did not identify the use of film and outline how defects in the weld are identified.

In answer to part (b), candidates should have outlined that the advantages of gamma radiography are that it detects internal defects and produces a permanent record of the test; that it may be used on a wide range of materials; that it has an in-situ capability and no coupling with the surface of the test piece is required; and that it does not require a power source. However, this type of radiography has disadvantages namely that it requires full compliance with the requirements of the Ionising Radiation Regulations; that the equipment needs a large exclusion zone for in-situ testing and access is required to both sides of the test piece whilst alternatively for off-site testing a special shielded bay will be required; that the operation is time consuming, expensive and there is a delay in obtaining the results; that skilled personnel are required both for operating the equipment and for analysing and interpreting the results; and that since operators may be exposed to radiation, very detailed safe systems of work will have to be prepared. Answers to this part of the question varied in quality and on occasions it was difficult to distinguish between what was regarded as an advantage and what a disadvantage. For example it was suggested that one advantage was that the equipment was portable but a disadvantage was that it was bulky and required a lot of space. Only the better answers referred to the disadvantage of the possibility of radiation exposure.

Question 4 *The Lifting Operations and Lifting Equipment Regulations 1998 specifiy fixed intervals between thorough examinations of lifting equipment but also includes an option for thorough examination to be carried out in accordance with an 'examination scheme'.*

Outline** the factors that a competent person would need to take into account when deciding whether **less** frequent examinations might be justified.* ***(10)

In answering this question, Examiners were looking to candidates to outline factors which the competent person would need to take into account such as the age of the equipment; the standards and specifications to which the equipment had been designed and manufactured and the quality conformance of materials at the time of manufacture; the manufacturers' recommendations on testing, inspection and maintenance and whether there has been compliance with these recommendations; the history of the equipment including the extent of use, the loads lifted and the environments in which it has been used and its current and anticipated future use; the equipment's accident, breakdown and repair history including the records of modifications, alterations and the fitting of replacement parts and the typical performance history of similar items of equipment; the records of previous thorough examinations; and any insurance company requirements.

Answers to this question were to a reasonable standard though in a number of cases there was insufficient attention paid to the command word and the required outline was not provided. Some candidates did not address the question and simply gave an outline of the contents of LOLER without considering factors that might result in less frequent examinations being justified. Others introduced factors such as the competence and training of the operators which were not relevant.

Question 5 *The residents of a village have recently been affected by a fallout of dust on their cars and property. They allege that the dust comes from a cement works situated a few miles away.*

Outline** the steps that should be taken by those responsible for the cement works in order to investigate whether emissions from the works are the cause of the problem.* ***(10)

In order to investigate whether the dust causing the problem emanated from the cement works, management would first need to carry out a desk study involving contact with the residents and a research into historical records, weather patterns, possible links with the prevailing wind direction and the existence of other potential sources of dust in the area. They would need additionally to check the plant for obvious faults and their maintenance records and carry out continuous monitoring of the emissions on site together with off site background monitoring. Analysis of dust collected from the village would also help to establish whether it matched that produced at the cement works. It would also be in management's interest to consult and liaise with officials from the Local Authority and, dependent on the location of the works, with members of the Environment Agency or the Scottish Environmental Protection Agency.

Answers to the question varied in quality but in general were of a reasonable standard though only the better answers referred to matters such as on-site monitoring and spatial fallout patterns. Some suggested the remedial action that should be taken rather than the investigative action which would indicate whether the company were in fact at fault.

