

**Measure of the Director  
of Central European Institute of Technology of Masaryk University  
No. 6/2017**

## **Operation, Handling and Storage of Gas Pressure Vessels**

*(wording effective as of 27 July 2017)*

*Pursuant to the provisions of Act No. 262/2006 Coll., the Labour Code, as amended (hereinafter the "Labour Code"); Act No. 133/1985 Coll., on Fire Protection, as amended, Government Order NO. 101/2005 Coll., stipulating detailed requirements pertaining to worksites and work environment, as amended, Government Order No. 18/1979 Coll., defining the specified pressure vessels and stipulating certain conditions for ensuring their safety, as amended CSN standard 8304 "Gas Pressure Vessels t- Operating Rules", and pursuant to the Chancellor's Guideline No. 10/2009 "Determination of the Organisational Measures of Occupational Safety and Health Protection at MU", I hereby issue this Measure:*

### Article 1

#### **Objective and Subject Matter**

- (1) This Measure stipulates the terms and conditions for ensuring safety in the course of handling gas pressure vessels at all worksites within CEITEC MU. This Measure is binding upon all employees of CEITEC MU assigned for handling pressure vessels, as well for other persons performing work activities in the course of which pressure vessels are being handled.
- (2) Definitions:
  - a) gas pressure vessels are steel, composite or light alloy vessels, having a water volume from 0.5 litres to 150 litres, the inside walls of which are subject to gas or vapour pressure after filling;
  - b) gas is any substance that is, under the pressure of 1.013 bar (0.1013 Mpa) and temperature of 20°C, in a fully gaseous state or where the vapour pressure is higher than 3 bar (0.3 Mpa) at 50°C.

### Article 2

#### **Storage of Pressure Vessels**

- (1) Pressure vessels are stored in technical rooms designated for this purpose and must be secured in an appropriate manner against bumps and falls (e.g. in the upper half by means of a strap or chain).
- (2) The vessels must be located in a sufficient distance from heating units and heat-emitting surfaces, so that the surface temperature of the vessels does not exceed the critical temperature value in the case of liquified gases and 50°C in the case of other gases, respectively. The vessels must be located in the distance of **at least 3 meters** from sources of open fire.

- (3) There may not be more than 12 vessels containing the same or different type of gas located in the same technical room in a multi-floor building. If any fire section contains several technical rooms, the total number of vessels in each fire section may not exceed 24.

#### Article 3

##### **Work with Technical Gases in a Laboratory**

- (1) Vessels containing technical gases may only be kept in the laboratory if they are necessary for the operation. The head of the laboratory shall be obliged to ensure that unused or empty vessels are removed from the laboratory by a competent contractor company.
- (2) The doors to the rooms where compressed gas vessels and other gas vessels are located must be labelled with a sign specifying the name of the relevant gas (the sign may also be located on the wall near the door). After changing the location of a pressure vessel, it is necessary to contact the occupational safety, health protection and fire prevention manager and agree on the placement of the signs.
- (3) Prior to commencing any work with technical gases, it is necessary to ensure the possibility of ventilation, to prepare adequate protective, fire extinguishing and decontamination tools, to inspect sealing and the functionality of valves and sealing of installations.
- (4) While working with technical gases, the following is prohibited:
  - a) using of vessels with expired date of periodic tests or damaged vessels;
  - b) using of unsuitable or damaged reduction valves;
  - c) using of brute force or unsuitable tools for opening and closing valves;
  - d) using the vessels for any other purposes or for any other gases than intended;
  - e) repairing the vessels or valves or alter their labelling;
  - f) accelerating the gas discharge;
  - g) free discharge of gases within closed areas, except where this is a part of the regular work process.

#### Article 4

##### **Safety Instructions**

- (1) Under no circumstances make any interventions in the reducer or its components.
- (2) In the event of any anomalies or occurrences not specified in this document, do not use the reducer and immediately decommission it by means of stopping the gas supply and call the central security desk at phone no. 549 49 2929 or the occupational safety, health protection and fire prevention manager at phone no. 777 926 633.
- (3) Do not in any manner manipulate the discharge overpressure valve ("7").
- (4) Possible shrinkage of gas is a sign of its anomaly.
- (5) Do not use any violence. Correct connection must be achieved without the use of force.

- (6) Do not in any manner interfere with the parts or components that are in operation, physically insulate the sector in which works are being performed, preventively remove any residue pressure and before starting any intervention, verify the condition of insulations.
- (7) Do not use oils and fats.
- (8) Prevent the occurrence of fire.

