



ACCEPTED  
Council Decision  
Eurasian Economic Commission  
on July 2, 2013 № 41

**Technical regulations of Customs Union  
"On the safety equipment of high pressure"  
(TR TC 032/2013)**

**I. Scope**

1. This technical regulation establishes safety requirements for equipment in the development (design), production (manufacturing), as well as requirements for labeling equipment in order to protect human life and health, property, prevention of actions misleading consumers.

2. This technical regulation applies to the following types of equipment:

a) vessels for gases, liquefied gases, dissolved under pressure, vapors and used for working environments group 1 and having:

a maximum allowable operating pressure in excess of 0.05 MPa, a capacity greater than 0,001 m<sup>3</sup> and the product of the maximum allowable working pressure on the value of capacity, constituting more than 0.0025 MPa · m<sup>3</sup>;

a maximum allowable working pressure of over 20 MPa, capacity more than 0.0001 m<sup>3</sup> to 0.001 m<sup>3</sup> inclusive.

Categories receptacles for gases and used working environments for group 1 are shown in Table 1 of Annex 1 to the number of technical regulations;

b) Receptacles for gases, liquefied gases, dissolved under pressure, vapors and used to working fluid in group 2 and having:

a maximum allowable operating pressure in excess of 0.05 MPa, a capacity greater than 0,001 m<sup>3</sup> and the product of the maximum allowable working pressure on the value of the capacity of well over 0,005 MPa · m<sup>3</sup>;

a maximum allowable working pressure of more than 100 MPa, capacity more than 0.0001 m<sup>3</sup> to 0.001 m<sup>3</sup> inclusive.

Categories receptacles for gases and used for production environments 2 groups are shown in Table 2 of Annex 1 to the number of technical regulations;

c) intended to contain liquids used for working fluid in group 1 and having:

a maximum allowable operating pressure is above 0.05 MPa capacity of more than 0,001 m<sup>3</sup> and the product of the maximum allowable working pressure on the value of the capacity of well over 0.02 MPa · m<sup>3</sup>;

a maximum allowable working pressure greater than 50 MPa, capacity over 0.0001 m<sup>3</sup> to 0.001 m<sup>3</sup> inclusive.

Categories receptacles for liquids and used for working environments in group 1 are shown in Table 3 of Annex 1 to the number of technical regulations;

d) intended to contain liquids used for working fluid in group 2 and having:

a maximum allowable operating pressure in excess of 1 MPa capacity of more than 0.01 m<sup>3</sup> and the product of the maximum allowable working pressure on the value of capacity, is more than 1 MPa · m<sup>3</sup>;

a maximum allowable working pressure of more than 100 MPa, capacity over 0.0001 m<sup>3</sup> to 0.01 m<sup>3</sup> inclusive.

Categories of vessels designed for liquids and used for working fluid in group 2 are shown in Table 4 of Appendix 1 to the number of technical regulations;

e) boilers having a capacity of more than 0,002 m<sup>3</sup> , intended to produce hot water at a temperature above 110 °C, or steam , the excess pressure is above 0.05 MPa, and the vessels of the fired, having a capacity of more than 0,002 m<sup>3</sup>.

Categories of steam, hot water boilers and fired vessels are shown in Table 5 of Annex 1 to the number of technical regulations;

f) piping having a maximum allowable operating pressure above 0.05 MPa, a nominal diameter of 25 mm for gases and vapors are used for working fluid in group 1.

Categories pipelines intended for gases and vapors are used for working fluid in group 1 are shown in Table 6 application number 1 to this technical regulation;

g) pipes having a maximum allowable operating pressure in excess of 0.05 MPa, nominal diameter greater than 32 mm and the product of the maximum allowable working pressure on the nominal diameter over 100 MPa · mm for gases and vapors used for working fluid in group 2.

Categories pipelines intended for gases and vapors and used for production environments 2 groups are shown in Table 7 of Annex 1 to the number of technical regulations;

h) pipes having a maximum allowable operating pressure in excess of 0.05 MPa, nominal diameter of more than 25 the product of the MMI maximum allowable operating pressure value of the nominal diameter of more than 200 MPa · mm, intended for liquids and used for the working fluid in group 1.

Categories pipelines intended for liquids and used for the working fluid in group 1 are shown in Table 8 application number 1 to this technical regulation;

i) pipes having a maximum allowable operating pressure in excess of 1 MPa, a nominal diameter of 200 mm and the product of the maximum allowable working pressure on the nominal diameter of more than 500 MPa · mm, intended for liquids and used for working fluid in group 2.

Categories pipelines designed for liquids and used for production environments 2 groups are shown in Table 9 of the annex number 1 to this technical regulation;

j) items of equipment (assembly units) and accessories to it, pressure-resistant;

k) valves having a nominal diameter of 25 mm (for equipment with fluid group 1), fittings, having a nominal diameter of 32 mm (for equipment used for gas with fluid group 2), fittings, having a nominal diameter of 200 mm (for pipelines designed for liquids and used for working environments group 2);

l) showing and safety devices;

m) hyperbaric chambers (except single medical);

n) devices and safety equipment.

3. This technical regulation does not apply to the following products:

a) pipelines, local distribution and infield pipelines designed to transport gas, oil and other products, with the exception of equipment used on the pressure regulating stations or compression stations;

b) timing network and network gas consumption;

c) equipment specially designed for use in nuclear power equipment, working with radioactive environment;

d) vessels working under pressure created by the explosion inside them, in accordance with the process or during combustion mode of self-propagating high-temperature synthesis;

e) equipment specially designed for use in marine and river vessels and other floating objects and underwater applications;

f) braking equipment, railway rolling stock, vehicles and other vehicles; g) vessels specifically designed for use on aircraft and other flying machines;

g) equipment for defense purposes;

h) of the equipment shall not constitute separate vessels (hull pumps or turbines, steam engine cylinders, hydraulic, internal combustion engines, air compressors and machines);

i) single medical hyperbaric chambers; l) equipment with a spray bottle;

j) shell of high-voltage electrical equipment (switchgear, control gear, transformers and rotating electrical machines);

k) the shell casing of elements of the transmission of electric energy (power cables and communication cables) operating pressurized;

l) equipment manufactured (produced) of non-metallic flexible (elastic) shell;

m) silencers or exhaust gas suction;

n) vessel or siphons for carbonated beverages.

## II. Basic Concepts

4. For the purposes of this technical regulation of the concepts used are as follows:

"gas cylinders" - a cylinder having 1 or 2 neck to install valves, flanges or fittings designed for transportation, storage and use of compressed, liquefied or dissolved gases;

"pressure chamber" - a vessel, which creates a low and (or) high blood pressure, which is equipped with instruments and equipment, and in which people can be accommodated;

"barrel" - a vessel of cylindrical or other shape, which may be rolled from one place to another and put on the ends without additional supports and which is designed for the transportation and storage of liquid and other substances;

"commissioning" - documented event, fixing equipment availability for use (use);

"capacity" - the volume of the inner cavity of the equipment determined by the figures given nominal size;

"group operating environments" - a set of working environments, subdivided into:

group 1, which includes working environment consisting of a flammable, oxidizing, flammable, explosive, toxic and highly toxic gases, vapors and liquids in the single-phase state, as well as mixtures thereof;

group 2 includes all other Fluids which are not assigned to the group 1;

"internal pressure", "external pressure" - the overpressure acting on the inner or outer wall surface of the equipment;

"pressure test" - a positive pressure which is produced when the test equipment on the strength and density;

"working pressure" - the maximum overpressure caused the normal flow of the workflow

"pressure allowed" - the maximum operating pressure for the equipment (element), set on the basis of conformity assessment and (or) control based on strength;

"pressure rated" - pressure for which the calculation is performed on the strength equipment;

"pressure conditional" - design pressure at 20 °C, used in the calculation of the strength of standard vessels (components, parts, fittings);

"nominal diameter", "conditional pass" - numeric designation size value equal to the rounded internal diameter of which is indicated for all hardware components other than the components mentioned at the outer diameter or size of the thread. Nominal diameter and nominal inside diameter in millimeters without indication of dimension;

"identification equipment" - equipment classification procedure for the application of these technical regulations and the establishment of compliance of equipment accompanying technical documentation;

"manufacturer" - a legal entity or natural person registered as an individual entrepreneur, which carry out on its behalf manufacture or production and sale of equipment and are responsible for compliance with safety requirements of this technical regulation;

"exhaust gas boiler" - a device in which the source of heat used flammable gases or other process streams;

"Boiler Power Technological" - steam or boiler including soda recovery), in which the processing furnace process materials;

"electrode boiler" - steam or hot water boiler, which uses the heat generated by the flow of electric current through water;

"boiler with heating" - steam or hot water boiler, which uses the heat generated by the heating elements;

"fired boiler" - a device designed to heat water under pressure greater than atmospheric and used as a coolant is that device;

"steam boiler" - a device designed to produce steam at a pressure above atmospheric, this device is used;

"safety case" - document containing an analysis risks, as well as information out of the design, operational, technical documentation about the minimum necessary measures to ensuring safety that accompanies the equipment at all stages of the life cycle, and supplement the information about the results of the risk assessment at the stage of operation after a major overhaul;

"limit state equipment" - equipment condition in which its continued operation is unacceptable;

"intended use" - the use of equipment in accordance with its purpose and technical characteristics indicated in the technical documentation of the manufacturer;

"serial production" - the type of production, characterized by the manufacture of similar products on the model design decisions and (or) the use of standard processes associated with unchanging types of equipment, including assembly operations, for manufacturing (production) recurring items of equipment regardless of the types of further assembly;

"repair" - restoration of damaged, worn or dilapidated for any reason vascular elements with bringing them to a healthy state;

"resource assigned" - the total time above which the operation of the equipment must be stopped regardless of its technical condition;

"vessel" – hermetically closed receptacle (permanently installed or mobile), intended for conducting chemical, thermal and other processes, as well as for storage and transport of gaseous, liquid and other substances;

"lifetime appointment" - calendar duration of the operation of the equipment, above which operation should be stopped, regardless of its technical condition;

"the life of the settlement" - the life of a calendar year, set in the design and calculated from the date of commissioning of the equipment;

"fluid temperature" - the minimum (maximum) temperature of the medium at normal flow of technological process;

"the estimated wall temperature" - the temperature at which determined by the physical and mechanical properties, the allowable stress of the material and the calculation is carried out on the strength of pieces of equipment;

"wall temperature permissible" - the maximum (minimum) wall temperature at which permitted operation of the equipment;

"authorized manufacturer face" - registered in accordance with the laws of the State - a member of the Customs Union and the Common Economic space its territory a legal entity or natural person as an individual entrepreneur, operating functions of the foreign manufacturer under a contract with him in terms of ensuring compliance with the equipment requirements hereof and of the responsibility for non-hardware requirements hereof;

"safety device" - a device designed to protect vessels, boilers, piping from destruction in excess of permissible values of the pressure or temperature;

"cycle of life" - the time period since the release of the equipment manufacturer to its disposal;

"tank" - a mobile vessel permanently mounted on the frame rail platform on the vehicle chassis (trailer), including trucks, or other vehicles designed for the transport and storage of gaseous, liquid and other substances;

"maintenance of equipment" - the stage of the life cycle since the commissioning of the equipment prior to its disposal;

"piece of equipment" - the subassembly of equipment designed to perform one of its basic functions.

