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RULES OF DEVICE AND SAFE OPERATION OF VESSELS, WORKING UNDER PR--ETC(U)

JAN 78 A STUGAREV

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FOREIGN TECHNOLOGY DIVISION



RULES OF DEVICE AND SAFE OPERATION OF VESSELS,
WORKING UNDER PRESSURE

by

A. Stugarev



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AD-A066295

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UNEDITED MACHINE TRANSLATION

FTD-ID(RS)T-2314-77

13 January 1978

MICROFICHE NR: *FD-78-C-000127*

RULES OF DEVICE AND SAFE OPERATION OF VESSELS,
WORKING UNDER PRESSURE

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English pages: 206

Source: Pravila Ustroystva i Bezopasnoy
Ekspluatatsii Sosudov, Rabotayushchikh
pod Davleniyem, Moscow, 1962, pp 1-80

Country of origin: USSR

Requester: FTD/ETDB

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<i>А а</i>	A, a	Р р	<i>Р р</i>	R, r
Б б	<i>Б б</i>	B, b	С с	<i>С с</i>	S, s
В в	<i>В в</i>	V, v	Т т	<i>Т т</i>	T, t
Г г	<i>Г г</i>	G, g	У у	<i>У у</i>	U, u
Д д	<i>Д д</i>	D, d	Ф ф	<i>Ф ф</i>	F, f
Е е	<i>Е е</i>	Ye, ye; E, e*	Х х	<i>Х х</i>	Kh, kh
Ж ж	<i>Ж ж</i>	Zh, zh	Ц ц	<i>Ц ц</i>	Ts, ts
З з	<i>З з</i>	Z, z	Ч ч	<i>Ч ч</i>	Ch, ch
И и	<i>И и</i>	I, i	Ш ш	<i>Ш ш</i>	Sh, sh
Й й	<i>Й й</i>	Y, y	Щ щ	<i>Щ щ</i>	Shch, shch
К к	<i>К к</i>	K, k	Ъ ъ	<i>Ъ ъ</i>	"
Л л	<i>Л л</i>	L, l	Ы ы	<i>Ы ы</i>	Y, y
М м	<i>М м</i>	M, m	Ь ь	<i>Ь ь</i>	'
Н н	<i>Н н</i>	N, n	Э э	<i>Э э</i>	E, e
О о	<i>О о</i>	O, o	Ю ю	<i>Ю ю</i>	Yu, yu
П п	<i>П п</i>	P, p	Я я	<i>Я я</i>	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ë in Russian, transliterate as yë or ë.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh ⁻¹
cos	cos	ch	cosh	arc ch	cosh ⁻¹
tg	tan	th	tanh	arc th	tanh ⁻¹
ctg	cot	cth	coth	arc cth	coth ⁻¹
sec	sec	sch	sech	arc sch	sech ⁻¹
cosec	csc	csch	csch	arc csch	csch ⁻¹

Russian	English
rot	curl
lg	log

SUBJECT CODE 97410

Rules of device and safe operation of vessels, working under pressure.

A. Stugarev.

Page 1.

Are necessary for all ministries and departments.

I confirm: the chairman

of Gosgortekhnadzor [1987] - State Committee of the Council of Ministers for Supervision of Industrial Safety and for Mining Inspection (CRSFSR)] of the USSR

A. Stugarev

on 17 Dec. 1956.

Page 2.

No typing.

Page 3.

I. General considerations.

1. Present rules determine requirements for construction, to manufacture, to setting up and content of vessels, working under pressure, and they are spread on:

a) vessels, working under pressure more than 0.7 atm(gage) (without taking into account of hydrostatic pressure), with exception/eliminations, indicated in st. 2;

b) of cistern and flanks, intended for transportation of liquefied gases vapor pressure of which at temperature to +50° exceeds 0.7 atm(gage), and also cisterns, intended for transportation of liquefied gases at atmospheric pressure, but emptied by means of

pressure transfer under pressure more than 0.7 atm(gage);

c) the bottles, intended for transportation and storage of the compressed, liquified and dissolved gases with operating pressure are more than 0.7 atm(gage) -

2. Present rules are not spread on:

a) instruments of steam and hot-water heating;

b) vessels not more than 25 l in capacitance whose product of volume in liters by operating pressure in the atmosphere comprises not more than 200.

During the definition of tank capacity, which consist of the separate housings, connected among themselves tubes whose bore is are not more than 100 mm, each housing must be considered as separate vessel;

c) the machine parts, which are not independent vessels as, for example: the jugs, steam and air engines and compressors, undetachable intercoolers and the oil-moisture separators of blowing plants, which are one whole with compressor, air chambers of pumps, shock struts and braces on aircraft etc.;

d) gas piping, vapors and liquids;

e) vessels from nonmetallic materials;

f) tubular furnace;

g) the vessels, which consist of the tubes whose bore is are not more than 100 mm without collector/receptacles, or with the collector/receptacles, carried out also pipes whose bore is is not more than 150 mm;

Page 4.

h) the vessels, working in vacuum;

i) the individual vulcanizers of types IVP, IVK, intended for the vulcanization of the tires and chambers;

j) the vessels, working under the pressure of water at temperature are not more than 115°, or the vessels, working under the pressure of other noncorrosive, nontoxic and nonexplosive liquids at the temperature, which does not exceed the boiling point at the

pressure 0.7 atm(gage);

k) air reservoirs of brake rigging of steam locomotives;

l) the special-purpose vessels of the military department;

m) the vessels, utilized for scientific experimental target/purposes, by the capacitance/capacity of 25 l and less, independent of operating pressure and temperature.

3. For correctness of construction of vessel, for calculation of its strength and selection of material, for quality of manufacture and installation, and also for conformity of vessel to present rules answers organization, which fulfilled corresponding works.

4. All the changes of project in process of manufacture or installation of vessel must be in writing agreed between planning organization and organization, required change in project.

II. Requirements for the construction of vessels.

5. Vessels, having bore are more than 800 mm, they must be

equipped by sufficient for their inspection and repair quantity of accesses, arrange/located in places, available for maintenance. Circular accesses must have a diameter not less than 400 mm; the size/dimension of oval accesses must be not less than 300 x 400 mm.

Vessels with internal diameter of 800 mm less must have circular or oval small hatches of smallest axle/axis 80 mm in size/dimension through which it would be possible to clean and to inspect the walls of vessel. If by the construction of vessel the device of such small hatches is not represented possible, can be establish/installed the small hatches of smaller size/dimension or are carried out the holes, which are closed by filler plugs or by plug/silencers.

Tubular vessels, consisting of cylindrical housing and grates with the rolled in in them tubes (heat exchangers), is permitted to manufacture without accesses independent of the diameter of vessel.

6. In presence of removable bottoms or cap/covers, and also of hatches or branches of vessel, which ensure possibility of conducting its internal inspection, devices of special accesses is not required.

Page 5.

7. Internal devices in vessels (mixer, coils, plates,

partition/baffles and other devices), which prevent inspection of vessel, must be, as a rule, removable.

The jackets, used for external heating or cooling of vessels, it is permitted to manufacture by removable or welded.

8. Hinged-folding or inserted bolts, inserted in slot, clamps and any clamping devices of hatches, accesses, cap/covers and flanges must be structurally protected from shift/shear or weakening.

The inverted vessels must be equipped by the devices, which prevent auto/self-tilting/reversal.

9. Longitudinal and transverse welds of shells of steel vessels must be only butting. Are allow/assumed the connections in of brands for welding of the flat/plane bottoms, flanges, of the tube walls, branches and other similar cell/elements, and also the bilateral welding of bottoms overlapping to cylindrical shell with the wall thickness of the flanged part of the bottom is not more than 16 mm.