Article 5

**Properties of Gases**

Based on the colour classification indicating the content properties in line with the safety sign and the information sticker, at least vessels containing all gases and gaseous mixtures must be properly labelled.

<b>INFORMATION STICKERS IN THE SHAPE OF DIAGONALLY PLACED SQUARES</b>	
<b>Substance property</b>	<b>Coloured labelling</b>
Toxic or corrosive	Yellow - white background
Combustible	Red
Oxidising	Light blue
Inert (non-toxic, non-corrosive, non-combustible)	Bright green

<b>SAFETY SIGNS ON VESSELS FOR GAS TRANSPORTATION</b>	
<b>Substance property</b>	<b>Background colour</b>
Toxic	White
Combustible	Red
Corrosive	Upper half of the sign - white Lower half of the sign - black
Oxidising	Yellow
Gas under pressure (non-flammable, non-toxic)	Green (non-flammable - non-toxic)

Article 6

**Requirements Pertaining to Qualification of the Pressure Vessel Operators in Laboratories**

- (1) Handling, transport or storage of pressure vessels may only be performed by persons over 18 years of age, physically capable and trained and tested to perform these activities.
- (2) All persons entering laboratories for the purpose of performing work or studies shall be obliged to undergo a training provided by the head of the respective worksite or by another employee authorised for this purpose in writing.
- (3) A record shall be executed on the performed training and testing, to be deposited with the head of the respective worksite.

## Article 7

### **Operational and Safety Requirements Pertaining to Pressure Vessel Handling**

- (1) Prior to the transport of vessels intended for transporting gases to individual workplaces, it must be verified whether the vessels are not deformed, whether they are properly labelled according to the type of the transported gas and whether they are equipped with protective caps.
- (2) During any manual handling, the vessels must be protected against bumps and the radiation surface temperature of 50°C may not be exceeded.
- (3) In the event of any defect of the pressure vessels, the employees are obliged to decommission the vessel and report this fact to the supervisor who shall arrange for the vessel replacement.
- (4) If a full vessel is delivered to a worksite where welding works were carried out, the technical gas release from the vessel may not be commenced prior to the expiry of at least one hour after the completion of welding works at the worksite.
- (5) Protective caps may not be used for any other purposes than prescribed, i.e. only for closing the valve cover. The caps must be properly tightened.
- (6) When opening and closing the valves on the vessels, it is prohibited to use tongs or crescent wrenches; only the prescribed wrench may be used. Opening and closing must be performed slowly.
- (7) Vessels of the total weight exceeding 50 kg may only be carried by at least two persons, physically capable to perform such work.
- (8) While handling the vessels, it is prohibited to throw them. The vessels may not be dragged or rolled. Vessels with the content heavier than 10 kg may be rolled on the rim.
- (9) Full and empty vessels may only be transported with closed valves and with protective caps.

## Article 8

### **Safety Rules in the Case of Combustible Gas Leakage**

- (1) The device tightness, as the main precondition of safe operation, shall be verified by means of a foaming preparation or by a detector.
- (2) Upon detection of leakage of any combustible gas, the following steps must be promptly taken:
  - a) turn off all flames and decommission any and all possible sources of initiation;
  - b) close all gas closures or, if applicable, the main gas closure;
  - c) after closing the main closure, verify whether all the closing gas installations are closed and if there are any opened installations, close them (torch igniters, gas refrigerators, etc.);
  - d) avoid lighting matches or lighters, avoid smoking;

- e) avoid pulling out any electric plugs, avoid handling with electric switches;
  - f) avoid using electrical appliances, electric bells and elevators;
  - g) avoid entering rooms from which gas odour can be smelled with open fire.
- (3) Light may only be switched on after a concentration below 50% of the lower explosion limit has been ascertained with certainty.
- (4) Where the odour cause cannot be determined even though all the closing gas installations are closed, the Bohunice University Campus administration service must be immediately called.
- (5) Even a very slight gas odour the cause of which was not or could not be determined must be reported to the central security desk.
- (6) If the gas odour comes from rooms that are not commonly accessible, the police or fire department must be immediately notified who are entitled to secure access to these areas; at the same time, the gas supplier shall be notified.
- (7) Avoid repairing the breakdown or damage of gas devices by yourself! This may only be done by technically qualified personnel of authorised companies.