Question 6 *In relation to a newly designed machine that falls within Schedule 2 Part 4 Annex (iv) of the Supply of Machinery (Safety) Regulations 2008,* ***outline*** *the procedures that must be followed, and the requirements that must be met, before such a machine is placed on the market for sale in the European Economic Area.* ***(10)***

In answering this question, candidates were expected to refer to the necessity of the machine designer/manufacturer to ensure the machine satisfies the Essential Health and Safety Requirements (EHSRs) by reference to relevant EN standards and to compile a technical file. If the machine is consequently found to be safe, and has been designed and manufactured according to EN standards, the manufacturer may either ensure that the machine is manufactured in accordance with the technical file by carrying out internal checks or develop a quality assurance (QA) system and have it approved by an approval body or obtain EC type approval from an approval body. When any of these procedures is completed satisfactorily, the approved body issues either an EC type examination certificate or approval for the quality assurance system. If the machine is not designed and manufactured according to EN standards, the manufacturer may again either develop a QA system and have it approved or obtain EC type approval from an approval body. A successful completion of either of the above will again result in the issue of an EC type examination certificate or approval for the QA system. Finally the manufacturer should ensure the machine conforms with other non-machinery directives before issuing a declaration of conformity and fixing the CE mark to the machine.

Most candidates referred to EHSRs, the need to prepare a technical file and attaching a CE mark. There were, however, some outdated ideas expressed, such as the submission of a prototype, while some candidates only outlined what should constitute the contents of the technical file while others referred to the requirements of PUWER.

Section B – *three from five questions to be attempted*

Question 7 *A company has been contracted to undertake maintenance work on the roof of a building that is partly constructed of fragile material.*

(a) ***Identify*** *the characteristics of the fragile material that may contribute to the risk of falls through the roof.* ***(6)***

(b) ***Outline*** *the measures to be taken to minimise the risk to persons involved with the work.* ***(14)***

For part (a) of the question, candidates should have identified characteristics such as the type of material for example fibre board, asbestos or polycarbonate and its thickness; the age and condition of the material which might be corroded, rotten, water sodden or weathered; the sheet profile and the design of the supporting structure such as the purlins together with the span between the roof supports; and the fact that the fragile material might well be camouflaged by deposits of dirt and other material. While answers to this part of the question were mostly to a reasonable standard, there were some candidates who found difficulty in identifying the characteristics of fragile material which could contribute to the risk of falls through a roof with some referring to ductile strength, metal fatigue and creep. Others raised occupational health issues arising from the handling of asbestos sheets which was not relevant to the question asked.

In answering the second part of the question, an initial reference should have been made to the importance of completing a full risk assessment of the operation to be carried out and the consequent production of a method statement detailing the safe system of work to be followed. This would describe the proposed means of access to the area of work such as the provision of scaffolds and crawling boards and the erection of edge protection comprising guard rails and toe boards to prevent the falls both of persons and materials from the roof. It would also be necessary to identify areas of the roof containing fragile materials, to mark them with barriers or signs and to prevent falls through them by the use of covers. An additional safeguard would be to provide safety nets and/or air bags under the areas of the roof which contained fragile materials. For certain tasks, the use of safety harnesses with adequate fixing points might also be necessary. Arrangements, such as a hoist, might be needed to transport tools, equipment and materials to the roof, while the use of chutes should be considered for the removal of rubbish. An important factor in carrying out this type of work is to ensure the use of competent personnel fully briefed and aware of the risks involved and the precautions to be observed and to draw up procedures to deal with any emergency that might occur. Finally, measures would have to be taken such as the erection of barriers and signs to prevent occupants of the building from passing beneath areas of the roof where work was being carried out and also members of the public from passing in close proximity to the building.

Most candidates were able to obtain at least half the marks available for this part of the question though suggestions that the work shoud be done from inside the building were not considered to provide a practical solution.

Question 8 *Contractors are required to work in a sewer chamber that is accessed via a vertical shaft. Due to their enclosed nature, the shaft and chamber may have to be categorised as confined under the Confined Spaces Regulations 1997.*

(a) ***Outline*** *the hazards the contractors could be exposed to when undertaking this activity.* ***(7)***

(b) ***Outline*** *the risks that would be classed as 'specified risks' under the Confined Spaces Regulations 1997.* ***(6)***

(c) ***Outline*** *the issues to consider when developing emergency arrangements that will be provided during this activity.* ***(7)***

This was a popular question, but the quality of answers did not always reach the required standard. Whilst all three parts required an outline, these were often not provided and accordingly full marks were not gained. Many candidates discussed the Confined Spaces Regulations in general terms without addressing the specific issues contained in each part of the question.