10. During stress analysis of welded joints of vessels, can be accepted following greatest values of modulus of resistance of welds:

a) for butt welds with bilateral penetration, executed by

automatic electric arc welding under layer of flux, and also for connections in of brands with provision for bilateral solid penetration it is allow/assumed application/use of calculated coefficient $\phi = 1$ with any form of load;

b) for connections in of brands, made by hand with provision for bilateral solid penetration, and also for all forms of butt welds, made by hand and rewelded from apex/vertex of weld, is allow/assumed application/use of calculated coefficient $\phi = 0.95$;

c) for the butt welds, made by hand, available to welding only on the one hand and having in the welding process the block/backing from the apex/vertex of weld, adjacent to base metal over an entire weld length, is allow/assumed the application/use of a calculated coefficient $\phi = 0.9$;

d) for the connections in of the brands in which is not provided the solid penetration of the combinable cell/elements, and also for lap joints in the presence of welds with two sides is allow/assumed the application/use of a calculated coefficient $\phi = 0.8$;

e) for the butt welds, weldable only on the one hand by automatic submerged-arc welding, $\phi = 0.8$;

f) for the butt welds, available to welding only on the one hand and made by hand, is allowed/assumed the application/use of a calculated coefficient $\phi = 0.7$.

Page 6.

If weld was fulfilled in essence by automatic submerged-arc welding and the cross-sectional area of a layer of the metal, deposited in this hand weld, does not exceed 150% of cross-sectional area of weld, then this weld is considered as welded by automatic submerged-arc welding with the resultant consequences in the ratio of the permissible during calculation increased modulus of resistance of weld.

11. During stress analysis of soldered joints of vessels, modulus of resistance of weld is established by planning organization.

12. In butt-welded joints for all flanged cell/elements of vessel, working under pressure, with the exception of bottoms, provided for GOST 9530 [- All-union State Standard] 6533-53, distance from axis of weld to beginning of rounding of flanged cell/element l must be not less.

13. During layout of welded butt joints between cell/elements of different thickness, it is necessary to provide smooth transition from one cell/element to another by means of gradual thinning of thicker cell/element at length, equal not to less quintuple difference in thicknesses of abutting members.

If difference in the thickness of the combinable cell/elements comprises not more than 30% thickness of fine/thin cell/element and does not exceed 5 mm, then is allow/assumed the application/use of welds without the preliminary thinning of thick cell/element, moreover welds must provide smooth transition from thick cell/element to fine/thin.

14. Longitudinal welds in separate shells of cylindrical part of vessel, and also meridian or chord welds of bottoms, which adjoin shells, must not be continuation each other, but they must be misaligned with respect to each other by value of triple thickness of thickest plate, but it is not less than on 100 mm (between axle/axes).

15. Bottoms can be made both of one plate and welded of several parts. Welding the separate cell/elements of bottom must be butting with two-sided penetration.

Толщина стенки отбортованного элемента S, мм	Величина l, мм
До 5 От 5 до 10 От 10 до 20 Свыше 20	$l \geq 15$ $l \geq 2S + 5$ $l \geq S + 15$ $l \geq \frac{S}{2} + 25$

Key: (1). The wall thickness of the flanged cell/element S, mm. (2). Value, mm. (3). To. (4). From. (5). It is more than.

Page 7.

Is allow/assumed the manufacture of welded dished bottoms by the following methods:

a) by stamping or rolling in special machines of welded two or three plates with the arrangement of welds chordwise at a distance from the center of the bottom are not more than of 1/5 diameter of the latter;

b) by welding the die-forged/stamped cell/elements with the arrangement of welds only over meridian and circular section/cuts. The circular joints of bottom, with the exception of the bottoms of spherical form, must be located at a distance from the center of the bottom not more than of $1/4$ diameters of the latter. The smallest distance between the meridian welds must be of the quintupler thickness of bottom, but it is not less than 100 mm (between axle/axes).

16. Arrangement of longitudinal welds in horizontal vessels must be only of outside limits 140° lower part of housing of vessel, if lower part is almost inaccessible for inspection.

17. Disposition of circular (transverse) welds in horizontal vessels must be outside supports of vessel.

18. In the case of supports to housing or bottom of vessel distance between edge of circumferential seam of vessel and edge of weld of welding supports must be not less than wall thickness of vessel.

19. Mounting of hatches on longitudinal welds is not allowed/assumed. Is permitted the setting up of hatches on the circular welds under the condition of the reinforcement of holes for them.

Drilling in longitudinal welds of holes for welded branches up to 150 mm in diameter is permitted with the distance between their centers not less than two diameters of hole. The reinforcement of holes must be produced, if this is required according to calculation.

20. For quality control of welding rings, which fasten holes for hatches, accesses and branches, must be signal hole in ring, if it is welded snaruji, or in wall, if ring is welded from inside of vessel.

III. Manufacture of vessels.

A. General requirements.

21. Manufacture of vessels, cisterns, buoy/barrels and bottles, working under pressure, must be produced in enterprises, which dispose of techniques, which ensure good-quality manufacture and inspection of indicated articles in accordance with requirements for present rules, TU [99sp] - Technical Specifications] and Gosts, and also having for this resolution of local organ/control of

Gosgortekhnadzor of USSR or corresponding republic or departmental organ/controls of boiler inspection.

Resolution for the manufacture of vessels and their cell/elements, working under pressure, is overhung to enterprises in accordance with the effective "command about the order of supervision after the manufacture of the objects of the boiler inspection" of Gosgortekhnadzor of the USSR.

22. Technical specifications for manufacture of vessels, their cell/elements and fittings, workers under pressure, must be agreed and affirmed in order, established by ministry in conduct of which is found manufacturing plant.

Page 8.

23. Vessels, cisterns, flanks, bottles to which there are special Gosts, must be manufactured in complete conformity with requirements, indicated in these Gosts.

24. With issue of vessels from manufacturing plants to them, must be fastened on visible place metallic plates with designation:

a) designation of manufacturing plant;

- b) number of vessel on list of plant;
- c) year of manufacture;
- d) operating pressure, kg/cm²;
- e) greatest temperature of wall (if temperature exceeds 250°) and smallest, if temperature of medium is below -30°.

On spare air receivers of the autobrakes of railroad cars, gasoline locomotives, electric locomotives, diesel locomotives and air receivers of the pneumatic equipment of the self-discharging cars, besides specifications indicated above, on metallic plate must be hammered out also the tankage and the mark OTK [- Quality Control Department] of manufacturing plant.

Besides metallic tablet with specifications, on all vessels, except spare air receivers of the autobrakes of railroad rolling stock and air receivers of the pneumatic equipment self-unloading cars, on their one thickest and visible part (branch, flange and similar cell/elements) the manufacturing plant must hammer out the following marks:

- a) the designation of manufacturing plant;
- b) the number of vessel on the list of plant;
- c) the year of the manufacture of vessel;
- d) operating pressure, kg/cm².

25. To each manufactured vessel, which is subject to action of present rules, by manufacturing plant or organization, that manufactured vessel, must be comprised and transmitted to client log book of established/installed form (in one copy), with the exception of spare air receivers of autobrakes of railroad rolling stock and air receivers of pneumatic equipment of self-discharging cars, of railway cranes, automobiles and other conveying devices to which log book are not comprised.

B. Materials.

26. Materials, used for manufacture, installation and repair of

vessels, cisterns, buoy/barrels and bottles, working under pressure, must satisfy the requirements for present rules, GOST and TU and they must be selected taking into account effect of medium on metal and operating conditions.

Page 9.

The chemical composition and the mechanical properties of the metals, not provided for by standards, supplied according to technical specifications for the manufacture of the indicated vessels, working under pressure, must be agreed by ministries with Gosgortekhnadzor of the USSR or with the appropriate republic or departmental organ/controls of boiler inspection.