#### Article 9

#### **Final Provisions**

- (1) The secretary of the Institute shall be responsible for the interpretation of this Measure.
- (2) The Occupational Health and Safety and Fire Prevention manager shall be responsible for continuous updates of this Measure.
- (3) The heads of the respective worksites shall be responsible for the supervision over the compliance with this Measure.
- (4) This Measure shall become valid as of the date of signature hereof.
- (5) This Measure shall become effective as of 27 July 2017.

**Annexes:** [Annex No. 1 - Launching of pressure vessels into operation](#)  
[Annex No. 2 - Decommissioning of pressure vessels](#)  
[Annex No. 3 - Replacement of empty vessels](#)

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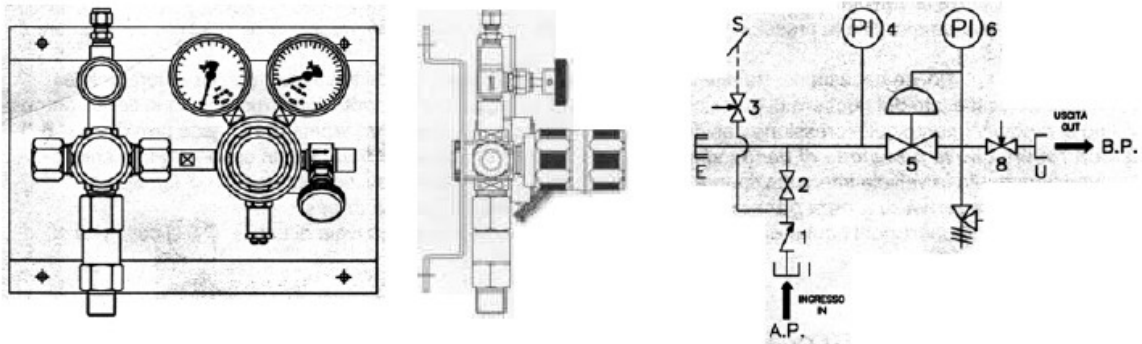
*reg. no.: ITI/224/PRE/2013*

In Brno, on 27 July 2017

*Jiří Nantl*  
*Director of the Institute*

## Annex No. 1 - Launching of pressure vessels into operation

- (1) Procedure of launching of pressure vessels into operation:
- (2) Verify whether the interruption inlet valve A.P. ("2") leading to the group, the interruption relief valve ("3") and valves of any connected platforms are closed.
- (3) Close the interruption outlet valve ("8").
- (4) *Check whether the regulation valve of the pressure reducer ("5") is released, i.e. whether it is turned to the backstop counterclockwise.*
- (5) SLOWLY open the interruption valve connected to the group in the direction from the pressure vessel.
- (6) SLOWLY open the interruption valve A.P. ("2").
- (7) On the high pressure manometer ("4"), verify the inlet pressure value at the inlet to the pressure reducer ("5").
- (8) If necessary, perform deaeration through the relief valve ("3") in the manner prescribed by the gas supplier.
- (9) Standing at the side of the pressure reducer ("5") point, turn the regulation valve clockwise until you reach the required pressure, while monitoring the pressure value on the low pressure manometer ("6").
- (10) *Make sure that the outlet pressure is constant for a period of at least 5 minutes.* Otherwise, immediately close the access valve to the A.P. reducer ("2"), decommission the reducer and file a complaint with the supplier.
- (11) *Inspect the sealing to detect possible gas leakage.*
- (12) If all the preceding steps were taken with a positive result, open SLOWLY the inlet interruption valve ("8") connected to the connection piece ("U").



**Figure 1 Gas flow**

A.P. High pressure or pressure in the pressure vessel  
 B.P. Low or reduced pressure  
 E Modular content  
 I Inlet connection  
 S Deaeration  
 U Outlet connection

1. Non-return valve A.P.
2. Interruption valve A.P.
3. Interruption relief valve
4. Manometer A.P.
5. Pressure reducer
6. Manometer B.P.
7. Overpressure valve
8. Interruption discharge valve