For part (a), hazards that might be expected when carrying out the activity described include those arising from unsafe access and egress and working on slippery surfaces which could result in falls; the presence of gases and vapours either toxic and/or flammable and an atmosphere that was deficient in oxygen; the possibility of the sudden ingress of water which could contain chemical or biological contaminants; the hazard of working in a restricted space with low headroom where the standard of lighting provided may not be of the best; the danger of material falling down the shaft; the possible presence of sharps in the sewer chamber and thermal issues that might occur when working in hot or alternatively cold temperatures. Hazards associated with access, lighting and restricted space were seldom quoted and there were frequent references to risks rather than hazards. There was the occasional surprising reference to earthquakes and the presence of pests and insects.

For part (b), candidates with knowledge of the Confined Spaces Regulations were able to outline risks such as injuries arising as a result of a fire or explosion; loss of consciousness or asphyxiation arising from gas, fumes, vapour or a lack of oxygen; drowning due to the increase in the level of liquid and loss of consciousness arising from an increase in body temperature. It became apparent that there were many candidates who did not have a comprehensive knowledge of the contents of the Regulations.

Part (c) required an outline of the issues to be considered in developing emergency arrangements to be provided while the activity was being carried out. These would include arrangements for: carrying out dynamic risk assessments; raising the alarm and carrying out a rescue operation which would need a trained and competent emergency rescue team together with procedures for summoning the public emergency services if required and providing them with relevant information; the provision of means of communication for those inside the chamber with those on the outside; the provision of rescue and resuscitation equipment such as lifelines, lifting equipment and breathing apparatus; safeguarding the members of the rescue team from risks to their health and safety by the provision of personal protective equipment, for example overalls, footwear and head protection; the precautions to be taken in the event of fire such as the provision of fire extinguishers; the identification of plant in the vicinity that may need to be shut down during an emergency rescue; the availability of first aid equipment and trained first aid personnel until the arrival of professional medical help; and for ensuring access to the point of entry for carrying out the rescue operation bearing in mind the possible remoteness of the site. Answers to this part of the question were generally to an acceptable standard though there was a tendency to submit a list rather than an outline. The need for dynamic risk assessments was rarely mentioned. Some candidates wrote of the normal precautions that should be taken when working in confined spaces rather than the issues to be considered in the development of emergency arrangements.

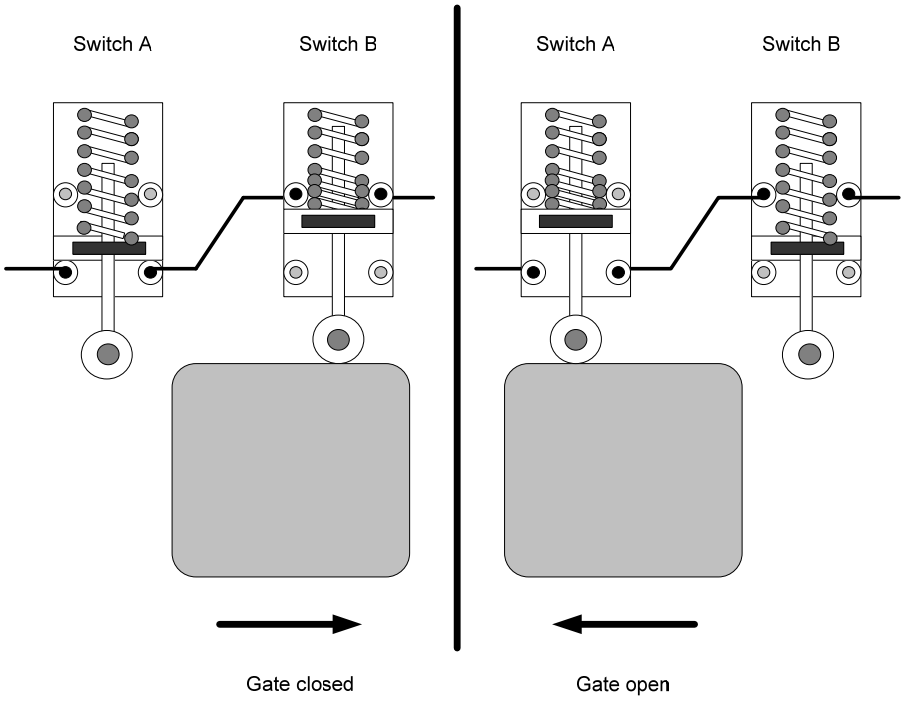
Question 9 *An external lift on a construction site has an interlocked guard to prevent the lift operating when the gate is open. With reference to the diagram:*