Quality and the fundamental characteristics of materials must be confirmed by supplier plant in the appropriate certificates.

In the absence of certificates for materials, all the their necessary tests must be carried out on the manufacturing plant of vessels.

27. Materials, used for manufacture of welded vessels and their cell/elements, must undergo heat treatment when latter is provided for by technical specifications for manufacture of article.

28. When on technological process is required heat working of finished parts, appropriate tests of specimen/samples must be carried out on plant-manufacturer of these parts.

29. Application/use for manufacture of vessels of metals, not provided for by present rules, must be by ministries agreed in routine with Gosgortekhnadzor of USSR or with appropriate republic or departmental organ/controls of boiler inspection on affiliation/accessory.

30. Materials or ready vessels, acquired outside boundary/interface, must answer norms of present rules or norms of this country, if latter render/show not lower than norms of present rules.

Sheet steel.

31. Sheet steel, used for manufacture of vessels and their cell/elements, working under pressure (shells of cylinders, bottom, cap/cover, tube walls, flanges etc.), must be melted by Martin method

or in electric furnaces and it must be applied in accordance with Table 1 depending on operational characteristics.

32. During manufacture of vessels made of two-layered or compound steel, base layer must be selected depending on operational characteristics in accordance with Table 1.

Tubes steel.

33. For manufacture of vessels and their cell/elements, working under pressure can be applied tubes in accordance with Table 2.

Forgings.

34. Small forgings and stampings made of sheet steel (hatch cover, accesses, flanges etc.) must satisfy appropriate requirements to sheet steel (see Table 1).

Page 10.

Table 1.

(1) № по пор.	(2) Марка стали	(3) ГОСТ	(4) Область применения		(7) Виды испытаний
			(5) Рабочая температура стенки, град.	(6) Рабочее давление среды не более, кг/см ²	
1	Ст. 2, Ст. 3	5520—50	По ГОСТ		По ГОСТ
2	Ст. 2, Ст. 3	380—50	От —15	16	(15) Испытание от партии листов на растяжение и на загиб
3	Ст. 4 кипящая	Гр. А	До +200		
3	Ст. 3, Ст. 4 кипящая	380—50	От —30	50	(14) Испытание от партии листов на растяжение, на загиб и ударную вязкость
4	Ст. 3, Ст. 4 спокойная	Гр. А	До +200		
4	Ст. 3, Ст. 4 спокойная	380—50	От —30	50	(16) Испытание от партии листов на растяжение, загиб и ударную вязкость
5	(17) То же	Гр. А	До +400		
5	(17) То же	380—50	От —30	50	(15) Испытание каждого листа на растяжение, загиб, ударную вязкость
6	Ст. 5	380—50	От —40, до +425		
6	Ст. 5	Гр. А	До +425	50	(14) Испытание в зависимости от рабочих параметров согласно пп. 1, 2, 3, 4 настоящей табл.
7	15К, 20К, 25К	5520—50	От —40	Не ограничено	(9) По ГОСТ
8	10, 15, 20 спокойная	1050—52	От —40	То же	(9) По ТУ
9	22К	ТУ	От —40	„	(17) То же
10	10Г2Т(М)	ТУ	До +450	„	„
11	3Н	ТУ	От —70	„	„
12	12МХ	ТУ	От —40	„	„
13	12ХМ	5632—51	От —40	„	„
14	1Х18Н9Т	и ТУ 7350—55	От —196	„	(9) По ГОСТ и ТУ (21)
15	Х18Н12М2Т	и ТУ 5632—51	От —196	„	(9) По ТУ
		7350—55	До +700		

Notes. 1. For manufacture of vessels, intended for work with minus temperatures of walls of than lower indicated in Table 1, 2, 3, 4, 6, is permitted application/use of steels, provided for by these

tables, under condition of test work of base metal and welded joints of vessels for impact toughness at operating temperatures; in this case tests are considered satisfactory, if not one of specimen/samples gave results of less 2 kg/cm². The results of specific tests must be recorded into the log book of vessel.

2. Boiling carbon steel can be applied with thickness of sheet not more than 26 mm. With the rolling of plates made of boiler steel for the manufacture of shells, residual strain must not exceed 30/o. Strain is calculated from formula $\frac{S}{D_{cp}} \cdot 100\%$, where S is wall thickness, D_{cp} is the mean diameter of the shell of vessel.

The need for heat treatment is determined in accordance with st. of 64 present rules.

Key: (1). No on pores. (2). Trademark of steel. (3). GOST. (4). Field of application. (5). Operating temperature of wall, deg. (6). The operating pressure of medium is not more, kg/cm². (7). Types of tests. (8). St. (9). On. (9a). From. (10)%. Testing from the batch of plates for elongation and for knee. (11). boiling. (12). degree. (13). to. (14). Testing from the batch of plates for elongation, for knee and impact toughness. (15). steady. (16). Testing from the batch of plates for elongation, knee and impact toughness. (17). The same. (18). Tensile test of each plate, knee, impact toughness. (19).

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PAGE

~~21~~
22

Testing depending on operational characteristics according to paragraphs 1, 2, 3, 4 present of table. (20). Not it is limited. (21). and.

Page 11.

TABLE 2.

(1) № по пор.	(2) Марка стали	(3) ГОСТ	(4) Область применения		(7) Виды испытаний
			(5) Рабочая температура стенок, град.	(6) Рабочее давление среды не более, кг/см ²	
1	Ст. 5, Ст. 6	301-50	От -30 до +120	220	(10) По ГОСТ
2	Мст. 2, Мст. 3	4015-52	От -15 до +200	16	(13) То же
3	Ст. 2, Ст. 4	301-50	От -15 до +300	16	
4	Мст. 3 спокойная	4015-52	От -30 до +350	50	(15) 1. Проверка механических свойств сварного шва каждой десятой трубы в соответствии с правилами (16) 2. Просвечивание 15% продольного шва каждой трубы (17) 3. Гидроиспытание полуторным давлением от рабочего каждой трубы или корпуса сосуда, изготовленного из этих труб (18) По ГОСТ
5	(18) Марки стали выбираются по ГОСТ 380-50 и 1050-52	3262-55 усиленные	От 0 до +300	16	
6	10 и 20	1753-53 и дополн. ТУ	От 0 до +300	13	(19) По ГОСТ и ТУ
7	10, 20 спокойная	301-50	От -40 до +400	50	(20) По ГОСТ
8	10, 20	3100-46	От -40 до +450	160	(21) То же
9	10, 20	3099-46	От -40 до +450	160	
	10, 20	То же	От -40 до +475	160	(22) Испытание каждой трубы в объеме, предусмотренном ГОСТ
10	30ХМА	ГОСТ 4543-47	От 0 до +500	Не ограничено	(23) По ТУ
11	12МХ и 12МХФ	ТУ	От -40 до +540	То же	(24) То же
12	Х5М	ТУ	От -40 до +550	"	"
13	12ХМ(15ХМ) и 12ХМФ	ТУ	От -40 до +560	"	"
14	1Х18Н9Т	5543-50	От -196 до +600	"	(25) По ГОСТ
15	Х18Н12М2Т	5543-50	От -196 до +700	"	(26) То же

Key: (1). No on pores. (2). Trademark of steel. (3). GOST. (4). Field

of application. (5). Operating temperature of wall, deg. (6). The operating pressure of medium is not more, kg/cm². (7). Types of tests. (8). St. (9). From. (10). On. (11). to. (12). MST. (13). The same. (14). steady. (15). Testing the mechanical properties of weld of each tenth tube in accordance with rules. (16). Radioscopy 150/o of the longitudinal seam of each tube. (17). Hydrotest by one-and-one-half pressure from worker each tube or the housing of vessel, manufactured from these tubes. (18). The mark/brands of steel are selected according to GOST. (19). intensified. (20). and. (21). and supplementary. (22). Testing each tube in the volume, provided for GOST. (23). Not it is limited.