### **III. Market circulation**

5. Equipment is available in market circulation at present under its technical regulations and other technical regulations of the Customs Union, which apply to the equipment, and provided that it has passed the assessment (confirmation) of compliance in accordance with Section VI of these technical regulations and other technical regulations of the Customs Union, the effect of which it is subject.

6. Equipment, for which conformity the requirements of this technical regulation is not confirmed, should not be marked with [a unified mark of commerce](#) on the Customs Union Member States and are not allowed for release into commerce.

### **IV. Safety equipment in the development (design), manufacturing**

7. Equipment must be designed (designed) and manufactured (made) so that when used as directed, operation and maintenance ensures that it meets safety requirements.

8. In order to determine the risks to equipment must be factored represent the following major hazards:

- a) the presence of unprotected moving parts
- b) vibration,
- c) the highly explosive elements;
- g) invalid parameter deviations in design, assembly units and safety devices that may affect safety ,
- d) fire, emergencies of natural and manmade;

- e) overheating;
- f) the excess pressure (working pressure does not exceed the permitted);
- g) damage caused by the deposition of impurities working environment on the internal surfaces of equipment components,
- h) corrosion or other types of surface wear items of equipment; k) failure of safety devices and safety systems; l) Termination of auxiliary equipment; m) flame failure in the furnace combustion chamber;
- i) the disappearance of voltage on all test instruments, devices, remote and automatic control,
- j) reduction of the motive liquid below the minimum level;
- k) improving the working environment above the maximum permissible level;
- l) decrease coolant flow through the boiler below the minimum value;
- m) reducing the pressure in the coolant path boiler below the minimum level of significance;
- n) increase the coolant temperature at the outlet of the equipment to the limit specified by the manufacturer,
- o) the failure of the level gauges working environment of direct action.

9. For the identified hazards in the design risk assessment calculations, experimental, or by experts according to the operation of similar types of equipment.

10. Depending on the capacity of the equipment or the nominal diameter and maximum allowable working pressure is [classified by categories](#) (1st, 2nd, 3rd and 4th) in accordance with Annex 1 to this number the technical regulations.

11. Safety equipment is ensured by compliance with the development (design), manufacturing (production) of the safety requirements set out in this section and Appendix number 2 to this technical regulation.

12. In manufacturing (production) of equipment and safety devices provided by the manufacturer of their compliance with the parameters and characteristics set design documentation and the requirements hereof.

13. The manufacturer is testing the equipment in the project design.

14. Deviations from project documentation in the production (manufacturing) equipment coordinated with the developer (designer).

15. Equipment must be safe for the lifetime when the consumer ensure its safety established in the technical documentation.

16. [Technical documentation](#) accompanying the equipment includes:

- a) [a passport equipment](#);
- b) [a copy of the safety case](#);
- c) general drawing;
- d) passport safety devices (if any, in accordance with the project documentation);
- e) payment capacity of the relief devices (if any, in accordance with the project documentation);
- f) calculation of strength equipment;
- g) [operating \(user\) manuals](#);
- h) the drawings, diagrams, calculations, and other documentation in accordance with the supply (contract).

17. Certificate of equipment is the main document to identify the equipment.

A passport is mandatory for equipment handling equipment in the customs territory of the Customs Union at all stages of the life cycle of the equipment.

Passport issued equipment manufacturer.

Passport stamp affixed equipment manufacturer and the date of its registration.

18. Depending on the type of equipment certificate of equipment shall contain information in accordance with paragraphs 19 - 23 of these technical regulations.

19. Passport pipeline includes the following information:

- a) the name and address of the owner;
- b) appointment;
- c) the date of manufacture (production);
- d) the work environment;
- d) the operating parameters of the working environment: pressure, MPa (kgf/cm<sup>2</sup>)  
temperature, °C;
- e) the life expectancy;
- f) design life;
- g) the estimated number of starts;
- h) diagrams, drawings, certificates and other documents for manufacturing (production) and the installation of the pipeline.

20. Passport boiler includes the following information (the amount of information forms the manufacturer depending on boiler type):

a) general information:

name and address of the manufacturer;

date of manufacture (production);

type (model);

name and designation;

serial number;

estimated lifetime;

design life of the boiler and main parts;

estimated number of starts;

the geometric dimensions of the boiler and its components;

b) specifications and parameters:

the estimated fuel and its calorific value, MJ / kg (kcal / kg);

fuel consumption, m<sup>3</sup> / h (t / h);

the type and characteristics of the furnace system (burners);

calculated, business, test pressure, MPa (kgf / cm<sup>2</sup>);

the maximum allowable flow resistance boiler at nominal performance, MPa (kgf / cm<sup>2</sup>);

the minimum allowable pressure rated temperature, MPa (kgf / cm<sup>2</sup>);

the nominal temperature of the steam leaving the boiler, °C;

the estimated temperature of the superheated steam (liquid), °C;

the nominal temperature of the liquid at the boiler inlet, °C;

nominal and maximum fluid temperature exiting the boiler, °C;

nominal, minimum and maximum allowable steam, t / h;

nominal, minimum and maximum output in kW;

surface heating boiler and main parts, m<sup>2</sup> ;

capacity, m<sup>3</sup> ,

the minimum and maximum allowable flow rate , m<sup>3</sup> / h;

c) details about the safety devices (including the type, quantity, location of installation, cross-sectional area, nominal diameter, flow coefficient in vapor or liquid, the value (range) of the opening);

d) information about liquid level indicator (water) (including a pointer type, quantity, location of installation);

e) information on the main fixture (including the number, nominal diameter, nominal pressure, operating parameters, body material, installation location);

f) information on the basic equipment for measurement, control, signaling, control and automatic protection (including the number, type (name));

g) information about the pumps (including the type, number, operating parameters, drive);

h) information about the basic elements of the boiler manufactured (made) from sheet steel (including the number, size, material, welding and heat treatment);

i) information on the elements of the boiler manufactured (made) from the pipes (including the number, size, material, welding and heat treatment);

j) information on fittings, lids, bottoms, reducers, flanges (including the number, size, material);

k) information on the coolant (including the name, the maximum allowable operating temperature, ignition temperature in an open space, the solidification temperature, boiling temperature change (curve) the boiling temperature depending on the pressure, other data affecting the safe operation),

l) drawings, diagrams, drawings boiler and its essential elements and other documents (summary sheet factory changes, pick list, indicating the specification the main dimensions of assembly units, etc.); n) other information to ensure safe operation of the boiler.

21. Passport vessel includes the following information:

a) General information:

name and address of the manufacturer;

date of manufacture (production);

serial number;

expected lifetime;

b) information on the technical characteristics and parameters:

business, design, test pressure, MPa ( $\text{kgf} / \text{cm}^2$ );

working fluid temperature,  $^{\circ}\text{C}$ ;

the estimated wall temperature,  $^{\circ}\text{C}$ ;

the minimum allowable negative wall temperature,  $^{\circ}\text{C}$ ;

the name of the working environment;

group working environment;

increase to compensate for corrosion (erosion), mm;

capacity,  $\text{m}^3$ ;

the mass of the empty vessel, kg;

maximum weight of filled environment kg;

c) information about the main parts (including the number, size, material, welding (soldering));

d) information on the fittings, flanges, caps, fasteners ( including the number, size, material);

e) information on the safety devices, the main fixture, measuring devices, safety devices (including the number, nominal diameter, design pressure, body material, installation location);

f) drawings, diagrams, drawings and other documents of the vessel (combined leaf plant changes, a pick list, the specification with principal dimensions of assembly units, etc.);

g) other information to ensure safe operation of the vessel.

22. Passport gas cylinder includes the following information:

a) General information:

name and address of the manufacturer;  
date of manufacture (production);  
designation of the gas cylinder;  
wednesday, which is designed for the gas cylinder;  
serial number;

b) Information on the technical characteristics and parameters:

working pressure, MPa (kgf / cm<sup>2</sup>);  
test pressure, MPa (kgf / cm<sup>2</sup>);  
the basic dimensions gas cylinders, drawing;  
capacity, l,  
weight, kg;  
neck thread;  
sealing manholes;  
operating temperature range, °C;  
the maximum number of refills;  
the design life from date of manufacture (production) years;

c) requirements for transport and storage gas cylinder;

d) requirements for installation of the gas cylinder;

e) requirements for the operation of the gas cylinder;

f) other information to ensure safe operation of the gas cylinder.