(a) ***identify*** *the* ***TWO*** *types of switch shown (Switch A* ***AND*** *Switch B);* ***(2)***

(b) ***identify*** *the functional components associated with* ***BOTH*** *switches;* ***(4)***

(c) ***outline*** *the normal sequence of operation for the electrically-operated,cam-activated switch assembly when the gate opens and closes;* ***(6)***

(d) ***outline*** *ways in which electrically-operated, cam-activated switches may fail to operate as intended.* ***(8)***



For the first part of the question candidates were expected to identify that limit switch A is wired normally closed and is a positively operated switch while switch B is wired normally open and is negatively operated. In answer to part (b) they should have identified that the functional components of the switches are the cam follower or plunger, an internal spring compressed from the bottom, internal electrical contacts attached to the cam follower with the gate acting as the cam.

In answer to part (c), a good answer would have outlined that when the gate is closed the normal sequence of operations would be the depression of the plunger on switch B and the compression of the internal spring and the release of the cam follower on switch A causing de-compression of the spring. This would allow electrical contact to be made in both switches, so making the circuit and allowing the operation of the lift. When the gate is open, the cam follower on switch A is depressed and the internal spring compresses while the cam follower in switch B is released causing de-compression of the spring. The electrical contact is broken in both switches thus breaking the circuit and preventing the operation of the lift.

For part (d), there are a number of ways in which the type of switch described in the scenario might fail to operate as intended. These include initial faulty installation with incorrect wiring; failure of or damage to the internal spring which prevents the appropriate contact being made; damage to other internal parts of the switch; the presence of debris or dirt within the body of the switch; a contact weld through electrical arcing; a misalignment between cam and cam follower or a wiring fault; wear of or damage to parts such as a bent plunger; damage due to a corrosive atmosphere and sabotage such as deliberate disconnection of wiring or the 'taping up' of parts to simulate activation by the gate.

This was not a popular question though of those who did attempt it, most provided answers to a reasonable standard. Those with a basic knowledge of electricity realised that the answers to Parts (a) and (c) were included in the examination paper if the diagram was interpreted properly whilst those with little appreciation of the principles involved struggled and found difficulty both in naming the various components of the switches and in identifying the ways in which the switches might not operate as intended.

Question 10 *In relation to dust explosions:*

(a) ***explain*** *the conditions that must be present for a primary dust explosion to occur;* ***(4)***

(b) ***explain*** *the additional conditions necessary for secondary explosions to occur;* ***(4)***

(c) ***identify*** *the causes and effects of the General Foods dust explosion, Banbury 1981;* ***(4)***

(d) ***identify*** *the design features that would minimise the likelihood and effect of a dust explosion.* ***(8)***

In order for a primary dust explosion to occur, the dust must be combustible, must be capable of becoming airborne and mixing with air and its particle size and distribution must be capable of propagating flame. Additionally the concentration of dust must fall within the explosive limits, an ignition source of sufficient heat energy must come in contact with the dust and the atmosphere must contain sufficient oxygen to sustain combustion. There were few candidates who referred to the dust explosion pentangle, some referred to the need for a source of ignition but did not add that it should provide sufficient heat energy whilst there was an occasional reference to the fire triangle possibly in the belief that the question was concerned with fire rather than dust.