Page 12.

The large forgings, used for the manufacture of vessels, must satisfy the requirements, provided for by Table 3.

Steel casting.

35. Steel casting for vessels and their cell/elements, working under pressure, must be manufactured according to GOST 977-53 and TU

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from carbonic and those alloyed steels, melted during Martin or electrical furnaces with maximum content of sulfur and phosphorus it is not more than 0.05o/o each cell/element.

36. Depending on temperature and pressure, casts must be applied in accordance with Table 4.

Table 3.

(1) № по пор.	(2) Марка стали	(3) ГОСТ	(4) Пределы применения	
			(5) Темпера- тура стенки не более, град.	(6) давлени- е, кг/см ²
1	15, 20, 25, 22K	2335-50	От -40 до +450	Не огра- ничено
2	12MX (12MXФ)	По ТУ	От -40 до +540	То же
3	12XM(15XM) и 12XMФ	По ТУ	От -40 до +560	"
4	1X18H9T	То же	От -196 до +600	"

Key: (1). No on pores. (2). Trademark of steel. (3). GOST. (4). Limits of application/use. (5). the temperature of wall is not more, deg. (6). pressure, kg/cm². (7). From. (8). Not it is limited. (9). to. (10). On. (11). The same. (12). and.

Table 4.

(1) № по пор.	(2) Марка стали и группа отливки	(3) ГОСТ	(4) Область применения	
			(5) температура стенки, град.	(6) давление не более, кг/см ²
1	15Л, 20Л, 25Л, 30Л гр I	977-53	От -15 до +400	50
2	15Л, 20Л, 25Л, 30Л гр. II и III	977-53	От -40 до +450	Не ограничено
3	X17	По ТУ	От 0 до +450	"
4	30ХМАЛ	То же	От 0 до +480	"
5	18ХМЛ	"	От -40 до +540	"
6	1X18H9	"	От -196 до +500	"
7	X5МЛ	"	От -40 до +550	"
8	1X18H9ТЛ	"	От -196 до +600	"
9	20ХМФЛ	"	От -40 до +570	"
10	20ХМЛ	7832-55	От -40 до +540	"

Key: (1). No on pores. (2). Trademark of steel and group casts. (3).

GOST. (4). Field of application. (5). the temperature of wall, deg. (6). pressure is not more, kg/cm². (7). degree. (8). From. (9). to. (10). or. (11). Not it is limited. (12). On. (13). The same.

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37. Cast steel, manufactured for vessels, working under pressure, must be accepted in accordance with following requirements:

- a) all cast steel must be accepted in heat-treated state;
- b) steel casting, intended for work to pressure to 50 atm (gage) of metal up to 400° in temperature, must be accepted according to chemical composition and it is additional according to mechanical properties (limit of strength and elongation per unit length), but for parts, which are subject to welding, furthermore, with testing of content in them of carbon, sulfurs and phosphorus;
- c) casts for the pressure more than 50 atm (gage) or at the temperature of metal above 400° must be accepted according to the complete chemical composition and the mechanical tests with toughness test - for castings II and of III groups;

d) specimen/samples for the mechanical tests must be cast together with part and be driven off after final heat treatment. For small parts it is permitted casting separate test plate/bars;

e) casts from those who were alloyed steels, besides testing of their mechanical properties and the chemical composition, must undergo metallographic examinations (control macro- and microstructures in the heat-treated state) and in the cases, provided for by technical specifications for the manufacture of article, to testing for tendency toward intercrystallite corrosion.

38. All hollow cast steel must be subjected to hydraulic test in accordance with st. of 108 present rules.

Iron casting.

39. Iron casting is allow/assumed for manufacture of vessels of those who were intended for operation at temperature of wall from -15 to +250°, temperature of heating medium not above 650°, also, without heating by flame, according to Table 5.

For the manufacture of the indicated vessels, is allow/assumed

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the application/use of cast iron of other mark/brands, than not lower
given in Table 5.

Table 5.

(1) Марка чугуна	(2) ГОСТ	(3) Рабочее давление не более, кг/см ²	(4) Допустимый максималь- ный внутрен- ний диаметр сосуда, мм	(5) Назначение
(6) Сч. 15-32	1412-54	6	1 000	(7) Для внутреннего давления
(6) Сч. 15-32	1412-54	3	2 000	(8) То же
(6) Сч. 18-36	1412-54	3	3 000	
(6) Сч. 18-36	1412-54	8	2 000	(9) Для наружного давления

Key: (1). The mark/brand of cast iron. (2). GOST. (3). Operating pressure is not more, kg/cm². (4). Permissible maximum bore of vessel, mm. (5). Designation/purpose. (6). SCh. (7). for internal pressure. (8). The same. (9). For ambient pressure.

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Material for fasteners.

40. Manufacture of bolts, pins and nuts must be made of open-hearth steel or smelted in electric furnaces in accordance with Table 6.

41. Fasteners of vessels, not provided for Tables 6, can be applied in accordance with st. of 29 present rules.

42. Selection of mark/brands of steels for bolts, pins and nuts of flange joints, provided for GOST, must be produced in accordance with GOST to these flanges.

For the joints of flanges from austenitic steel, the bolts, pins and nuts must be manufactured from steels of the same class.

The setting up of fasteners made of austenitic steels on flanges made of carbon steel, and also during another combination of these steels (flanges made of austenitic steel, fasteners made of pearlitic steel) is allow/assumed only in the cases of the work of joints at constant temperature.

43. Nuts and pins must be manufactured from different mark/brands of steels, but during manufacture from one mark/brand - with different mechanical properties (hardness).

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44. Alloy steels, used for manufacture of reinforcing articles, must undergo heat treatment (hardening and tempering or standardization and tempering).

Table 6.

(1) № по пор.	(2) Марка стали	(3) ГОСТ	(4) Допускаемые рабочие параметры среды		(7) Назначение
			(5) Темпера- тура, град	(6) Давление не более, кг/см ²	
1	Ст. 3, Ст. 4, Ст. 5	380—50	(9) От —30 (10) до +350	(12) 50	(11) Болты, шпильки, гайки
2	25, 30, 35, 40	1050—52	(9) От —30 (10) до +435	Не ограничено	(13) То же
3	35X, 38XA и 40X	4543—48	(9) От —40 (10) до +435	(12) То же	(15) Шпильки, болты
4	35X, 38XA и 40X	4543—48	(9) От —40 (10) до +480	„	(16) Гайки
5	30ХМА	4543—48	(9) От —40 (10) до +480	„	(15) Шпильки, болты
6	30ХМА	4543—48	(9) От —40 (10) до +510	„	(15) (16) Гайки
7	35X2МФА	4543—48	(9) От —40 (10) до +530	„	Шпильки, болты
8	25X2МФА	4543—48	(9) От —40 (10) до +550	„	(16) Гайки
9	1X18H9T	5632—51	(9) От —196 (10) до +600	„	(11) Болты, шпильки, гайки
10	4X14H14B2M (ЭИ69)	5632—51 (14) и ТУ	(9) До +600	„	(13) То же

Key: (1). No on pores. (2). Trademark of steel. (3). GOST. (4). Permissible operational characteristics of medium. (5). Temperature, deg. (6). Pressure is not more, kg/cm². (7). Designation/purpose. (8). St. (9). From. (10). to. (11). Bolts, pins, nuts. (12). Not it is limited. (13). The same. (14). and. (15). Pins, bolts. (16). Nuts.

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45. For manufacture of vessels and their cell/elements, working under pressure, is allow/assumed application/use of nonferrous metals in accordance with Table 7.

The application/use of nonferrous metals at the temperatures, not provided for by present table, must be agreed in accordance with st. of 29 present rules.