23. Passport valve includes the following information:

a) General information:

name and address of the manufacturer;  
date of manufacture (production);  
the name, designation and identification (serial) number;  
appointment reinforcement;  
information on conformity assessment;

b) information about the technical parameters:  
diameter Nominal (DN);  
nominal pressure (PN) or working pressure (Pp), MPa (kgf / cm<sup>2</sup>);  
working environment; fluid temperature, °C; obturator tightness;  
climatic performance and environmental parameters;  
the type of connection to the pipeline;  
hydraulic characteristics (coefficient of resistance, or conditional bandwidth, or flow coefficient);  
resistance to external influences (if you must specify this information);  
weight in kilograms; reliability indices;  
indicators safety  
type and its main technical characteristics;

c) gives information on the major parts;

d) other information to ensure safe operation of the boiler.

24. Manufacturer may supplement the information specified in paragraphs 19 - 23 of these technical regulations, information reflecting the specific design features of the equipment.

25. Justification safety equipment prepares to stage of development (design) of the equipment.

The justification given safety risk analysis for the equipment, as well as the minimum necessary safety measures.

Original of the safety equipment is kept by the developer (designer), and a copy - the manufacturer of the equipment and organization, operating equipment.

26. Equipment manufacturer shall provide guidance equipment (instruction) manual.

Guide (user) manual prepared on stage of development (design) of the equipment.

27. Manual (user) manual includes:

a) information on the design, principle of operation, characteristics (properties) equipment;

b) instructions for installation or assembly, setup or adjustment, maintenance and repair of equipment;

c) guidance on the use of equipment and safety measures that must be taken when using the equipment (including commissioning, proper use and maintenance of all types of repair, periodic diagnostics, testing, transportation, packaging, preservation and storage conditions);

d) assigned readings (the appointed time storage specified lifetime and (or) the assigned resource) depending on the design features.

After designated indicators (designated retention period specified lifetime and (or) the assigned resource) specified in the user manual (instruction) manual, stops operation of the equipment and to decide on the direction of its repair, or disposal of, or the testing and the establishment of new designated indicators (assigned resource shelf life, life);

- e) a list of critical failures, possible false operations, which lead to an incident or accident
- f) personnel actions in the event of an incident, accident or critical failure;
- g) limit state criteria;
- h) instructions for decommissioning and disposal;
- i) information on the qualifications of the service staff;
- j) the name, location and contact information of the manufacturer (manufacturer's authorized person), the importer.

28. Manual (user) manual prepared in Russian and with the appropriate requirements in the legislation of the Member States of the Customs Union and the Common Economic Space (hereinafter - the Member States) in the official languages of the Member States.

Manual (user) manual is issued on paper when this may be accompanied by a set of operational documents on electronic media. Non-domestic equipment to the kit manufacturer's choice of destination may be accompanied by guide (manual) operating only on an electronic medium.

29. On the equipment shall be marked in a clearly legible and indelible label, containing the following information:

- a) name and (or) type designation, make, model, equipment,
- b) parameters and characteristics affecting safety;
- c) name of the material from which made (produced) equipment (items);
- d) trademark of the manufacturer (if available)
- e) the serial number;
- f) the date of manufacture (production).

30. Location of that marking is determined by the design organization and is specified in the user manual (instruction) manual.

If the information specified in paragraph 29 of this technical regulation can not be applied directly to the equipment, they can only be specified in the attached to this equipment manual (instructions) for operation.

31. Equipment designed for the transport of liquefied petroleum gas (gas cylinder and tankers), applied distinctive coloring and identification information in accordance with the requirements of the application number 3 to this technical regulation. When coating (plating) of equipment corrosion-resistant and heat-insulating materials paint the entire length can not be made.

32. Elements and completing equipment labeled in accordance with the contract for the supply of (contract). Labelling should provide their identification.

33. Technical documentation on the equipment stored at the manufacturer (person designated by the manufacturer) for the design life from the date of removal from the production of this equipment or the termination of its production.

34. Terms of the equipment established by the legislation of the Member States.

## V. Ensuring compliance with safety requirements

35. Match equipment requirements hereof provided by direct implementation of these requirements or by the requirements of the standards included in the list of standards as a result of which, on a voluntary basis, compliance with these technical regulations.

36. Research methods (tests) and measurements of equipment set standards included in the list of standards containing the rules and methods of researches (tests) and measurements, including the rules of sampling required for the application and enforcement of the requirements of this Technical Regulation and implementation of assessment (confirmation) of compliance equipment.

## VI. Rating (s) matching equipment

37. Equipment manufactured in circulation in the customs territory of the Customs Union, subject to evaluation (confirmation) of compliance requirements hereof.

38. Grade (s) that equipment requirements hereof is held in the form of state control (supervision) in the form of conformity.

39. State control (supervision) over observance of this technical regulation is carried out in accordance with the laws of the Member States.

40. Demonstration of compliance with the equipment requirements hereof (hereinafter - the conformity assessment) is done by:

a) certification by an accredited certification body (assessment (confirmation)) included in the Unified Register of certification bodies and testing laboratories (centers) of the Customs Union (hereinafter - the body certification),

b) declaration of conformity based on their own evidence, and (or) evidence obtained with the certification body or an accredited testing laboratory (center) included in the Unified Register of certification bodies and testing laboratories (centers) of the Customs Union (hereinafter - accredited testing laboratory).

41. Demonstration of compliance is carried out according to the schemes of certification and declarations established by the present technical regulation.

42. Declaration of conformity of the equipment requirements hereof is held by the applicant in respect of equipment 1st and 2nd categories, as well as any equipment category to which manufacturing using permanent connections provided on-site testing.

43. Certification is carried out on equipment 3-yi 4th categories.

44. The only document that confirms that the equipment requirements hereof, is either a declaration of conformity or the certificate of conformity.

45. In carrying out conformity applicant generates a set of documents for the equipment, which includes:

a) [safety case](#);

b) [passport equipment](#);

c) [manual \(user manual\) manual](#);

d) project documentation;

e) the results of calculations of the strength and capacity of safety calculations devices (if any, in accordance with the project);

f) technological regulations and information on the process (data on the materials used, semi-finished products, components, welding materials, the methods and parameters of welding and heat treatment methods and results of non-destructive testing);

g) details of [the tests \(measurements\)](#);

h) the test equipment, the manufacturer's authorized by the manufacturer and the person (or) accredited testing laboratory;

i) a document confirming the characteristics of materials and components (if any);

j) certificates of conformity declaration of conformity or test reports for materials, components (if any);

k) a list of the standards referred to in section V of the technical regulations that have been applied in the production (manufacturing) equipment (if they are used by the manufacturer);

l) documents confirming the qualification of professionals and staff of the manufacturer;

n) other documents directly or indirectly confirming that the equipment requirements hereof (subject to availability).

46. Declaration of conformity of the equipment requirements hereof carried out as follows:

a) Scheme 1d applied to commercially available equipment 1 and 2 categories, while the applicant generates a set of documents referred to in paragraph 45 of this technical regulation, production control and performs takes measures to ensure that the manufacturing process ensures conformity of the equipment requirements hereof, is testing samples to the testing laboratory or an accredited testing laboratory receives and records the declaration of conformity;

b) scheme applies to 2d games equipment (single product) 1 and 2 categories, while the applicant generates a set of documents referred to in paragraph 45 of this technical regulation, is testing samples to the testing laboratory or an accredited testing laboratory receives and records the declaration of conformity,

c) 3d scheme applies to mass-produced items of equipment 1 and 2 categories of components and equipment 1 and 2 categories, while the applicant generates a set of documents referred to in paragraph 45 of this technical regulation implements production control and takes measures to ensure that the manufacturing process ensures compliance elements equipment and components requirements hereof, is testing samples in accredited testing laboratory receives and records the declaration of conformity,

d) scheme 4d applies to party members equipment 1st and 2nd categories of equipment and components 1 and 2 categories, while the applicant generates a set of documents referred to in paragraph 45 of this technical regulation, is testing samples in accredited testing laboratory receives and records the declaration of conformity,

d) 5d scheme applies to equipment 1, 2, 3 and 4 categories, to which manufacturing using permanent connections provided on-site testing in the following cases:

it is impossible to conduct tests in full prior to installation on site of its operation;

the development (design) and manufacturing (production) equipment not applied the standards referred to in paragraph 36 of this technical regulation, including innovative equipment. During use of the 5d applicant generates a set of documents referred to in paragraph 45 of this technical regulation implements production control and takes measures to ensure that the manufacturing process ensures conformity of the equipment requirements hereof, and directs the certification application for the type of research equipment;

certification body is conducting a study based on the type of equipment received from the applicant's documents. If the applicant has not applied the standards referred to in paragraph 36 of these technical regulations, the certification body assesses the possibility of replacing the requirements of these standards stated requirements. Study the type of equipment depending on the documents submitted by the applicant is conducted by one of the following methods:

survey sample as representative of all subsequently produced equipment;

study the documents submitted, the test sample or core (critical) parts of the equipment;

registration and issuance of the applicant certification body for positive research findings equipment type certificate for the type of equipment on a single form, approved by the

decision of the Eurasian Economic commission. This certificate is an integral part of the declaration of conformity. Contained therein stated hardware requirements as set forth sufficient proof equipment compliance with these technical regulations, used for checking compliance with these technical regulations conducted by bodies of state control (supervision),

the applicant receives a declaration of conformity and implements its registration in the prescribed manner.

47. When declaring the conformity schemes 1d, 3d and 5d applicants may be registered in accordance with the legislation of the Member State in its territory a legal entity or natural person as an individual entrepreneur, in the manufacture or persons authorized by the manufacturer.

When declaring conformity schemes 2d and 4d applicants may be registered in accordance with the legislation of the Member State in its territory a legal entity or natural person as an individual entrepreneur, are manufacturers, sellers or persons authorized by the manufacturer.

48. As evidentiary materials that are the basis for the declaration on the basis of his own evidence, used the documents referred to in paragraph 45 of these technical regulations, and standards specified in Section V of this technical regulation.

49. The test reports of equipment can be used for evidentiary purposes, are the basis for the adoption of a declaration on the basis of own evidence, if in them the values of indicators, confirming that the claimed equipment all apply to him the requirements hereof.

