

INTRODUCTION

Pressure devices are devices used for the production, storage, transport and use of pressurized fluids.

The main risk these types of devices can come up against is the risk of explosion due to high pressure and to the high temperature in which these instruments are used. The explosions can be caused by several reasons which must be identified and eliminated. Amongst them are manufacturing defects, regulation failures, malfunctioning of security devices (security valves, etc.), poor or lack of maintenance, water leaks inside the boiler, uncleanliness in the water supply, incorrect cleaning of the boiler and failure in the flame regulator or in the boiler combustion.

The risks derived from the presence of gas in the facilities are due to their physical storage characteristics (the gas could be under high pressure, low temperatures, etc.), and to the chemical structure of each of the substances.

There are risks fire or explosion if we are dealing with flammable substances, intoxication if dealing with toxic gas, asphyxiation with inert gas and burns with corrosive substances.

BASIC PREVENTIVE CRITERIA

The main risk when dealing with pressure devices is the sudden release of pressure. To be able to use these pressure devices, several technical and security standards must be met. These standards are legal requirements that allow homologation and grant the supporting documents for the pressure devices. Apart from the manufacturing characteristics of the devices, the users of these pressure devices, which are under the “pressure devices regulations”, must keep a Registry Book endorsed and stamped by the relevant authority. The following information on all the installed devices must be kept in this Registry Book: characteristics, origin, supplier, installer details, date of the installation authorization and dates of the first and following periodic tests. The Registry Book must also include a detailed account of any non-official inspection and/or any repair carried out. LPG (Liquefied Petroleum Gas) Cylinders, siphons, fire extinguishers and similar devices will not be included in the Registry Book.

The agents in charge of watching, supervising, using and maintaining the pressure devices must be properly trained in the use of the equipment and they must be aware of the risks involved in a incorrect handling or maintenance. In the case of boilers with Pressure x Volume > 50 ($P=Kg/cm^2$ and $V= m^3$), the Gas devices Regulations require that the agents are accredited with an adequate level of knowledge in the field.

The Gas Devices Regulations regulate each device through its CTI (Complementary Technical Instruction), the security procedure to be followed,

as well as the characteristics of the location where these devices will be installed, depending on their specific category.

For the secure handling and storage of gases, it is necessary to identify the gas' physical, chemical, and toxic properties and their effect on people's health. The conditions of use of such gases must be adequate to the risks that could be involved (flammable, toxic, corrosive, etc.).

Gases can be stored in fixed containers such as tanks and mobile cylinders which are often fitted with pipes and in which these substances can be moved.

Gas cylinder warehouses are classified in five categories clearly defined depending on the product quantity in CTI-MIE-APQ005. Each of the warehouses must meet the general security standards and other specific security standards for each of the categories stated in CTI-MIE-APQ005.

BASIC REGULATIONS

Royal Decree 1244/1979 of the 4th of April, in which the Gas Devices Regulation is approved. Modified by the Royal Decree 507/1982 of the 15th of January, the Royal Decree 473/1988 of the 30th of March and the Royal Decree 1504/1990 of the 23rd of November. Improved through the following Complementary Technical Instructions:

COPLEMENTARY TECHNICAL INSTRUCTIONS FOR THE REGULATION OF PRESSURE DEVICES	
CTI-MIE-AP1	Boilers, Boiler Economizers, Superheaters and Reheaters
CTI-MIE-AP2	Pipes for Boiler related fluids
CTI -MIE-AP3	Aerosol Generators
CTI -MIE-AP4	LPG Cartridges
CTI -MIE-AP5	Fire Extinguishers
CTI -MIE-AP6	Oil Refinery and Petrochemical Plants
CTI -MIE-AP7	Liquefied, Dissolved and Pressure gas Cylinders
CTI -MIE-AP8	Black liquor Recovery Boilers
CTI -MIE-AP9	Reefer containers
CTI -MIE-AP10	Cryogenic containers
CTI -MIE-AP11	Mass production devices aimed to heat or store hot water
CTI -MIE-AP12	Hot water boilers

CTI -MIE-AP13	Heat exchanger panels
CTI -MIE-AP14	Quick coffee machines
CTI -MIE-AP15	Liquefied Natural gas in Pressurized cryogenic containers
CTI -MIE-AP16	Thermal power stations which generate electricity
CTI -MIE-AP17	Compressed air treatment and installations

Royal Decree 1618/1980 of July 4th approving the Heating, Air conditioning and Hot Sanitary Water Systems Regulation. Completed by the Royal Decree 2946/1982 of 1st October and Order 16-7-1981, Complementary Technical Instructions, modified by Order 28-6-84 and by Royal Decree 275/1995 of 24th February.