Table 7.

(1) Марка металла	(2) ГОСТ	(3) Рабочая температу- ра, град.	(4) Примечание
(5) Листы латунные			
Л62	1019-47	(6) От -196 до +250	(8) Листы должны быть мягкими отожженными (9) То же
ЛЖМц59-1-1	931-52	(7) От -196 до +250	
ЛМц58-2	1019-47	(6) От -196 до +250	
Л68, Лс59-1	931-52	(7) От -196 до +250	
Л062-1, Л070-1	1019-47	(6) От 0 до +250	
(10) Трубы латунные			
Л62	494-52	(6) От -196 до +250	(11) Трубы должны быть мягкими (9) То же
ЛЖМц59-1-1	494-52	(7) От 0 до +250	
Лс59-1	494-52	(6) От 0 до +250	
Л070-1	494-52	(7) От 0 до +250	
(12) Листы медные			
(13) М2 и М3	859-41	(6) От -196 до +250	
	499-50	(7) От -196 до +250	
(14) Трубы медные			
(13) М2 и М3	617-53	(6) От -196 до +250	
(15) Листы алюминиевые			
АМЦ	4784-49	(6) От -196 до +150	(16) Применяются в отож- женном состоянии (17) Применяются в отож- женном или полунагар- тованном состоянии
Д1А-М	1946-50	(7) От 0 до +150	
АМгА-М	1946-50	(6) От 0 до +150	
АМцА-М	1946-50	(7) От 0 до +150	
АМцА-П	1946-50	(6) От 0 до +150	
(18) Трубы алюминиевые			
АД, АМг, АМц	1947-56	(6) От -196 до +150	(19) Применяются в отож- женном или полунагар- тованном состоянии
	4773-49	(7) От -196 до +150	

Key: (1). Mark/brand of metal. (2). GOST. (3). Operating temperature, deg. (4). Note. (5). Plates are brass. (6). From. (7). to. (8). Plates must be soft those who were annealed. (9). The same. (10).

Tubes are brass. (11). Tubes must be soft. (12). Plates are copper. (13). and. (14). Tubes are copper. (15). Plates are aluminum. (16). They are applied in the annealed state. (17). They are applied in the annealed or partly gathered state. (18). Tubes are aluminum.

END SECTION.

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Added materials.

46. During welding of vessels and their cell/elements, must be applied: electrodes according to GOST 2523-51 or according to technical specifications, welding wire according to GOST 2246-54 or according to technical specifications. Is allow/assumed application/use added material of the same chemical composition, as base metal. The used during welding of steel vessels added materials must provide the mechanical properties of weld metal according to Table 8.

The mechanical properties of weld metal during welding of alloy steels, provided for Tables 8, are establish/installed according to technical specifications.

In the absence of certificate to added material, the latter must

be tested in accordance with requirements GOST, TU [Technical Specifications] and present rules.

47. Mechanical tests of weld metal must be produced according to GOST 6996-54, for elongation - in specimen/samples diag. 3-6, to impact toughness - in specimen/samples diag. 7.

48. Results of tests of weld metal are defined as arithmetic mean from tested specimen/samples, which must be not less than value, indicated in Table 8. In this case, the tests are considered satisfactory, if not one of the specimen/samples gave the results, differing from the indicated in norms present rules more than by 10o/o to the side of decrease, but for impact toughness on 2 kgm/cm² lower than established/installed norms.

49. In presence of certificate for this batch of added material, testing weld metal on plant-manufacturer of vessels not is compulsory.

50. During welding of vessels from nonferrous metals, mechanical tests of weld metal are not necessary, if their conducting is not provided for by technical specifications for manufacture of article.

Table 8.

(1) Механические свойства наплавленного металла	(2) Для низколегиро- ванных сталей		(3) Для углеродистых сталей	
	(4) электро- дуговая сварка	(5) газовая сварка	(4) электро- дуговая сварка	(5) газовая сварка
(6) Предел прочности, кг/мм ²	(7) Не ниже (нижнего предела прочно- сти основного металла по ГОСТ или ТУ для соответствующей мар- ки стали			
(8) Относительное удлинение не менее, %	16	12	18	16
(9) Ударная вязкость не менее, кгм/см ²	5	4	8	4

Key: (1). Mechanical properties of weld metal. (2). For low-alloy steel. (3). For carbon steel. (4). electric arc welding. (5). torch welding. (6). Ultimate strength, kgf/mm². (7). Not lower than lower limit of the strength of base metal according to GOST or TU for the appropriate mark/brand of steel. (8). relative elongation is not less, o/o. (9). Impact toughness is not less, kgm/cm².

51. With manufacture, installation and repair of vessels and their cell/elements, is allow/assumed application/use of all industrial welding methods, which ensure quality of welded joints in accordance with requirements for present rules. Technology of the welding process and order of control/check are establish/installed prior to the beginning of manufacture.

52. To welding of vessels and their cell/elements, must be allow/assumed welders, which put tests in accordance with "rules of testing electro-welders and gas welders", affirmed by Gosgortekhnadzor [State Committee of the Council of Ministers for Supervision of Industrial Safety and for Mining Inspection (CRSfsr)] of USSR.

53. Processing of materials under welding can be produced by mechanical method or gas cutting by condition of providing for necessary form and size/dimensions of machined cell/elements and edges of welds in accordance with requirements for project.

54. During gas working of steels under welding, sensitive to concentrated heating and rapid cooling, technological process of

working must consider this special feature/peculiarity they began with those so that during working would not be obtained inadmissible defects (cracks or deterioration in quality of metal) on edges of cut and in heat-affected zone.

55. Machined under welding cell/elements they must be thoroughly examined to assembly. The edges of the cell/elements of vessels, prepared for welding, but equally to also adjacent to them surfaces of base metal must be before welding cleaned to width not less than 10 mm to metallic luster. Inequalities or undercuts must be aligned by hewing or emery wheel.

56. For adjustment of ends of tubes of carbon steel, is allow/assumed cold distribution of ends of tubes not more than to 30/o of tube bore with outside diameter of tubes to 83 mm and wall thickness not more than 6 mm.

57. Methods of assembly of vessels and their elements must provide correct mutual arrangement of coupling cell/elements and free access to execution of welding works by way of sequence, provided for by technological process.

With assembly is not allow/assumed the application/use of methods of adjustment, calling work hardening or the secondary

stresses in metal.

58. With assembly of welded vessels and their cell/elements of clamp, they must be fulfilled by welders of the same qualification, also, as far as possible by the same welders which will weld basic welds, with application/use of added materials which will be applied for basic welds.

59. With assembly of welded cell/elements of vessels made of steel, sensitive to thermal effect, clamps it is to fulfill through the same technology, as welding cell/elements.

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60. Welding vessels and their cell/elements can be produced only after testing by quality control department of enterprise of correctness of assembly and trimming of all surfaces of metal, which are subject to welding.

After the imposition of each layer (cylinder) of weld metal, its surface must be thoroughly decontaminated from slag and splashes of metal.

61. Defects and welding defects, discovered in process of

manufacture of welded vessels and their elements, must be in accordance with technological process and technical conditions for manufacture of articles corrected by means of cut or melting of defective sections of welds or welded joints, tubes with following seal and their repeated checking.

62. All welding works during manufacture of vessels and their cell/elements, as a rule, must be produced in locations at temperature not lower than zero. Welding vessels and their cell/elements at the temperature of surrounding air lower than zero is permitted in accordance with stated below Table 9 and under the condition of applying the corresponding devices for the protection of welding points from the direct effect of rain, wind and snowfall.

63. Welding technique of vessels must be elaborated for each individual case and must provide for such order of welding with which internal stresses will be smallest.

