



SAFETY TRAINING LEAFLET 14 CRITICAL SAFETY SYSTEMS - ALARM AND TRIPPING DEVICES

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CRITICAL SAFETY SYSTEMS – ALARM & TRIPPING DEVICES

Prepared by Safety Advisory Group

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Note: this Safety Training Leaflet is taken from Leaflet 13: CRITICAL SAFETY SYSTEMS - ALARM AND TRIPPING DEVICES in Doc 23/08 Safety Training of Employees. The leaflet has been put into a new format and revised.

1 Introduction

1.1 Safety leaflets

Safety training leaflets summarise the basic operational safety knowledge which needs to be known by employees working in the gas industry.

Refer to EIGA Doc 23 *Safety Training of Employees* for the various combinations of leaflets which define the scope of safety training for a variety of specific jobs.

Each leaflet addresses a specific topic as identified in the title.

1.2 Comprehension tests

There is a comprehension test for each leaflet, included in **Appendix 1**.

Each test comprises several questions. To pass the test it is suggested that the employee should score 75% at the first attempt. Incorrect answers should be discussed to confirm understanding.

Appendix 2 includes the list of correct answers.

2 Critical safety systems – Alarm and tripping devices

2.1 General

Critical safety systems are systems required to avoid hazardous situations arising in plant operations. The main characteristics which can change during operation include pressure, temperature, flows and levels. The changes could be the effect of several causes including instrument or equipment failure, human error, uncontrolled process deviation, loss of utility.

2.2 Objectives of critical safety systems

The main objectives of critical safety systems are:

- to give warning by audible or visual means (alarm),
- to shut down a plant (tripping),
- to release pressure in a safe manner.

2.3 Examples of conditions requiring alarm tripping devices

Examples of conditions requiring alarm tripping devices include:

- | | |
|----------------------|---|
| ○ High temperature | - acetylene generators, machinery bearings |
| ○ Low temperature | - outlets from vaporisers. |
| ○ High pressure | - pump discharges, filling lines. |
| ○ Low pressure | - compressor or pump suction lines. |
| ○ High (excess) flow | - emergency shut-off valves on cryogenic storage tanks. |
| ○ Low flow | - cooling water systems. |
| ○ High level | - storage tanks. |
| ○ Low level | - oil sump. |
| ○ High vibrations | - compressors, motors. |
| ○ High voltage | - equipment malfunction. |
| ○ Low voltage | - supply fault, excess consumption. |

- High current - use of unauthorised appliances, short-circuit.
- Low current - cryogenic pump starvation.
- Ground (earth) fault - on electrical circuits / equipment.
- High/low oxygen content - in a room.

2.4 Types of devices

The main types of device are:

- Safety valves relieve pressure by discharging to a safe area; they are designed to close automatically when pressure returns to normal.
- Bursting discs relieve pressure by rupturing; once ruptured they have to be replaced.
- Fuses or differential protection act when current in a circuit exceeds the value for which it is designed (short circuit, ground fault).
- Alarms are normally flashing lights, horns, but can be connected to telephone line for monitoring etc.
- Emergency stop push buttons - these are to be used by operating staff to shut down plant or equipment in case of emergency.

2.5 Actions

Make sure that you know what all the alarms and protective devices are in your work area, what they mean and what action to take when they are activated.

Report all instances when alarms or protective devices are activated to your supervisor, so that investigations can be made, and deficiencies are corrected.

Never bypass, isolate or change the setting on an alarm or protective device. This could endanger plant and personnel.

Never try to repair an alarm or protective device; if you know or suspect that one is faulty, report to your supervisor.

Alarms and protective devices must be checked and/or operationally tested at regular intervals. Make sure that you know the periodicity and report any case of non-compliance to your supervisor.

Make sure that you know the critical operating parameters of the process or equipment that you operate and what to do in case they reach the control limits.

Appendix 2 – Critical Safety Systems – Alarm and Tripping Devices – Test Answers

1. Pressure, Temperature, Flows, Levels and Product
2. Give warning, Shut down and Release pressure in a safe manner
3. To be checked for each location
(The operators are requested to define the cases for their particular locations)
4. A
5. A
6. A
7. Safety valve closes automatically (re-seats) when pressure returns to normal, and bursting disc does not
8. Emergency co-ordinator asks for it,
The cases stipulated in the emergency plan