50. The declaration of conformity is issued in accordance with gray form the declaration of conformity with the technical regulations of the Customs Union and the rules of the form, approved by the Decision Board of Eurasian Economic Commission dated December 25, 2012 № 293.

51. The declaration of conformity shall be registered in the prescribed manner. The declaration of conformity starts from the date of registration in the Unified Register of issued certificates of conformity and declarations of conformity registered. Validity of the declaration of compliance with commercially available equipment is not more than 5 years. For party equipment (single product) validity of the declaration of conformity is not installed.

Declaration of Conformity party hardware requirements hereof applies only to equipment belonging to a particular party.

52. Certification of equipment is carried out as follows:

a) Scheme 1c applies to commercially available equipment, wherein:

the applicant generates a set of documents referred to in paragraph 45 of these technical regulations, and submit an application for certification to the certification body, certification body carries out sampling the applicant for testing; accredited testing laboratory is testing samples of the equipment; certification body conducts analysis of the production of the manufacturer and the results of sample testing equipment and positive results gives the applicant a certificate of conformity,

certification body conducts inspection control of certified equipment by testing samples accredited testing laboratory and (or) analysis of production,

b) 3c scheme applies to party equipment, wherein:

the applicant generates a set of documents referred to in paragraph 45 of these technical regulations, and submit an application for certification to the certification body, certification body or accredited testing laboratory carries out sampling of the applicant to carry out tests, accredited testing laboratory is testing samples of the equipment, the certification body analyzes the results of sample testing equipment and positive results gives the applicant a certificate of conformity;

c) 4c scheme applied to a single product, with this:

the applicant generates a set of documents referred to in paragraph 45 of these technical regulations, and submit an application for certification to the certification body, which shall contain the identifying characteristics of a single product,

the certification body shall notify the applicant a decision on the application containing the conditions of certification;

accredited testing Laboratory on behalf of the certification body is testing a single product, the certification body analyzes the results of a single product tests and positive results shall issue a certificate of conformity;

d) 7c scheme applies to equipment intended for registration in the batch and mass production, as well as in event planning modifications to the equipment at that:

the applicant generates a set of documents referred to in paragraph 45 of this technical regulation, and applies for the certification to the certification body,

certification body conducts research equipment type one of the following ways:

examining a sample of equipment for production as planned a typical representative of all future products; analysis of technical documentation, sample test equipment or major components.

Findings drew the conclusion, in which the certification body assesses the type of equipment conformity with the requirements.

Analysis of production, the applicant held by the certification body. Results of the analysis are drawn act.

Positive results of the study the type of equipment and production analysis certification body draws up a certificate of conformity, and outputs it to the applicant.

53. The certification body conducts inspection control of certified equipment for the duration of the certificate by testing samples of the equipment by accredited testing laboratory and (or) analysis of production. With the positive results of the inspection control the certificate of conformity shall be considered approved as specified in the act of surveillance. With negative results of the inspection control certification body shall take one of the following decisions:

a) suspend the certificate of conformity;

b) cancel the certificate of conformity.

54. When making changes to the design (composition) of the equipment or the technology of its production, which may affect the conformity of the equipment requirements hereof, the applicant in advance in writing notify the certification body, which decides on the need for new tests and (or) analysis of production equipment.

55. When certification schemes 1c and 7c applicants may be registered in accordance with the legislation of the Member State in its territory a legal entity or individual person as a sole proprietorship, in the manufacture or persons authorized by the manufacturer.

When certification schemes 3c and 4c applicants may be registered in accordance with the legislation of the Member State in its territory a legal entity or individual person as an individual entrepreneur, the manufacturer, sellers or persons authorized by the manufacturer.

56. The applicant may apply to the application for certification in any certification body having the proper scope of accreditation.

57. Certificate of Compliance issued in accordance with the unified form of the certificate of conformity with the technical regulations of the Customs Union and its design rules, approved by the Decision Board of Eurasian Economic Commission dated December 25, 2012 Ne 293.

58. Validity of the certificate of conformity of the equipment is:

a scheme in which 1c, 3c and 4c - 5 years

a scheme in which 7c - during its service life, or assigned resource.

59. Documents and materials confirming certification results are stored in the certification body that issued the certificate of conformity for the design life of the equipment passed the certification procedure.

60. At the request of customers (buyers) and (or) interested litskopiya declaration of conformity or the certificate of conformity must be provided to them free of charge by the manufacturer (person authorized by the manufacturer) or the seller.

## **VII. Marking equipment single sign of products on the market of the Member States of the Customs Union**

61. Equipment that meets the requirements hereof and elapsed conformity assessment procedures, one marked with a mark of products on the market of the Member States of the Customs Union.

62. Marking a single sign of products on the market states - members of the Customs Union is carried out before the release of the equipment in circulation in the market.

63. Single sign of products on the market of the Customs Union member states is applied to each piece of equipment in any way, providing crisp and clear images for the entire life of the equipment, as well as given in annexed operational documents.

64. Marking equipment single sign of products on the market of the Customs Union member states indicates compliance with its requirements of technical regulations of the Customs Union, applicable to this equipment and providing for the application of a single mark of products on the market of the Member States of the Customs Union.

## **VIII. Safeguard clause**

65. Authorized bodies of the Member States shall take all measures to control and ban of issue equipment in the customs territory of the Customs Union, as well as withdrawal from the market of equipment that does not meet the requirements hereof.

In this case the competent authority of a Member State shall notify the competent authorities of other Member States of its decision stating the reason for its adoption and the provision of evidence, explaining the need for the implementation of this measure.

## CLASSIFICATION

### equipment for hazard categories

1. [Equipment categories are determined](#) in accordance with Table 1 - 9 of this document.

Safety devices are classified according to category 4, with the exception of safety devices manufactured (made) for the specific equipment that can be classified in the same category as the equipment for which they made (produced).

2. Category of equipment intended for use with design temperature above the transition temperature creep of metal increases by 1 (except category 4).

3. Transition temperature creep is:

400 °C - for carbon and low alloy steels silico;

450 °C - for low-alloy chromium-molybdenum and molybdenum vanadium steel,

525 °C - for high-chromium alloy martensitic and austenitic steels class;

575 °C - for the iron-nickel alloys and nickel basis.

**Table 1 Categories receptacles for gases and used for working environments group 1**

Category	Capacity equipment (m <sup>3</sup> )	The product of the maximum allowable working pressure and capacity values (MPa • m <sup>3</sup> )	Maximum allowable working pressure (MPa)
1	2	3	4
1st	more than 0,001	more than 0.0025 to 0.005 inclusive	above 0.05
2nd	more than 0,001	above 0.005 to 0.02 inclusive	above 0.05
3rd	more than 0.0001 to 0.001 inclusive	not standardized	Over 20 to 100 inclusive
	more than 0,001	more than 0.02 to 0.1 inclusive	above 0.05
4th	more than 0.0001 to 0.001 inclusive	not standardized	over 100
	more than 0,001	above 0.1	above 0.05

**Table 2 Categories receptacles for gases and used for working environments group 2**

Category	Capacity equipment (m <sup>3</sup> )	The product of the maximum allowable working pressure and capacity values (MPa • m <sup>3</sup> )	Maximum allowable working pressure (MPa)
1	2	3	4
1st	more than 0,001	above 0.005 to 0.02 inclusive	above 0.05
2nd	more than 0,001	more than 0.02 to 0.1 inclusive	above 0.05
3rd	more than 0.0001 to 0.001 inclusive	not standardized	above 100 to 300 inclusive
	more than 0,001 to 1 inclusive	greater than 0.1 up to 0.3 inclusive	above 0.05
	over 1	not standardized	above 0.05 to 0.4 inclusive
4th	more than 0.0001 to 0.001 inclusive	not standardized	More than 300
	more than 0,001 to 1 inclusive	more than 0.3	more than 0.4
	over 1	not standardized	more than 0.4

**Table 3 Categories receptacles for liquids and used for working environments group 1**

Category	Equipment capacity (m <sup>3</sup> )	The product of the maximum allowable working pressure on the capacity value (MPa • m <sup>3</sup> )	Maximum allowable working pressure (MPa)
1	2	3	4
1st	above 0.01	over 0.02	more than 0.05 to 1, inclusive
2nd	more than 0,001	over 0.02	more than 1 to 50
	more than 0.0001 to 0.001 inclusive	not standardized	over 50
3rd	more than 0,001	not standardized	over 50

**Table 4 Categories receptacles for liquids and used for working environments group 2**

Category	Equipment capacity (m <sup>3</sup> )	The product of the maximum allowable working pressure on the capacity value (MPa • m <sup>3</sup> )	Maximum allowable working pressure (MPa)
1	2	3	4
1st	above 0.01	over 1	more than 1 to 50
2nd	more than 0.0001 to 0.01 inclusive	not standardized	over 100
	above 0.01	over 1	over 50

**Table 5 Categories of steam, hot water boilers and vessels fired**

Category	Equipment capacity (m <sup>3</sup> )	The product of the maximum allowable working pressure on the capacity value (MPa • m <sup>3</sup> )	Maximum allowable working pressure (MPa)
1	2	3	4
1st	more than 0.002 to 0.1 inclusive	to 0.005 inclusive	above 0.05
2nd	more than 0.002 to 0.4 inclusive	above 0.005 to 0.02 inclusive	above 0.05 to 3.2 inclusive
3rd	more than 0.002 to 1, inclusive	more than 0.02 to 0.3 inclusive,	above 0.05 to 3.2 inclusive
4th	more than 0.002 to 0.01 inclusive	not standardized	Over 3.2
	more than 0.01 to 1, inclusive	more than 0.3	more than 0.3
	over 1	not standardized	above 0.05