Additional conditions necessary for secondary explosions to occur include the dislodgement of accumulated dust from horizontal surfaces within the affected building by the pressure wave and consequent air turbulence created by the primary explosion and the airborne suspension of combustible dust throughout the affected area which is ignited by the original primary explosion ignition source or by the combustion of products from the primary explosion or by any other ignition source with sufficient heat energy within the affected area. Answers varied in quality with some candidates showing that they were fully aware of the additional conditions necessary for secondary explosions to occur whilst others were unable to provide the necessary explanation.

In identifying the causes and effects of the General Foods dust explosion for part (c), candidates should have referred to an initial fault in a pneumatic conveying system which resulted in the overfilling of a holding bin. Air pressure caused the outlet filter to fail resulting in the emission and build up of a cloud of custard powder which was ignited by an electrical arc from a broken cable. The explosion caused injuries to nine men and substantial damage to an external wall. Answers submitted for this part of the question were poor with many candidates showing little knowledge either of the causes or effects of the incident.

In identifying design features that would minimise the likelihood and effect of a dust explosion, candidates should have referred to; the initial design of the ducting and equipment to withstand the effects of an explosion; the importance of ensuring the ducting was dust tight; the provision of local exhaust ventilation at points of transfer; the installation of explosion relief or suppression systems together with systems for suppressing fire; using screw conveyors instead of pneumatic systems for moving materials; providing a magnetic extraction system for removing metal from product fed to the plant; interlocking equipment to prevent overfilling of vessels and over-pressurisation; using instrument systems with integral emergency shutdown; using intrinsically safe electrical equipment and bonding all metal work to earth; preventing dust build up in the plant by the use of sloping surfaces and introducing a mechanised system for the humidification of the air. Answers to the last part of the question were reasonable though there were some who wandered away from design to operational considerations and discussed the need to carry out risk assessments and introduce safe systems of work which did not gain them any marks.

Question 11 *A corrosive substance has a flash point of 20°C. An electrical sub-contractor has been employed to design and install the electric supply to an open air production plant which is used to manufacture the corrosive substance. This plant is located next to the sea.*

(a) ***Outline*** *the aspects of this situation which the designer of the electrical supply must address to ensure that the installed system will be compliant with the Electricity at Work Regulations 1989.* ***(10)***

(b) ***Describe*** *the types of fault that may be found in fixed electrical systems under such conditions.* ***(10)***

There were few candidates who attempted this question and generally the answers submitted did not obtain many marks.

A logical approach to part (a) of the question would have been to outline the aspects to be addressed by the designer under the general headings of mechanical damage, weather impact, adverse environmental contaminants, flammable atmosphere and environmental factors relevant to the use and maintenance of the intended supply.

Mechanical damage would include that caused by impact, stress and strain, abrasion, wear, vibration and pressure while the system must be resistant to the impact of the weather for example the effects of rain, snow loading and UV degradation from sunlight. Environmental contaminants include damp, dirt, corrosive leaks, salt laden air and water and steam leaks, whilst a flammable atmosphere might also be present as a result of vapour leaks, spills and effluents. Finally attention would have to be given to those environmental factors especially relevant to the use and maintenance of the plant such as the lighting of switch gear and instrument panels and that provided for winter maintenance in restricted work spaces and during periods of low temperature. There was some reference to corrosion but little else and it was apparent that there was a lack of understanding both of the requirements of the Regulations and of the issues that would need to be addressed given the type, intended use and location of the plant described in the question.

For part (b), faults in fixed electrical systems that might be found in the conditions described include equipment unsuitable for wet or corrosive conditions together with exposed live conductors, damaged or perished insulation and damage to the protection on cable conduits. Additionally corrosion of parts such as access grills and transformer casings could facilitate the ingress of fluids resulting in short circuits. There is a danger of poor earthing and a lack of earth continuity together with damage caused to the means for isolating the supply to parts of the plant. Finally it could be found that there is inadequate excess current protection because fuses with incorrect ratings have been fitted.

Whilst there was a slight improvement in the answers submitted for part (b), candidates often referred to general electrical faults rather than those that would be relevant to the type of installation described. Some candidates identified faults relating to poor workmanship during and after installation rather than those caused by the conditions. Others described issues relating to wiring but not to those connected to the environment.

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