Welding technique, fulfilled at minus temperature, must provide for:

a) maximum decrease in the number of clamps with the replacement of them by assembly jigs;

b) decrease in the volume of weld metal;

c) complete filling of multilayer welds without the cessation of welding.

Table 9.

(1) Марки стали	(2) Толщина металла, мм		
	(3) до 10	11-16	(4) свыше 16
(5) Сварка разрешается при температуре окружающего воздуха не ниже			
(6) Углеродистая сталь с содержанием углерода (7) до 0,2%	(7) -20° без подогрева стыка		(8) -20° с подогревом стыка до 100-200°
(9) Углеродистая сталь с содержанием углерода от 0,21 до 0,28%	(7) -10° без подогрева стыка		(8) -10° с подогревом стыка до 100-200°
(10) Углеродистая сталь с содержанием углерода от 0,28 до 0,33%; как исключение, молибденовая сталь марок 12МХ, 15ХМ.	(7) -10° без подогрева стыка		(8) -10° с подогревом стыка до 250-400°
(11) новая 15М и 20М Хромомолибденовая сталь марок 12МХ, 15ХМ.	(12) -10° с подогревом стыка до 250-400°		
(12) Стали типа 18-8 (1Х18Н9Т и др.)	(13) По Техническим условиям		

Key: (1). the mark/brand of steel. (2). Thickness of metal, mm. (3). to 10. (4). it is more than 16. (5). Welding is permitted at the temperature of surrounding air on below. (6). Carbon steel with carbon content to 0.20/o. (7). ... without the preheating of joint. (8). ... with the preheating of joint to 100-200°. (9). Carbon steel with carbon content from 0.21 to 0.28o/o. (10). Carbon steel with carbon content from 0.28 to 0.33o/o; as exception/elimination, is molybdenum 15 and 20. (11). Chrome-molybdenum steel of brands 12МХ, 15ХМ. (12). ... with the preheating of joint to 250-400°.

(13). Steels of type 18-8 (1X18H9T, etc.). (14). According to technical specifications.

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A. HEAT TREATMENT.

64. Vessels, manufactured from carbon steel with application/use of welding, stamping or rollings (shells), they are subject to necessary heat treatment in following cases:

a) when wall thickness of cylindrical part or bottom of vessel in site of welded joint is more than 35 mm;

b) when wall thickness of cylindrical part of vessel, manufactured from sheet steel by rolling exceeds value, calculated by formula $\frac{D_s + 127}{120}$ cm, where D_s - bore of vessel, cm;

c) during manufacture of bottoms of vessel (independent of their wall thickness) by cold pressing or hot die-forged at temperature of termination of stamping below 700°. The bottoms, manufactured by the

indicated methods, can undergo heat treatment before their welding to the cylindrical part of the vessel. In this case the heat treatment of vessel can not be produced, if the same is not required in accordance with paragraphs "a" or "b" of present article.

65. Heat treatment of vessels and their cell/elements, manufactured with application/use of welding, of carbon steel with carbon content more than 0.28o/o with wall thickness for which according to st. 64 heat treatment is not required, or made of alloy steels, and also from nonferrous metals, it is establish/installed by technical specifications for manufacture of article.

66. Is allow/assumed heat treatment in parts with subsequent final local heat treatment of coupling weld (welds) in circular furnace or by special heating devices.

During local heat treatment must be provided uniform heating and cooling over an entire weld length and adjacent to it zone of base metal to the width, equal to 2-3 widths of weld in the place of its greatest expansion/disclosure.

67. During heat treatment in furnaces, special attention must be directed to the uniformity of heating article, for its preservation from deformation under the effect of temperature and dead weight.

E. THE CONTROL OF WELDED JOINTS.

68. Organization of control of welded joints must provide systematic quality control of production in accordance with requirements for present rules and GOST.

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69. System of control of welded joints must provide for identical marking of welds of article and relating to them specimen/samples.

70. Besides post-operative control, quality of welded joints, carried out during manufacture of vessels and their cell/elements, must be checked by following methods, provided for GOST 3242-54, 6996-54, 7122-54:

a) by visual inspection of all welded joints;

b) by mechanical tests of specimen/samples, cut out from control

plates or welded joints of articles;

c) by radioscopy of butt-welded joints by X-ray or gamma-rays;

d) by metallographic examinations, conducted on specimen/samples, cut made of control plates or welded joints of articles;

e) by drilling fillets;

f) by hydraulic test;

g) by pneumatic testing.

71. During welding of vessels and their cell/elements made of alloy austenitic steels, for example chrome-nickel of type 18-8, conducting control of welded joints for intercrystalline corrosion must be produced in accordance with GOST 6032-51 "steels. Methods of testing for intercrystalline corrosion" depending on the properties of used steel and conditions of work of vessel.

72. All types of monitoring tests of vessels and their cell/elements must take shape by appropriate documentation, necessary for compilation for vessel of log book of established/installed form.

Visual inspection.

73. To visual inspection are subject all the welded joints for detection in them of possible flaw/defects, including:

a) cracks, coming out on weld face or arrange/located in heat-affected zone;

b) rolls or cuts in places of transfer/transition from weld to base metal;

c) porosity and porosities of external weld face;

d) shift of edges of cell/elements to be welded;

e) nonuniformity of width and throat;

f) digressions from size/dimensions of welds indicated into drawings.

The inspection of welded joints is produced from two sides on their entire extent (in available places) in accordance with GOST 3242-54.

74. Evaluation of weld quality according to visual inspection must be produced in accordance with requirements for present rules and technical specifications.

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Mechanical tests.

75. Necessary types of mechanical tests they are:

- a) tensile test;
- b) flanging test;
- c) impact toughness test.

76. Flanging test welded butting union couplings in up to 100 mm bore can be replaced by testing for flattening which must be produced

in specimen/samples in accordance with GOST 6996-54.

77. Impact toughness test of welded joints must be produced during welding of vessels and their cell/elements wall thickness 12 mm and more in in the following cases:

a) if vessels are intended for work under pressure above 50 atm(gage);

b) if operating temperature of wall it exceeds 450°;

c) if operating temperature of wall lower than indicated minus temperature in accordance with Table 1, 2, 3, 4, 6 present rules.

Impact toughness test on paragraphs "a" and "b" of present shape must be produced in accordance with GOST by 6996-54 or technical specifications, and for p. "c" - in the same specimen/samples at operating temperature.

78. Testing mechanical properties of welded butt joints made of sheet steel must be produced by tests of welded specimen/samples, cut from control plates, welded simultaneously with manufacture of controlled/inspected articles with application/use of the same initial materials, method of welding and welding mode/conditions.

79. For quality control of longitudinal seams, control plates are tack/caught to cylindrical part in such a way that weld of control plate would be continuation of longitudinal seam of article to be welded.

For quality control of the transverse seams, the manufacture of control plates is produced with the necessary observance of the same conditions of the weldings during which is welded the article. Mechanical tests for quality control of the transverse seams are not produced, if longitudinal and transverse seams were fulfilled by one welder.

80. During manufacture of articles by automatic welding to each article must be welded one control plate. During manual welding of article by several welders, which fulfill separate welds, by each welder must be welded one control plate to each article.

81. Size/dimensions of control plates to be welded must be selected so that of them it would be possible to cut out quantity of specimen/samples according to GOST 6996-54 for all forms of mechanical tests and metallographic examinations and so that of remaining part possible would be in the case of necessity to cut out

additionally doubled against that which was indicated below quantity of samples for mechanical tests and for metallographic examination.

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82. Form and size/dimensions of specimen/samples for mechanical tests, and also their cut must correspond to GOST 6996-54, tests must be produced:

a) for elongation on two samples according to GOST 6996-54, diag. 17, 18 or 20;

b) for knee or flattening on two specimen/samples according to GOST 6996-54, diag. 34, 36 and 38;

c) to impact toughness on three specimen/samples according to GOST 6996-54, diag. 7 and 10.