Royal Decree 473/1988 of 30th March, regarding the implementation of regulations of the Board of Directors 76/767/CEE of Pressure Devices.

Royal Decree of 11th October, regarding the implementation of regulations of the Board of Directors 87/404/CEE, of Simple Pressure Containers. Modified by the Royal Decree 2486/1994 of 23rd December.

Royal Decree 668/1980 of 8th February, approving the Chemical Products Storage Regulation, modified by Royal Decree 3485/1983 of 14th December. Completed by six Complementary Technical Instructions. Order 19-1-1986, approving the Regulation of the Petroleum Liquefied Gas Storage in fixed containers.

Royal Decree 1853/1993 of 27th November, approving the Regulation of Gas Installations in domestic, collective or commercial places.

Order 9-3-1971, approving the Working Security and Hygiene General Bylaw.

SAFETY CONDITIONS

7. GASES AND PRESSURE

People affected

Working area

Date:

Next revision date

By:

1. Administrative protocols of the equipment are carried out (starting authorization, periodical revisions, etc)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Carry out according to the Pressure Devices Regulation
2. There is an internal control and revision register, carried out by the company itself as well as by an authorized controlling body	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Introduce a recording registry system at anybody's disposal
3. The location is away of any heat source	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Move away or isolate from any heat source and from any uncontrolled fuel substance
4. Safety valves and rupture disks are set out in the proper conditions	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Check and correct. Such devices will be under control
5. Maintenance protocols will be carried out according to an established plan	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Introduce a maintenance program of all the key devices
6. Operators are trained in the correct and safe use of the equipment. There is a specific operator in charge of boilers and compressors	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Improve training
7. If a steam boiler is used, there is a double safety system in place and the physical variables such as pressure, level, etc are under control	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Verify and correct. If the boiler is not used jump to question 11
8. If $V_x P > 10$ (V_{m3} average water level, P Kg/cm ² Maximum effective pressure), a boiler house will be available for exclusive use	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Correct with a RF 240 minutes and 2 fire doors
9. The boiler house is fitted with natural or fixed ventilation and it is placed in a proper location (not cellars or basements)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Provide good ventilation and move the location of the boiler house under the supervision of a body in collaboration with the administration
10. There is a permanent fire detection and fire alarm device, as well as a fire extinguisher with power > 10 6Kcal/h	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Provide the fire detection and fire alarm system and check periodically
11. A compressor is used	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Jump to question 15
12. It is placed in an open space or in a room suited with acoustic isolation, ventialed and fire resistant. It should not be close to working areas	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Arrange ventilation, acoustic isolation or move it outdoors in a shed with no walls
13. Block valves, purge devices (water, oil...) and pressure retention valves are available in emergencies	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Correct appropriately
14. Auxiliary pipes are properly fixed to avoid vibrations and loosening	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Fix properly

15. Storage or use of gas is carried out.	YES	NO	Jump to the next questionnaire
16. Gas recipients are properly fixed, away from heating sources and in protected and delimited areas	YES	NO	Fix properly and place them in protected and well ventilated areas
17. Personnel working with toxic and corrosive gas have adequate gas masks and/or accessible oxygen equipment	YES	NO	Provide the proper individual protection equipment adequate to the specific type of gas
18. Areas where toxic or corrosive gas is used are ventilated and fitted with detection and alarm system as gas leak detection and control	YES	NO	Provide protection and detection Systems and check periodically
19. Bridles and pipe connections are avoided in unprotected areas where personnel are exposed to toxic leaks	YES	NO	If it cannot be avoided, bridles and pipe connections must be protected against any possible leak
20. Gas pipes are kept in good conditions (no corrosion, properly fixed, etc)	YES	NO	Repair the pipes and check periodically
21. Storage gas cylinders, even the empty ones, are fitted with a protection device and valves are shut	YES	NO	Establish the proper regulations to protect the valves
22. Gas cylinders are moved adequately	YES	NO	Use the specific adequate means
23. Acetylene and oxygen cylinders are fitted with a flame arrester valves	YES	NO	Provide guaranteed flame arrester valves
24. There is a prevention and maintenance training program for possible hazards	YES	NO	Provide the program

ASSESTMENT CRITERIA

HIGHLY POOR	POOR	NEEDING IMPROVEMENT
1, 4 or more tan 5 highly poor	2, 3, 5, 6, 8, 9, 16, 17, 18, 23	7, 10, 12, 13, 14, 19, 20, 21, 22, 24

	Highly poor	Poor	Needing improvement	Correct
Objective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subjective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

MEASURES TO BE TAKEN IN ORDER TO CORRECT THE DETECTED DEFICIENCIES