

## Session 21 – Maintenance Inspection Requirements



## Typical Maintenance Requirements under ATEX 137

The following organizational measures should be carried out:

**produce written operating instructions, where required by the explosion protection document; instruct workers in explosion protection; ensure workers have adequate competence; apply a permit-to-work system for dangerous work, where required by the explosion protection document; carry out maintenance; carry out inspection and surveillance; mark hazardous places, where necessary.**

The organizational measures taken must be recorded in the explosion protection document.

### **Operating instructions**

Operating instructions are activity-related binding instructions and rules of conduct issued in writing by the employer to the employees. They describe the workplace-related dangers to human beings and the environment and indicate the protective measures taken or to be observed. Operating instructions are produced by the employer or a competent person whom he appoints to perform the task and must be observed by workers. They relate to a particular workplace or part of the establishment. Among the matters to be covered by operating instructions for workplaces where there are explosive atmosphere risks are what explosion hazards exist and where, what mobile work equipment may be used and whether special personal protective equipment must be worn.

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## Worker competence

For every workplace, there should be available a sufficient number of workers with the requisite experience and training to perform the explosion protection tasks assigned to them.

## Training of workers



Employers must provide workers with training which informs them of the explosion hazards at the workplace and the protective measures taken. This training must explain how the explosion hazard arises and in what parts of the workplace it is present. The measures taken should be listed and their operation explained. The correct way of working with the equipment available must be explained.

Workers must receive training on recruitment (before starting work); in the event of a transfer or a change of job; when work equipment is introduced for the first time or changed; when new technology is introduced. Training of workers must be repeated at suitable intervals, for example once per year. On completion of training, it can be useful to check on what has been learned. The duty to provide training also applies to the employees of outside contractors. Training must be given by a competent person. Records should be kept in writing of the date and content of training activities and the participants.

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### Permit-to-work system

If work liable to cause an explosion is to be carried out in or near a hazardous place, it must be authorized by the person with responsibility for this function within the establishment. This also applies to activities which may interact with other work to cause hazards. A system of permits to work has proved useful in such cases. This may be implemented by means of a permit-to-work form which all concerned must receive and sign.

Once the work has been finished, a check must be made to establish whether the plant is still safe or has been made safe again. All concerned must be informed when the work is finished.

### Maintenance

Maintenance comprises repair, servicing and inspection. Before maintenance work begins, all concerned must be informed and the work must be authorized, e.g. by means of a permit-to-work system. It may be carried out only by competent persons. Experience shows that a high accident risk attaches to servicing work. Before, during and after completion of the work, care must therefore be taken to ensure that all necessary protective measures are taken.

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When maintenance involving a risk of ignition is carried out in a hazardous place, it should be reliably ensured that it will be free of hazardous explosive atmospheres for the duration of the work and if necessary for some time thereafter (e.g. to allow cooling). Except in exceptional circumstances, when other appropriate and adequate precautions have been taken, the items of plant on which work is to be carried out must as necessary be emptied, depressurized, cleaned, purged and must be free of flammable substances. While work is in progress, such substances must not reach the place where it is being carried out. Where work may give rise to flying sparks (e.g. welding, flame cutting, grinding), suitable screening should be provided and a fire sentry posted if necessary.