**Table 6 Categories pipelines intended for gases and vapors and used for working environments group 1**

Category	Nominal Diameter (mm)	The product of the maximum allowable working pressure on the nominal diameter (MPa • mm)	Maximum allowable working pressure (MPa)
1	2	3	4
1st	more than 25 to 100 inclusive	not standardized	more than 0.05 to 1, inclusive
	more than 25 to 100 inclusive	to 100, inclusive	more than 3.5 to 1, inclusive
2nd	above 100 to 350 inclusive,	not standardized	more than 0.05 to 1, inclusive
	over 25 to 350 inclusive	above 100 to 350 inclusive,	more than 3.5 to 1, inclusive
	more than 25 to 100 inclusive	not standardized	over 3.5
	inclusive		
3rd	more than 350	not standardized	more than 0.05 to 1, inclusive
	above 100 to 350 inclusive,	more than 350	more than 3.5 to 1, inclusive
	over 100	not standardized	over 3.5

**Table 7 Categories pipelines intended for gases and vapors and used for working environments Group 2**

Category	Nominal Diameter (mm)	The product of the maximum allowable working pressure on the nominal diameter (MPa • mm)	Maximum allowable working phenomenon (MPa)
1	2	3	4
1st	more than 32	over 100 to 350 inclusive	above 0.05 to 3.2 inclusive
	from 32 to 100 inclusive	not standardized	Over 3.2
2nd	over 100	above 350 to 500 inclusive,	above 0.05 to 3.2 inclusive
	above 100 to 250 inclusive	not standardized	Over 3.2
3rd	More than 250		Over 3.2
	More than 250	More than 500	above 0.05 to 3.2 inclusive

**Table 8 Categories pipelines designed for liquids and used for working environments group 1**

Category	Nominal Diameter (mm)	The product of the maximum allowable working pressure on the nominal diameter (MPa • mm)	Maximum allowable working pressure (MPa)
1	2	3	4
1st	more than 25	more than 200	more than 0.05 to 1, inclusive
2nd	more than 25	more than 200	over 1 to 8 inclusive
	more than 25	more than 350	from 8 to 50 inclusive,
3rd	more than 25	not standardized	over 50
	inclusive		
3rd	more than 350	not standardized	more than 0.05 to 1, inclusive
	above 100 to 350 inclusive,	more than 350	more than 3.5 to 1, inclusive
	over 100	not standardized	over 3. 5

**Table 9 Categories pipelines designed for liquids and used for working environments Group 2**

Category	Nominal Diameter (mm)	The product of the maximum allowable working pressure on the nominal diameter (MPa • mm)	Maximum allowable working pressure (MPa)
1	2	3	4
1st	more than 200	More than 500	more than 1 to 50
2nd	more than 200	not standardized	over 50

## REQUIREMENTS

### Safety Equipment in the development (design), manufacturing

1. In developing (designing) equipment is calculated taking into account the strength of its projected loads that may arise during its operation, transport, transportation, installation and predictable deviations from such loads. This takes into account the following factors:

- a) the loads acting on the inner and outer surfaces of the equipment,
- b) an ambient temperature, and fluid temperature,
- c) the static pressure and pressure operating conditions in terms of the weight of the test content to the equipment;
- d) inertial load motion, wind and seismic effects;
- e) reactive force (reaction), which are transmitted from the poles, fixtures, piping;
- f) fatigue under variable loads;
- g) erosive and corrosive effects of the environment, including erosion-corrosion wear;
- h) chemical reaction media because of the instability and recycled process;
- i) changes in the mechanical properties of the materials during operation.

2. Equipment must exclude the possibility of harm in case of:

- a) opening and closing hatches or equipment condition monitoring devices;
- b) technological operations associated with the production of equipment under pressure, putting into operation mode, as well as relieving;
- c) implementation of technological operations associated with the risk of falling from the work site personnel for servicing;
- d) of the equipment inside the overpressure or vacuum when the people inside this equipment;
- e) inadmissible temperature of the external surfaces;
- f) decomposition of unstable environments.

3. Equipment shall be designed to allow inspections needed to verify its compliance with safety requirements.

4. Project equipment defined by its boundaries (limits).

5. Project depending on the destination equipment should provide his equipment:

- a) safety devices,
- b) means for measuring the level of liquid working medium;
- c) means for measuring pressure;

- d) means for measuring the temperature of the working environment;
- e) stop and control valves,
- f) nutritional devices ,
- g) means for controlling the thermal displacement.

6. Equipment design should provide safe access to the devices and safety monitoring devices parameters of the working environment equipment.

7. Equipment project application should include:

- a) the means of monitoring and measurement, the error in the working conditions which do not exceed the maximum permissible deviation of the control parameter,
- b) measuring means in accordance with the operating conditions of the equipment.

8. Project shall be equipped with the equipment and protection devices drainage venting allows:

- a) to avoid water hammer, vacuum failure, corrosion or of uncontrolled chemical reactions (in this case must be considered during the operation and tests);
- b) ensure safe cleaning, inspection and maintenance service.

9. Equipment project should provide safety processes filling or draining the equipment in case of:

- a) an overflow or overpressure, as well as the need of the equipment under pressure arising periodically while filling equipment;
- b) uncontrolled draining work environment when draining equipment
- c) safety, associated with connection to a pressure source and disconnecting from it during filling and discharging equipment.

10. In order to prevent corrosion, erosion-corrosion wear or other chemical to the fluid during operation and protection from equipment provided:

- a) minimization of impacts due to structural performance,
- b) the possibility of replacing items of equipment that may be subject to this effect.

11. If necessary, equipment is equipped with devices allowing minimizing the consequences for external ignition.

Provide extra lighting for safe operation of equipment. Internal parts and field equipment requiring frequent inspection, adjustment and maintenance, should have lighting that provides safety.

12. In the equipment for which there is a risk of overheating, eliminated or minimized factors arising from overheating and reduce its safety. For these purposes, provided:

- a) the device to limit supply or remove heat, limiting the level of the working environment in order to avoid local overheating or common metal;
- b) sampling sites working environment in order to assess its impact on the formation of deposits of impurities and (or) corrosion damage ,
- c) measures to prevent the damage associated with deposits of impurities;

g) for the safe removal of residual or excess heat after shutdown equipment

d) measures to exclude education highly explosive mixtures and flame propagation (flame arrestors plamyatsekateli, hydraulic gates).

13. Evaluation of the strength of equipment based on the methods of calculation or on the results of experimental tests without calculation applied in cases where the product of the maximum allowable working pressure value and capacity of the equipment is less than  $0.6 \text{ MPa} \cdot \text{m}^3$ , or if the product of the maximum allowable working pressure and the nominal diameter of less than  $300 \text{ mPa} \cdot \text{mm}$ .

14. To calculate the strength of the equipment, the following calculation methods that can complement each other:

a) using the formulas given in the rules based on strength equipment;

b) on the basis of the numerical analysis of the stress state,

c) based on a consideration of limit states and fracture mechanics.

15. In calculating the strength of taking into account all possible load factors and the probability of their simultaneous occurrence, all possible failure mechanisms (viscous or fragile materials creep, fatigue of materials, corrosion cracking) in accordance with the purpose and process equipment operation.

16. For strength equipment requires the following conditions:

a) the value of the design pressure shall be not less than the maximum allowable working pressure for which the equipment is intended. Calculated amount of pressure into account static head and dynamic load working environment, an increase in pressure due to the instability of working environments and processes. Equipment consisting of multiple cameras, working with different pressures for the design pressure taken or each pressure alone or pressure, which requires greater wall thickness calculated piece of equipment;

b) the calculated temperature set safe limits on the use of materials and equipment;

c) equipment and materials from which manufactured (made) the equipment used in the design temperature range,

d) take into account all possible combinations of pressure, temperature and other stresses occurring during operation, transportation, transportation and testing equipment.

17. In calculating the strength of materials into account the following characteristics:

a) yield strength, yield strength at 0.2 percent and 1 percent of the permanent deformation at normal temperatures and settlement;

b) tensile strength (tensile strength), tensile normal and calculated temperatures;

c) limit long-term strength and creep strength at the design temperature and a specified number of hours;

d) g) characteristic of low-cycle fatigue strength, or for a given number of cycles and stress levels;

e) Young's modulus (Young's modulus) and calculated at normal temperatures,

f) values of plastic deformation Breaking standard samples;

g) toughness;

h) fracture toughness (stress intensity factor).

18. Strength calculations are made taking into account the strength of welded joints coefficients whose values depend on the materials to be welded, welding technology (soldering), form of the compound, method and extent of nondestructive testing processes and equipment operation. Items of equipment operating under external pressure or experiencing compressive stresses from other stresses, should be checked for form stability.

19. In calculating the strength of equipment accounted for the predicted deviation of operating parameters during its operation permitted inaccuracies manufacturing (production), possible deviations of mechanical characteristics of the materials used.

20. Strength analysis provides a margin of safety equipment, which is considered when determining allowable stresses.

21. Allowable stress in the calculation of the strength of the load limit equipment under static load, determined as follows:

a) for carbon and low alloy plastic, ferritic, austenitic-ferritic martensitic steels and iron-nickel alloys on the basis of:

$$[\sigma] = \min \left\{ \frac{R_{e/t} \text{ или } R_{p0,2/t}}{1,5}; \frac{R_m}{2,4}; \frac{R_{m/10^n}}{1,5}; \frac{R_{pl/10^n}}{1} \right\},$$

where:

$[\sigma]$ - the allowable stress in the calculation of the strength of the extreme stresses on equipment under static loads;

$R_{e/t}$  - minimum yield strength at the maximum allowable temperature;

$R_{p0,2/t}$  - minimum yield strength at 0.2 percent residual strain and the maximum allowable temperature;

$R_m$  - the minimum value temporary resistance (tensile strength) at 20 °C;

$R_{m/10^n}$  - the mean value for the long-term strength limit  $10^n$  hours at maximum temperature;

$R_{pl/10^n}$  - an average value of 1 percent creep limit  $10^n$  h at the maximum allowable temperature;

b) for the austenitic chromium-nickel steel, aluminum, copper and their alloys:

$$[\sigma] = \min \left\{ \frac{R_{pl/t}}{1,5}; \frac{R_{m/t}}{3}; \frac{R_{m/10^n}}{1,5}; \frac{R_{pl/10^n}}{1} \right\},$$

where:

$R_{pl/t}$  - minimum yield strength at 1 percent of the residual strain and the maximum allowable temperature; - the minimum value of tensile strength (tensile strength) at the maximum allowable temperature, c) for aluminum casting alloys;

$R_{m/t}$  - the minimum tensile strength (tensile strength) at the maximum allowable temperature;

c) for aluminum casting alloys:

$$[\sigma] = \frac{R_{m/t}}{7};$$

d) for titanium and titanium alloys:

$$[\sigma] = \frac{R_{m/t}}{3};$$

e) for sheet metal and rolling tubes from titanium and titanium alloys:

$$[\sigma] = \frac{R_{m/t}}{2,6};$$

22. Permitted to specify the allowable stress for austenitic steels, the following formula:

$$[\sigma] = \frac{R_{p0,2/t}}{1,3};$$

23. Steel castings for allowable stress value defined by the formulas referred to in paragraphs 21 and 22 of these requirements, multiplied by 0.8 if subjected to the continuous casting of non-destructive testing, or 0.7 if the cast were not subjected to a continuous non-destructive testing.