83. For quality control of welded joints in tubular cell/elements with butt welds simultaneously with welding of latter are manufactured under the same production conditions control joints from which are cut out specimen/samples for conducting mechanical tests.

A quantity of control joints is determined into 1.00/o of the total number of those who were welded by each welder of the one-type joints of the tubes of this vessel, but it is not less than one joint to each welder.

84. Tensile test of separate specimen/samples made of welded joints of tubular cell/elements can be replaced ^(test) elongation~~of~~ whole joints with removed effort/force (GOST 6996-54, diag. 21).

85. With impossibility to manufacture flat/plane specimen/samples made of welded joint of tubular cell/element is permitted to produce testing specimen/samples, cut out from welded control plates in appropriate positions.

86. All the control plates and the joints, from which are manufactured the specimen/samples for conducting the monitoring tests, must be subjected to the same forms of heat treatment, by which undergo the controlled/inspected weldments.

87. Quantity of control plates and control joints of tubes, provided for by present rules for mechanical tests, can be decreased in agreement with control of circle/wheel of Gosgortekhnadzor of USSR or appropriate republic or departmental organ/controls of boiler control in following cases:

a) during preparation of batch production with application/use one and the same initial materials and with strict observance of technological discipline;

b) during specialization of welders on various welding works and establish/installed to tests of uniformity of quality of output;

c) with systematic issue of welded production of high quality, which is establish/installed by analysis of test results during period of time not less than 6 months.

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88. Results of mechanical tests of welded specimen/samples must satisfy the requirements GOST, TU and Table 10 and 11 of present rules:

Table 10.

Механические свойства сварных соединений	(2) Для низко-легированных сталей		(3) Для углеродистой стали		(4) Для стали 1X18H9T
	(5) электро-сварка	(6) газовая сварка	(5) электро-сварка	(6) газовая сварка	(7) электро-сварка
Предел прочности, кг/мм ²	(8) Не ниже нижнего предела прочности основного металла, установленного по ГОСТ или ТУ для данной марки стали				
Угол загиба, град.:					
а) углеродистая, независимо от S	—	—	100	70	—
б) молибденовая S < 20 мм	80	50	—	—	—
в) " S > 20 мм	60	50	—	—	—
г) хромомолибденовая S < 20 мм	50	30	—	—	—
д) " S > 20 мм	40	30	—	—	—
е) 1X18H9T S < 5 мм	—	—	—	—	120
" S > 5 мм	—	—	—	—	100
Ударная вязкость, кгм/см ² :					
а) молибденовая	6	—	—	—	—
б) хромомолибденовая	5	—	—	—	—
в) углеродистая	—	—	6	—	—
г) 1X18H9T	—	—	—	—	7

Key: (1). Mechanical properties of welded joints. (2). For low-alloy steel. (3). For carbon steel. (4). For steel 1X18H9T. (5). electric welding. (6). torch welding. (7). 1. Ultimate strength, kgf/mm². (8). Not lower than lower limit of the strength of the base metal, establish/installed according to GOST or TU for this mark/brand of steel. (9). 2. Angle of knee, deg.: (10). a) carbonic, independent of S. (11). b) molybdenum S < 20 mm. (12). c) is molybdenum from > 20 mm. (13). d). chrome-molybdenum S < 20 mm. (14). e) chrome-molybdenum

$S > 20$ мм. (15). f) ^{1Kh18N9T}~~1X18H9T~~ $S \leq 5$ мм. (15a). $S > 5$ мм. (16). 3.
 Impact toughness, kgm/cm². (17). a) is molybdenum. (18). b) is
 chrome-molybdenum. (19). c) is carbonic. (20). d) ^{1Kh18N9T}~~1X18H9T~~.

Table 11.

(2) Механические свойства сварных соединений		(3) Цветные металлы		
		Л-62	ЛМц-58-2	АМц
1	2	3	4	5
(2) Предел прочности	(4) Угол загиба: (1) при толщине < 5 мм (2) при толщине > 5 мм	(5) По Техническим условиям ¹		
		160	160	120
		140	140	100

Key: (1). No on pores. (2). Mechanical properties of welded joints.
 (3). Nonferrous metals. (4). Ultimate strength. (5). According to
 technical specifications ¹.

FOOTNOTE ¹. Is allow/assumed the limit of the strength of the welded
 joint lower than lower limit of the strength of base metal. In this
 case the calculation of cell/element must be produced on ultimate
 strength not higher than the limit of the strength of welded joint.
 ENDFOOTNOTE.

(6). Bend angle. (7). with thickness ≤ 5 mm. (8). with thickness > 5 mm.

During the manufacture of vessels from the materials, not provided for Tables 10 and 11, the indices of the mechanical properties of welded joints are establish/installated by TU.

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The indices of the mechanical properties of welded joints must be defined as arithmetic mean from the results, obtained during testing of separate specimen/samples, and satisfy the norms, given in st. of 88 present rules. In this case, the indices of mechanical properties are considered unsatisfactory, if at least one of the specimen/samples it gave the results, differing from the established/installated norms more than by 100/o to the side of reduction/descent, but for impact toughness by 2 kgm/cm² it is lower than these norms.

89. In the case of obtaining unsatisfactory results any of forms of mechanical tests or metallographic investigations, is permitted conducting repeated tests in specimen/samples, cut out from the same

control plate or from weld of article.

90. Repeated tests are carried out only according to that of forms of mechanical tests or metallographic examinations which it gave unsatisfactory results. For conducting the repeated tests, is accepted the doubled quantity of specimen/samples against the norms, indicated in st. of 82 present rules.

91. In the case of obtaining unsatisfactory results and during repeated tests welds are considered unsatisfactory.

In the case of obtaining the unsatisfactory results the flanging test with obtaining simultaneously of positive results other forms of mechanical testing and metallographic examination in agreement with the control of the district of Gosgortekhnadzor of the USSR or with the appropriate republic or departmental organ/controls of boiler inspection can be allow/assumed the digressions from the given above norms on flanging test.

92. Quality of welded joints, carried out with application/use of fillet welds overlapping or in brands, must be checked by OTK OTK [Quality Control Department] by method of visual inspection, by dimensional control of welds and by local drilling.

Metallographic examinations.

93. Metallographic investigations of welded specimen/samples, cut out from control plates or from control joints of tubes, must be produced for cell/elements of vessels, working with temperature of wall more than 450° and independent of temperature of wall at pressure it is more than 50 atm(gage), and also in the case of manufacture of vessels made of alloy steel, receiving quenching in air or inclined to formation, intercrystalline cracks, and in other cases, if metallographic examination is provided for by technical specifications.

94. Metallographic examinations have as a goal control of physical continuity of welds, development/detection of cracks, pores, gas inclusions, nonfusions, flux contaminations, and also setting structural characteristic of metal in terms of basic zones (transfer, thermal effect).

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95. Welding quality according to results of metallographic

examinations must satisfy following requirements:

with macrostudy

a) absence of cracks in weld metal or in heat-affected zone of base metal;

b) absence of unwelded places between layers of welds or between weld metal and edges of finishing, with the exception of nonfusion, provided for in p. "C" of present article;

c) the reveal/detect/exposed nonfusion radically of the weld of articles, available to welding only on the one hand without block/backings or backing rings, does not exceed 150/o of wall thickness, but it is not more than 3 mm with wall thickness of more than 20 mm;

d) imporosity and flux contaminations, coming out beyond the limits of norms; is allow/assumed the presence of the seen with the naked eye pin-head blisters and flux contaminations in a quantity not more than 5 pcs. by 1 cm² of the cross-sectional area of weld in the place of their greatest accumulation; the maximum linear size of separate flaw/defect on the greatest extent must not exceed 1.5 mm, and their sum must not be more than 3 mm.

with the microexamination

the absence of microcracks and structural components, which are powerful to sharply lower plasticity and ductility/toughness/viscosity of metal.