# Typical Schedule of Inspection

SCHEDULE OF INSPECTIONS	
<p><b><u>Methods of protection against electric shock</u></b></p> <p><b>(a) Protection against both direct and indirect contact:</b></p> <p><input type="checkbox"/> (i) SELV</p> <p><input type="checkbox"/> (ii) Limitation of discharge of energy</p> <p><b>(b) Protection against direct contact:</b></p> <p><input type="checkbox"/> (i) Insulation of live parts</p> <p><input type="checkbox"/> (ii) Barriers or enclosures</p> <p><input type="checkbox"/> (iii) Obstacles</p> <p><input type="checkbox"/> (iv) Placing out of reach</p> <p><input type="checkbox"/> (v) PELV</p> <p><input type="checkbox"/> (vi) Presence of RCD for supplementary protection</p> <p><b>(c) Protection against indirect contact:</b></p> <p>(i) EEBAD including:</p> <p><input type="checkbox"/> Presence of earthing conductor</p> <p><input type="checkbox"/> Presence of circuit protective conductors</p> <p><input type="checkbox"/> Presence of main equipotential bonding conductors</p> <p><input type="checkbox"/> Presence of supplementary equipotential bonding conductors</p> <p><input type="checkbox"/> Presence of earthing arrangements for combined protective and functional purposes</p> <p><input type="checkbox"/> Presence of adequate arrangements for alternative source(s), where applicable</p> <p><input type="checkbox"/> Presence of residual current device(s)</p> <p><input type="checkbox"/> (ii) Use of Class II equipment or equivalent insulation</p> <p><input type="checkbox"/> (iii) Non-conducting location: Absence of protective conductors</p> <p><input type="checkbox"/> (iv) Earth-free equipotential bonding: Presence of earth-free equipotential bonding conductors</p> <p><input type="checkbox"/> (v) Electrical separation</p>	<p><b><u>Prevention of mutual detrimental influence</u></b></p> <p><input type="checkbox"/> (a) Proximity of non-electrical services and other influences</p> <p><input type="checkbox"/> (b) Segregation of band I and band II circuits or band II insulation used</p> <p><input type="checkbox"/> (c) Segregation of safety circuits</p> <p><b><u>Identification</u></b></p> <p><input type="checkbox"/> (a) Presence of diagrams, instructions, circuit charts and similar information</p> <p><input type="checkbox"/> (b) Presence of danger notices and other warning notices</p> <p><input type="checkbox"/> (c) Labelling of protective devices, switches and terminals</p> <p><input type="checkbox"/> (d) Identification of conductors</p> <p><b><u>Cables and conductors</u></b></p> <p><input type="checkbox"/> (a) Routing of cables in prescribed zones or within mechanical protection</p> <p><input type="checkbox"/> (b) Connection of conductors</p> <p><input type="checkbox"/> (c) Erection methods</p> <p><input type="checkbox"/> (d) Selection of conductors for current-carrying capacity and voltage drop</p> <p><input type="checkbox"/> (e) Presence of fire barriers, suitable seals and protection against thermal effects</p> <p><b><u>General</u></b></p> <p><input type="checkbox"/> (a) Presence and correct location of appropriate devices for isolation and switching</p> <p><input type="checkbox"/> (b) Adequacy of access to switchgear and other equipment</p> <p><input type="checkbox"/> (c) Particular protective measures for special installations and locations</p> <p><input type="checkbox"/> (d) Connection of single-pole devices for protection or switching in phase conductors only</p> <p><input type="checkbox"/> (e) Correct connection of accessories and equipment</p> <p><input type="checkbox"/> (f) Presence of undervoltage protective devices</p> <p><input type="checkbox"/> (g) Choice and setting of protective and monitoring devices for protection against indirect contact and/or overcurrent</p> <p><input type="checkbox"/> (h) Selection of equipment and protective measures appropriate to external influences</p> <p><input type="checkbox"/> (i) Selection of appropriate functional switching devices</p>
Date .....	
Inspected by .....	
<p><b>Notes:</b></p> <p>✓ to indicate an inspection has been carried out and the result is satisfactory</p> <p>✗ to indicate an inspection has been carried out and the result was unsatisfactory</p> <p>N/A to indicate the inspection is not applicable</p>	

## What is Competency?

.... a standardized requirement for an individual to properly perform a specific job.

It encompasses a combination of **knowledge, skills** and **behavior...** (1)

(1) Definition from Wikipedia.com



## Why is it important

### IEC 60079-14

#### 4.4 Qualifications of personnel

The **design** of the installation, the **selection of equipment** and the **erection** covered by this standard shall be carried out only by persons whose training has included instruction on the various types of protection and installation practices, relevant rules and regulations and on the general principles of area classification. The competency of the person shall be relevant to the type of work to be undertaken (see Annex F).

Appropriate continuing education or training shall be undertaken by personnel on a regular basis.