24. In the case of aluminum, copper and alloys thereof are no data on the yield strength and creep strength, the allowable voltage is determined by the following formula:

$$[\sigma] = \frac{R_{m/t}}{3,5};$$

25. When designing (design), manufacturing (production) of equipment from non-metallic materials, non-metallic materials for the values of tensile strength and elastic modulus of rupture correspond to the values set in the design documentation, and are as follows:

- a) for a composite based on carbon roving:
  - tensile strength  $[\sigma]$  - not less than 160 kgf / mm<sup>2</sup>;
  - the modulus of elasticity E - not less than 11,000 kgf / mm<sup>2</sup>;
- b) on the basis of the composite organic roving:
  - tensile strength  $[\sigma]$  - not less than 170 kgf / mm<sup>2</sup>;
  - the modulus of elasticity E - at least 6,500 kgf / mm<sup>2</sup>;
- c) for the composite based stack roving:
  - tensile strength  $[\sigma]$  - not less than 90 kgf / mm<sup>2</sup>;

the modulus of elasticity E - at least 5000 kgf / mm<sup>2</sup>.

26. In the equipment as a binder can be used thermoplastic or duroplastic polymeric materials.

Temperature curing (polymerization) of the binder should be below the softening temperature of the binder material is non-metallic.

Softening temperature of the material should not be below 100 ° C.

27. Welds should not have external or internal defects (damage) which may affect the safety of the equipment. Minimum values of the mechanical properties of welded joints of equipment should not be below the minimum values of mechanical characteristics of materials being joined.

28. Input control of welds performed by the equipment manufacturer. NDT methods and its volume determined by the project developer based equipment need for more accurate and complete identification of unacceptable defects in view of material properties and characteristics are specified in the design documentation equipment.

29. In calculating the strength of the welds pieces of equipment allowable stress value is multiplied by a factor of strength welds  $\phi \leq 1$ . The coefficient is determined by the strength of the welds in the calculation of the strength of the equipment depending on the material, volume control, welding technology and design of the weld.

30. For maximum stresses in the ground edge effect or stress concentration, defined on the basis of numerical analysis, safety factors are set depending on the mechanical characteristics of the materials used and the type of stress state.

31. Experimental tests of strength equipment carried on the sample. During the tests, it is possible to observe the critical zones of equipment with the help of test and measurement tools that can reliably detect the strains and stresses.

32. Pilot testing program includes:

a) pressure test for leaks and strength to confirm there is no leakage of the medium or residual deformations exceeding permissible values;

b) creep tests and fatigue of materials, which takes into account the processes of the equipment;

c) additional tests which take into account other factors, and are held, if necessary.

33. In developing (designing) equipment installed technical performance, minimizing the possibility of an incident of an accident during its operation.

34. Equipment manufactured (made) of materials and supplies provided by the project documentation and ensure its compliance with safety requirements throughout the life cycle.

35. Equipment manufactured (made) of materials and supplies that are provided in the contract delivery markings (no damage), which provides the ability to identify with these manufacturer's documentation materials or intermediate products.

36. Sheets, plates, tubes and forgings used in the manufacture (production) of the equipment shall be maintained marked with a manufacturer. If there is a semi-finished cutting part, each of them shall bear identical markings in a manner that was used for the marking materials manufacturer.

37. When selecting materials and (or) for the manufacture of semi-finished products (manufacturing) equipment is necessary:

a) to identify indicators for the design calculations, as well as the main characteristics of materials and their processing capability,

b) result in the technical documentation of the data used in the manufacture (production) equipment materials.

38. In manufacturing (production) of equipment used materials:

a) having the properties (ductility, strength), allowing their use in the operation and withstand the test equipment. Taken into account when choosing the material or its fragility

fracture. When using a brittle material provides measures to prevent brittle fracture (increased safety factor),

b) having chemical resistance to the working environment for which the equipment is intended. Changes in chemical and physical properties of materials throughout the design life of equipment or assigned resource should not lead to disruption of its safe operation

c) suitable for the intended treatments;

d) selected so that when you connect them to each other provides strength equipment during the lifetime of the equipment.

39. Equipment used in the plastic material is considered, if a tensile test of its elongation after fracture of not less than 14 percent, and impact strength, determined on specimens with a hub type KCV (c V-notch) is not less than  $27 \text{ J / cm}^2$  at a temperature above  $20^\circ \text{ C}$ , but not higher than the lowest permissible temperature.

40. If the production (manufacturing) change the characteristics of the material or residual stresses arise affecting the safety of the equipment, then held his heat treatment. Type of heat treatment equipment and its modes are defined by the developer of the project equipment.

41. In manufacturing (production) of equipment and safety devices provided by the manufacturer of the performance characteristics and parameters of the project documentation in accordance with the safety requirements of technical regulations of the Customs Union "On the safety equipment of high pressure" (TR TC 032/2013) subject to the applicable and a process control system.

42. In manufacturing (production) parts by rolling, stamping, rounding is not allowed change in the mechanical properties of materials, damage, cracks and other defects that may affect the safety of the equipment.

43. Items of equipment collected together must ensure the safety of equipment and appropriate to its purpose. All one-piece or welded joints pieces of equipment should be available for non-destructive testing.

44. Equipment equipped with quick-caps should have devices preclude the inclusion of equipment under pressure when fully closed the lid and the lid opening in the presence of excess pressure equipment.

45. The boiler is installed safety devices, the automatic shutdown of the boiler or its components with unacceptable deviations from the calculated modes of operation.

46. Piece of equipment, which is limited to the internal volume of isolation valves and pressure which may increase beyond the allowable shall be equipped with safety devices, automatically preventing the pressure increase over the allowable working environment by issuing to the atmosphere or the utilizing system.

47. As safety devices are used:

a) lever-freight safety valves direct action;

b) spring-loaded safety valves of direct action;

c) pulse safety device consisting of a pulsed valve and the main safety valve

d) safety devices with membrane disrupting (membrane safety devices).

48. Safety devices are placed in locations accessible for maintenance.

49. Vents from the pressure relief devices and impulse lines impulse safety devices in locations where condensation forming equipped with drainage pipes to remove condensate.

Installation of valves or other fittings in drainage pipes are not allowed. Wednesday opening of safety devices and drainage is diverted to a safe place. Discharged highly explosive, toxic environment and technological group 1 to the closed system for recycling or incineration in an organized system, or the atmosphere - for gas density relative to air of 0.8 or less.

Forbidden to combine discharges containing substances that are capable of when mixed to form an explosive mixture or unstable compounds.

50. Construction of pipelines connecting the safety devices (of lead, which discharge and drainage) should exclude the possibility of freezing them in the work environment.

When installed on a pipe or conduit several safety devices cross-sectional area of the nozzle or piping shall not be less than the total cross-sectional area of 1.25 installed on it safety valves. In determining the length of the pipe connecting section 1000 mm counted value of its linear resistance (pressure loss).

51. Lever-truck safety valve or pressure relief valve is equipped with a spring device to check the health of their actions during the operation of the equipment by the forced opening.

Impulse safety valve is equipped with a device enabling the forced opening of the safety valve remotely via the control panel.

Construction spring safety valves shall be designed to tightening spring above the value set by regulation to operate at a given pressure. Spring safety valves are protected from unacceptable heating or cooling, as well as from direct exposure to the working environment.

52. Equipment designed for an operating pressure which is less than the supply pressure of its source, is equipped with the water supply pipeline automatic mounting device with a reducing pressure gauge and safety valve mounted on the side of lower pressure after the reducing device.

Reduction and cooling devices provide automatic temperature control. If you install a bypass line (bypass), it is also equipped with a reducing device.

53. For a group of vessels that operate at the same pressure, the one permitted for the reducing device with manometer and a safety valve on a common mounting the supply pipe to the first branch to one of the vessels. In this case, the installation of safety devices on the vessels themselves is not necessary if they excluded the possibility of increasing pressure.

If a reducing automatic device due to the physical properties of the working environment may not work reliably, not install a flow regulator, with provision for protection against pressure increase.

54. Number of safety valves, their size and bandwidth are determined so that the equipment does not produce overpressure exceeding the maximum allowable working pressure:

- a) more than 0.05 MPa - for vessels in which the excess pressure is less than 0.3 MPa
- b) 15 percent - of the receptacles in which the excess pressure is between 0.3 to 6 MPa, inclusive;
- c) 10 percent - of the receptacles in which the overpressure is greater than 6 MPa.

55. When working overpressure relief valves in the vessel is allowed no more than 25 percent of the maximum allowable working pressure, provided that the excess provided guidance (instruction) operating the vessel.

56. Safety valves must protect boilers, super heaters, economizers and pipelines on the excess pressure in them for more than 10 percent of the maximum allowable working pressure. Excess pressure safety valves fully open for more than 10 percent of the maximum allowable working pressure allowed in the case provided for the calculation of the strength of the boiler, superheated, economizer and pipeline.