## **Annex No. 2 - Decommissioning of pressure vessels**

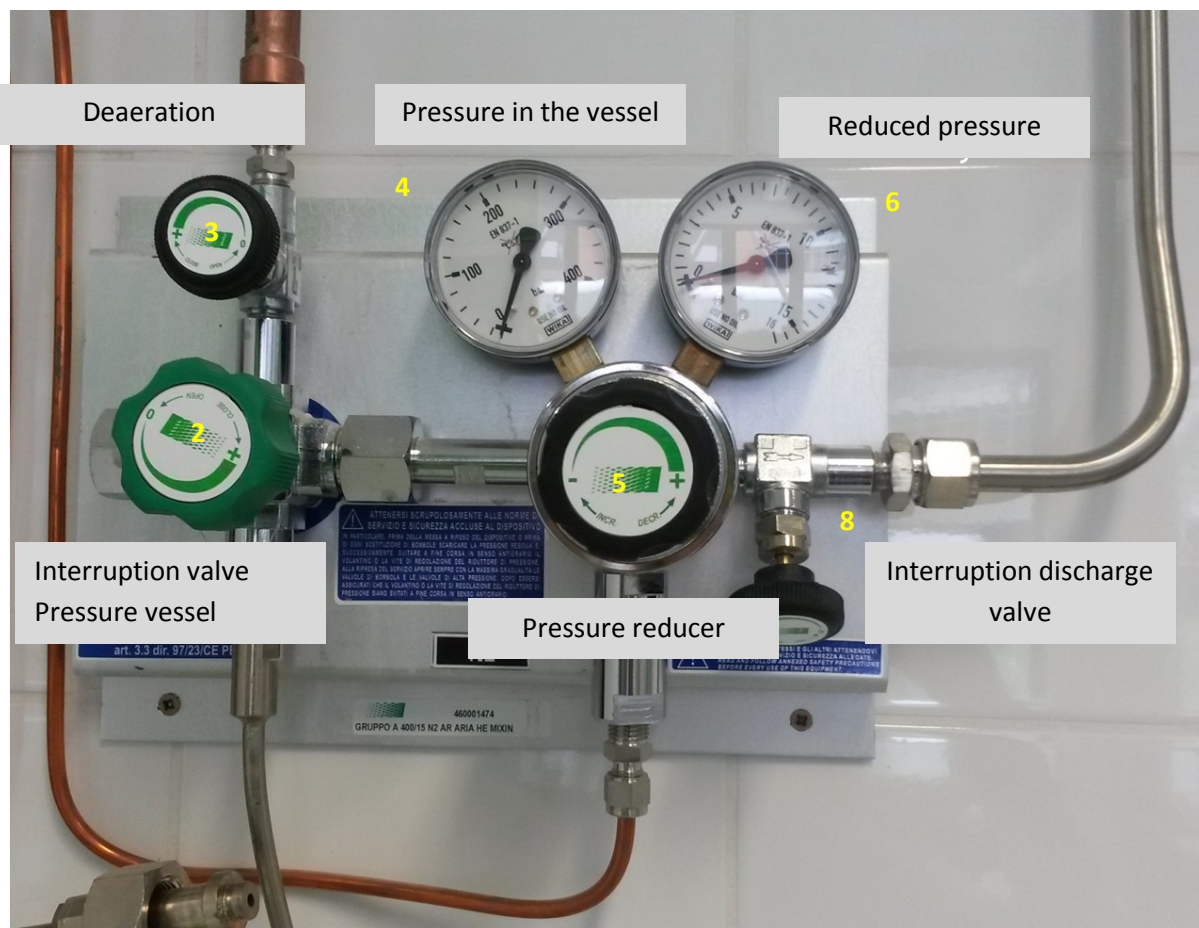
Procedure to be observed when decommissioning pressure vessels:

- a) Close the pressure vessel valve.
- b) Release the gas left in the group and on B.P. line.
- c) Make sure that the manometers A.P. ("4") and B.P. ("6") report zero (0) pressure value.
- d) Close the interruption valve A.P. ("2") of the group.
- e) Turn the pressure reducer regulation valve to the backstop counterclockwise ("5").



### Annex No. 3 - Replacement of empty vessels

- (1) Close the outlet valve ("8").
- (2) Turn the pressure reducer regulation valve to the backstop counterclockwise ("5").
- (3) Close the steel vessel valve. Subsequently, close the group valve ("2").
- (4) Replace the empty vessel, perform a preventive check of the integrity of pipe connections leading to the vessel and inspect whether the connections are clean and whether the lining is correct and compliant with applicable standards pertaining to pipes and hoses.
- (5) Do not lubricate the connections under any circumstances.



**Figure 2: Reduction station in a laboratory**