57. In steam boilers with a working pressure up to 4 MPa (except mobile boilers and boiler steam capacity of less than 35 t / h) set only impulse safety valves. On mobile boiler plants may not be mounted lever-truck safety valves.

58. At each steam boiler on and off working environment superheated safety valves are installed. Number and their installation are determined by the development (design).

Total capacity of boilers installed safety devices shall not be less than the nominal capacity of the equipment.

59. Capacity of the relief valves is confirmed by the relevant tests of prototype model of the safety valve of this design, carried out by the manufacturer and indicated in the passport equipment.

60. Safety devices for steam and hot water boilers are installed on sockets or pipes directly connected to boilers, as follows:

a) in steam boilers with natural circulation without superheated - on the upper drum or steam drum;

b) on steam boilers ramjet, as well as boilers forced circulation - on the weekends collectors or vapor outlet conduit;

c) on the hot-water boilers - on the weekends or collectors drum;

d) g) on reheated is possible to install all safety devices on the input side of the superheated steam;

e) e) disconnected the water economizers - not less than 1 safety device on the outlet and inlet water.

61. In the presence of the boiler superheated non disconnectable part of the safety valves with a capacity of not less than 50 percent of the rated output of the boiler is mounted on the superheated outlet header.

62. In steam boilers with a working pressure up to 4 MPa impulse safety valves installed on indirect non disconnectable superheater outlet header or steam line to the main shut-off valves, While at the drum boilers for 50 percent of the valves on the total bandwidth selection for a couple of pulses produced by a boiler drum.

When an odd number of identical valve allowed steam extraction for pulses from the drum for not less than one-third but not more than one second valve installed on the boiler. On block units in the case of placing the safety valves on steam line directly from the turbines allowed for the momenta of all the safety valves to use superheated steam, with 50 percent of valves supplied additional electrical pulse from the contact pressure gauge connected to the boiler drum.

When an odd number of identical safety valves may be supplied additional electrical pulse from the contact manometer, connected to the boiler drum, no less than one third but no more than one second valve.

63. For boiler economizers disconnected installation location of safety valves, adjust their technique and their discovery of the pressure determined by the designer.

Ramjet On steam boilers, which during firing or stop the boiler first (along the water) of the surface heating is disconnected from the rest of the heating surface VALVES must install, the number and size of safety valves for the first part of the heating surface are determined by the design documentation.

64. Diaphragm safety devices are installed on vessels and pipelines:

a) if the lever-freight and spring-loaded safety valves can not be applied due to their inertia or fo r other reasons;

b) before the safety valves in case the safety valves may not work reliably due to the harmful effects of working environment (corrosion, erosion, polymerization, crystallization, sticking, freezing) or possible leaks through the closed valve highly explosive, toxic, environmentally harmful substances. In this case, the equipment shall be a device that allows you to check the integrity of the membrane,

c) in parallel with safety valves to increase the capacity of the pressure relief systems;

d) g) on the output side of the safety valves to prevent the harmful effects of working environments from the relief system and to eliminate the influence vibrations from the backpressure of the system reliability of the safety valves.

65. Necessity and place of installation of membrane safety devices, as well as their structure determined by the project equipment. Protective membranes are installed only in their designated mountings.

Diaphragm safety devices are located in places that are open and accessible for inspection, mounting and dismantling. The connecting pipes are protected from freezing in their working environment, and safety devices are installed themselves on sockets or pipes directly connected to the equipment.

When installing diaphragm safety devices in series with the pressure relief valve (valve before or behind) the space between the disc and the safety valve outlet tube is reported pressure gauge with alarm (for the control of serviceability membranes).

Allowed to install the device before switching membrane safety devices in the presence of twice the number of membrane devices while providing protection of equipment from overpressure at any position of the switching device.

66. To control the level of liquid in the equipment having the media interface, apply the liquid level measuring instruments working environment. Along with liquid level indicator on the equipment installed sound, light and other signaling and blocking limit fluid levels.

67. On the boiler, except the ram, and the heated flame or flammable gases vessel, which may drop below the allowable liquid level is set at least two liquid level indicator of direct action.

Allowed further as duplicate set liquid level indicators indirect action. The number and place of installation of the liquid level indicator in boilers (including evaporation step with drums or the external separator) except boiler uniflow and flame-heated or combustible gases defined by the draft vessels equipment.

68. Liquid level indicator of direct action must have an independent connection to equipment. You can install two pointers liquid level direct action on the connecting tube (column) with a diameter of not less than 70 mm.

Installing on fluid levels of direct action intermediate flanges and valves, except sensors liquid level switch is not allowed. This requirement shall not apply to the flanges valves, which is part of the level indicator.

Connecting to a liquid level indicator of direct action and its connecting pipes or fittings other devices is not allowed except for point level sensor liquid, if it does not work broken dipstick liquid.

69. Configuration pipes connecting the liquid level indicators with the equipment must exclude education in their water bags and allow pipe cleaning. Connecting pipes should be protected from thermal heating fuel combustion products and from freezing.

70. Liquid level indicators of direct action and highlights arranged so that the fluid level was visible from the workplace staff. On equipment with operating pressures up to 4 MPa liquid level indicators are supplied with covers direct action to protect personnel in the event of destruction of transparent plates.

71. The width of the slit observation of liquid level indicator defined by the project equipment.

72. Liquid level indicators are provided with isolation valves to disconnect them from the equipment and purge. On valving specified (molded, stamped or marked with paint) direction of opening and closing, and on tap further stated his position orifice. Inner diameter of the passage of valves must be at least 8 mm. To drain water when flushing liquid level indicator provides a funnel with a protective device and outlet pipe for draining equipment.

73. At a pressure of 4.5 MPa equipment more liquid level indicators are supplied with two successive sets of shut-off valves to disconnect them from the equipment.

74. If the distance from the ground, which made observation of the liquid level in the equipment to liquid level indicator of direct action is more than 6 m, and if the fluid level is not visible from the workplace attendants, set 2 discount remote liquid level indicator. In this case, the installation equipment 1 may be a liquid level gauge direct action.

Lowered remote fluid level indicator connected directly to the equipment fittings are independently separate from other liquid level indicator and are soothing device.

75. On exhaust gas boilers and boilers energy technology remote liquid level indicators are installed on the remote (remote) data management boilers.
76. Steam boilers equipped with electric automatic power off when the level is below the maximum permissible level.
77. Boilers equipped with automatic audible and visual alarms upper and lower limits of water. Similar alarms should act on all parameters, which are triggered by the automatic stop devices and safety equipment.
78. Steam boilers, regardless of type and steam equipped with automatic controls feed water. Steam boilers with steam temperature at the outlet of the main or reheated more than  $400^{\circ}\text{C}$  are equipped with automatic devices for controlling the temperature of steam.
79. Boilers with a superheated, each to the main steam line isolation valves are provided means for measuring the temperature of the superheated steam. Boilers with reheat steam temperature measuring means mounted on the input and output pair.
80. Boilers with natural circulation and superheating steam performance of more than 20 t / h, once-through boilers with a capacity of more than 1 ton of steam / h with measurement instruments showing provide measurement tools with continuous recording quantities of superheated steam temperature.
81. Superheats on multiple parallel sections besides amount measuring means steam temperature steam lines installed on common superheated steam, set means periodic measurements of the steam temperature at the outlet of each section, and steam boilers with a steam temperature of  $500^{\circ}\text{C}$  - the output of the steam heater coils on one means of measurement for each meter width flue.
82. In steam boilers with a capacity of more than 400 tons of steam / h on the output of the superheated coils installed measurement tools with continuous recording temperature value pair. In steam boilers with de superheats for controlling the magnitude of the superheat steam superheated to and after the established means of measuring the corresponding quantities.
83. At the inlet of water to the economizer and the economizer outlet Water and the feed water piping for boilers without economizer means are provided measuring the temperature of the feed water.
84. On hot water boilers measuring water temperature set on the water inlet and outlet boiler water from the boiler.
85. On hot water boilers with a capacity of more than 4.19 tons of steam / h installed recording equipment measuring the water temperature at the outlet of the boiler.
86. To control the temperature of the metal and preventing its increase beyond acceptable values for kindling stops and maneuvering modes boiler provides means for measuring the temperature of the walls of its elements. The retrofitting of measuring temperature, their number and location determined by the project developer boiler.
87. Vessels operating under varying temperature walls are fitted with temperature measurements to control the rate and uniformity of warming the body of the vessel length and height, as well as pointers thermal displacement. The need to equip vessels means of temperature measurement and thermal displacement pointers allowable heating rate and cooling vessels are determined by the project developer and the vessel specified by the manufacturer of the equipment or in the passport in the user manual (instruction) manual.
88. Equipment and its separate cavities with different values of pressure measuring devices are equipped with direct pressure.
89. Steam boilers with a capacity of more than 10 tons of steam / h and hot water boilers with a capacity of more than 21 pair GJ / h must be fitted with a means of measuring the pressure recording.
90. Pressure measuring devices are placed:
- a) on the boiler drum,
  - b) on the boiler superheated steam superheated in front of the main shut-off valves;

- c) on the fitting of the vessel or pipe between the vessel and stop valves;
  - d) on a continuous-flow boiler superheated in front of the main shut-off valve.
91. On hot water boilers pressure measuring devices are placed on the water inlet and outlet boiler water from the boiler to the valves.
92. Class pressure measuring accuracy must be at least:
- a) 2.5 - operating at a pressure of not more than 2.5 MPa,
  - b) 1.5 - operating at a pressure of from 2.5 to 14 MPa inclusive,
  - c) 1 - with an operating pressure greater than 14 MPa.
93. When installing the measuring pressure at an altitude of more than 5 m provides a means of measuring the pressure duplicate.
94. Hardware design provides an opportunity to secure a purge and check off pressure measuring devices.
95. Valve type, its amount and position of the developer of the project are determined on the basis of equipment and safety equipment provided by the project outages and its elements.
96. When a group of feed water in boiler pump head is selected to meet the requirements of technical regulations of the Customs Union "On the safety equipment of high pressure" (TR TC 032/2013), as well as the basis of providing the boiler feed with the highest working pressure or maximum head loss in the feed water line.
97. Water supply nutrients devices is determined by the nominal capacity steam boilers based on the flow of water on a continuous or periodic purging steam cooled condenser, maintenance-reducing cooling and cooling devices, as well as the potential loss of water or steam.
98. Type, characteristics, quantity and circuit of the nutrient devices provide safe operation of the boiler during operation, including emergency stop.
99. In developing (designing) of piping must be:
- a) for pipes with nominal diameter of 150 mm with the working environment of 300 ° C or more in the project to determine the necessary number of indicators for monitoring the movements of thermal expansion of the piping and monitoring correct operation of the overhead system;
  - b) b ) to provide a device for condensate removal in cases where the inside of pipes transporting vaporous working environments, it may be education. These devices must be located in the lower points of the piping;
  - c) consider the possibility of damage caused by violations of the hydraulic regime, as well as the erosion-corrosion wear;
  - d) provide for measures and means to reduce vibration and eliminate the possibility of accidental destruction and depressurization of pipelines, which during operation subjected to vibration
  - e) provide devices which cut the branch pipeline in those cases where these pipelines are contained Fluids group 1;
  - f) to minimize the risk of accidental release of the working environment. Sampling site working environment must be clearly marked with the name of the working environment;
  - g) develop technical documentation for underground piping that contains the information necessary for safe maintenance, inspection and repair (steel grade, diameter, pipe thickness, length of the pipeline, the location of poles , expansion joints, hangers, valves, air-vent and drainage devices, welded joints and the distance between them and from them to the wells and user inputs, the location pointer for the control of the pipeline and the parameters of the working environment).
100. Recompression chamber design must allow inspection (including inner surface), cleaning, washing, flushing and repair of pressure chamber.
101. When designing (design) pressure chambers accounted stresses of installation and under the influence of inertial forces.

102. Length of stay of people in the chamber defined by the project and indicated in the passport. In the case of a long stay in the chamber provides people with different compartments functional purpose.

103. Equipment project should include grommets or glands high pressure electric cables, provides mechanical strength, axial and radial leak-tight cable glands in general and its conductive elements, and dielectric strength throughout the range of pressures in the chamber.

104. Recompression chamber design must be capable of opening pressure chambers inside and outside. Must not be used for constipation closing doors or covers in a recompression chamber.

105. For visual or television monitor the situation inside the hyperbaric chambers and lighting interior space project equipment provided portholes fitted outer cover, which protects the glass porthole from mechanical damage.

When designing (design), manufacturing (production) of hyperbaric chambers used portholes light transmitting materials with safety not less than safety margin body hyperbaric chambers and light transmission of not less than 85 percent.

106. The project provided equipment air supply and gas supply for the following purposes:

- a) forming a gaseous medium in the chamber,
- b) providing for the permanent respiratory system,
- c) the maintenance and change of pressure in the chamber;
- d) maintaining and changing the composition of the gaseous medium in the chamber of oxygen and indifferent gases;
- e) locking.

107. Air supply systems and gas provided by an increase in pressure in the chamber at a rate not less than 0.2 MPa / min. a pressure from 0.1 MPa to 1.7 inclusive ( $1 - 17 \text{ kgf / cm}^2$ ) not less than 0.1 MPa / min. ( $1 \text{ kgf / cm}^2 \cdot \text{min}$ ) – for pressures greater than 1,7 MPa ( $17 \text{ kgf / cm}^2$ ) and maintain pressure to within  $\pm 0,025 \text{ MPa}$  ( $0,25 \text{ kgf / cm}^2$ ). Reducing the pressure in the pressure chamber is produced with a rate of 0.003 – 0.9 MPa/h ( $0.03 - 9 \text{ kgf / cm}^2 \cdot \text{hr}$ )

108. Means of gas control pressure chambers must ensure the accuracy of measurements of oxygen, helium and carbon dioxide, as well as the possible harmful substances.

109. System and fire protection should ensure that an outbreak of fire in the chamber or prerequisites fire (smoke, uncontrolled rise in temperature), activate an alarm and extinguishing fire detection by all available means in the chamber.

110. Means the automatic control must provide a safe environment people stay inside hyperbaric chambers.

111. Each compartment is equipped with a recompression chamber and gateway pressure gauge, which is mounted outside on the nipple, welded to the shell hyperbaric chambers, or in the control systems of hyperbaric chambers.

112. Power networks recompression chamber should have backup power sources to ensure smooth operation of elements of air and gas systems, and fire protection.

113. All protective and switching-power electric ballasts mounted outside pressure chambers. Power cables in the chamber must be non-combustible insulation. The project should provide hyperbaric chambers protection system from static electricity, the possibility of grounding internal removable metal products, equipment and hyperbaric chambers housing.

114. Project equipment is determined by the need to install lighting. Fixtures installed in hyperbaric chambers, should be sealed, designed for working pressure environment.

115. The project provides an opportunity to use the equipment of communication with people inside the hyperbaric chambers.

116. Pipelines, steam and water heaters, installed inside the hyperbaric chambers, and pipelines supplying compressed air and gas mixtures that are installed outside the pressure chambers, designed seamless copper pipes or stainless steel pipes.

117. Hyperbaric chambers for domestic equipment used incombustible (PROTECTED) materials guaranteed by releasing hazardous substances in a gaseous medium pressure chambers.

ANNEX number 3  
to the technical regulations  
of the Customs Union "On the safety of equipment  
operating under positive pressure "  
(TR TC 032/2013)

**REQUIREMENTS**  
**a distinctive color and identity**

**I. Gas cylinder**

Name of gas	Coloring cylinders	The label text	Color printing	Color stripes
1	2	3	4	5
Nitrogen	black	nitrogen	yellow	brown
Ammonia	yellow	ammonia	black	-
Argon crude	black	crude argon	white	white
Argon Technology	black	Argon Technology	blue	blue
Argon clean	gray	pure argon	green	green
Acetylene	White	acetylene	red	—
Butylene	red	butylene	yellow	black
Naftogaz	gray	neftgaz	red	—
Butane	red	butane	white	—
Hydrogen	dark green	hydrogen	red	—
Air	black	compressed air	white	—
Helium	brown	helium	white	—
Nitrous oxide	gray	nitrous oxide	black	—
Oxygen	Blue	oxygen	black	—
Medical oxygen	Blue	Medical oxygen	black	—
Hydrogen sulfide	White	hydrogen sulfide	red	red
Sulfur dioxide	black	sulfur dioxide	white	yellow
Phosgene	Protective	—	—	red

Name of gas	Coloring cylinders	The label text	Color printing	Color stripes
1	2	3	4	5
Freon-11	aluminum	Freon-11	black	blue
Freon-12	aluminum	Freon-12	black	–
Freon-13	aluminum	Freon-13	black	2 red
Freon-22	aluminum	Freon-22	black	2 yellow
Chlorine	Protective	–	–	green
Cyclopropane	Orange	cyclopropane	black	–
Ethylene	Purple	ethylene	red	–
All other combustible gases	red	name of the gas	white	–
All other non-combustible gases	black	name of the gas	yellow	–

- Notes: 1. The inscription is applied on the circumferential cylinder length of not less than 1/3 the circumference, while the band - the entire circumference. The height of the letters on cylinders with a capacity of more than 12 liters to be 60 mm, while the width of the strip - 25 mm. On cylinders up to 12 l size of the letters and stripes should be determined depending on the lateral surface of the cylinder.
2. Allowed to paint in gray or yellow color of small cylinders (12 liters) for breathing apparatus and self-rescuers with compressed air.

## II. Tank trucks for transportation of liquefied petroleum gas

The outer surface of tank trucks for transportation of liquefied petroleum gas is painted in a light gray color. On both sides of the vessel applied distinctive red stripe width of 200 mm with an inscription in black over it "Propane - flammable." At the bottom of the vessel is put back black inscription "flammable".

Name of gas	Coloring cylinders	The label text	Color printing	Color stripes
1	2	3	4	5
Nitrogen	black	nitrogen	yellow	brown
Ammonia	yellow	ammonia	black	-
Argon crude	black	crude argon	white	white
Argon Technology	black	Argon Technology	blue	blue
Argon clean	gray	pure argon	green	green
Acetylene	White	acetylene	red	—
Butylene	red	butylene	yellow	black
Naftogaz	gray	neftgaz	red	—
Butane	red	butane	white	—
Hydrogen	dark green	hydrogen	red	—
Air	black	compressed air	white	—
Helium	brown	helium	white	—
Nitrous oxide	gray	nitrous oxide	black	—
Oxygen	Blue	oxygen	black	—
Medical oxygen	Blue	Medical oxygen	black	—
Hydrogen sulfide	White	hydrogen sulfide	red	red
Sulfur dioxide	black	sulfur dioxide	white	yellow
Carbon dioxide	black	carbon dioxide	yellow	—
Phosgene	Protective	—	—	red
Freon-11	aluminum	Freon-11	black	blue
Freon-12	aluminum	Freon-12	black	—
Freon-13	aluminum	Freon-13	black	2 red

Freon-22	aluminum	Freon-22	black	2 yellow
Chlorine	Protective	–	–	green
Cyclopropane	Orange	cyclopropane	black	–
Ethylene	Purple	ethylene	red	–
All other combustible gases	red	name of the gas	white	
All other non-combustible gases	black	name of the gas	yellow	–

- Notes: 1. The inscription is applied on the circumferential cylinder length of not less than 1/3 the circumference, while the band - the entire circumference. The height of the letters on cylinders with a capacity of more than 12 liters to be 60 mm, while the width of the strip - 25 mm. On cylinders up to 12 l size of the letters and stripes should be determined depending on the lateral surface of the cylinder.
2. Allowed to paint in gray or yellow color of small cylinders (12 liters) for breathing apparatus and self-rescuers with compressed air.