96. For conducting of metallographic examinations from each control plate or joint of tubes, is cut out one specimen/sample for macro- and microexaminations. The cut of specimen/samples and the control of macrostructure must be produced in accordance with GOST 3242-54 "welds welded. Methods of quality control".

97. Metallographic examinations are produced in specimen/sample, cut out across weld.

The controlled/inspected surface must include the section/cut of weld with heat-affected zones and the adjacent to it sections of base metal.

98. In the case of obtaining unsatisfactory results of metallographic examination, is allow/assumed conducting repeated testing in two specimen/samples, cut out from the same control plates

or welded joint of article.

99. In the case of obtaining unsatisfactory results during repeated metallographic examinations, welds are considered unsatisfactory.

Radioscopy of welded joints.

100. Control by radioscopy of welded joints of vessels by methods of radiography and gamma radiography has as its target/purpose determination of welding quality and is produced in accordance with GOST 7512-55.

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101. Length of x-rayed butt welds of vessels and their cell/elements is determined from Table 12.

The places of radioscopy are establish/installled by OTK of manufacturing plant.

In the case of the absence of the combination of the parameters

during the determination of the length of the x-rayed butt welds, it is necessary to be guided by the greatest parameter.

102. Welds acknowledge unsatisfactory, if will be revealed following flaw/defects:

- 1) cracks;
- 2) nonfusions on section of the weld;
- 3) nonfusions in apex/vertex of weld in joints, available to welding only on the one hand without block/backings, by depth are more than 150/o of thickness of base metal, if it does not exceed 20 mm, and more than 3 mm with thickness of more than 20 mm;
- 4) the flux contaminations or gas inclusions of groups A and B in GOST 7512-55 by size/dimension in the depth of weld are more than 100/o of wall thickness with wall thickness to 20 mm, and are also more than 3 mm with wall thickness more than 20 mm;
- 5) the flux contaminations, arrange/located by chain/network or the solid line along weld, of the group B GOST 7512-55 at their total length, which exceeds 200 mm on 1 m of weld;

6) gas pores, arranged/located in the form of solid riding-crops;

7) the accumulations of gas pores of group in GOST 7512-55 in the individual sections of weld are more than 5 pcs. by 1 cm² of the area of weld.

103. If with radioscopy will be reveal/detected inadmissible flaw/defects, then must be produced additional radioscopy of defective joints for extent/elongation, equal to radioscoped section of this joint, predominantly in places, located near defective section.

If with additional radioscopy will be also reveal/detected the inadmissible flaw/defects, then is x-rayed entire weld and the doubtful sections of other welds.

104. Defective sections of butt weld, reveal/detect/exposed with radioscopy by X-ray or gamma-rays, must be overcured and are newly enlightened.

105. All welds are subject to marking, which makes it possible to establish/install surname of welder, which fulfilled these welds.

Table 12.

(1) Допускаемое давление, кг/см ² (избыточное)	(2) Температура стенки, град.	(3) Длина просвечиваемых сты- ковых швов в процентах от общей длины стыковых швов
(4) Свыше 50	(5) Свыше +400, от -70 и ниже	25
(6) До 50	(7) От +200 до +400, от -40 до -70	15
(8) До 16	(9) До +200, от 0 до -40	10

Key: (1). Permissible pressure, kg/cm² (surplus). (2). temperature of wall, deg. (3). Length of the x-rayed butt welds in percentages from the common/general/total length of the butt welds. (4). It is more than. (5). It is more than +400, from -70 it is below. (6). To. (7). From +200 to +400, from -40 to -70. (8). To +200, from 0 to -40.

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Hydraulic test.

106. Hydraulic test of vessels and their cell/elements is produced for target/purpose of testing their strength and density.

107. Hydraulic test and internal inspection of vessels, sent

from manufacturing plants in assembled form (not requiring on the spot of installation of welding or rations of cell/elements, working under pressure), must be produced on manufacturing plants by specially separated workers of OTK of plants.

108. Hydraulic test of cast, forged and welded vessels on manufacturing plant must be produced by following pressure:

(1) Наименование сосуда	(2) Рабочее давление P, атм	(3) Пробное давление на заводе-изготовителе
(4) Все сосуда, кроме литых	(5) Ниже 5	(6) 1,5 P, но не менее 2 атм
(7) То же	(8) 5 и выше	(9) 1,25 P, но не менее P + 3 атм
(10) Литые сосуда	(11) Независимо от давления	(12) 1,5 P, но не менее 3 атм

Key: (1). Designation of vessel. (2). Operating pressure P, atm(gage). (3). Test pressure on manufacturing plant. (4). All vessels, except those who were cast. (5). It is below. (6). 1.5 P, but are not less than 2 atm(gage). (7). The same. (8). and it is above. (9). 1.25 P, but are not less than P + 3 atm(gage). (10). Cast vessels. (11). Independent of pressure. (12). 1.5 P, but are not less than 3 atm(gage).

The vessels, intended for work of wall are more than 400° in temperature, besides those who were cast, they undergo hydraulic test

on manufacturing plant by the pressure, which exceeds working not less than 1.5 times. The value of test hydraulic pressure, which exceeds 1.5 P, is establish/installed by planning organization.

The cast vessels, intended for work of wall are more than 400° in temperature, they must undergo on manufacturing plant the hydraulic test by the pressure, which exceeds working 2 times.

The vessels to which there are special Gosts, must test with the pressure, indicated in these Gosts, and fittings in accordance with GOST 356-52.

The vessels, which are subject to the coating with enamel, must undergo the hydraulic test by test pressure to the imposition of enamel. After the imposition of enamel, these vessels can undergo the hydraulic test by the pressure, provided for by technical specifications, but not less operating pressure.

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F. Tolerances during the manufacture of the basic cell/elements of vessels.

109. Shift of edges of longitudinal and circumferential seams of cylindrical cell/elements of vessels, manufactured from steel, is allow/assumed

$$b \leq nS_2 + \frac{S_1 - S_2}{2} \text{ mm}, \quad (1)$$

b - permissible shift of edges, mm;

n - permissible shift of centerlines of butting walls into portions of fine/thin wall thickness;

S_1 is actual thickness of thick wall, mm;

S_2 - actual thickness of fine/thin wall, mm;

$n = (S_2/S_1)$ - ratio of fine/thin wall thickness to thick wall;

D_n is outside diameter of tube, mm;

If $(S_1 - S_2)/2 > nS_2$, fine/thin wall must be within the limits of thick wall. Simultaneously with the observance of tolerances on the shift of edges by formula (1) must be maintained limiting requirements (Table 13).

110. For vessels from nonferrous metals, shift of edges of plates of identical thickness into longitudinal seams of shells with thickness of sheet to 3.5 mm must not exceed 0.5 mm, with thickness of sheet from 3.5 to 7 mm, - 0.7 mm, but with thickness of sheet, it is more than 7 mm - 100/o of thickness of sheet.

Table 13.

(1) Швы	(2) Элементы	л	(3) Ограничительные требования
(4) Продольные	(5) Обечайки	0,1	(6) Любое замеренное смещение не должно быть более 4 мм для сталей ферритного и перлитного класса и 2 мм для сталей аустенитного класса $m > 0,7$
(7) Кольцевые	"	0,25	(8) $S_1 - S_2 < 5 \text{ мм}^*$ Любое замеренное смещение не должно быть более 6 мм для сталей ферритного и перлитного класса и 3 мм для сталей аустенитного класса $m > 0,7$
(9) Продольные и кольцевые	(10) Обечайки из двухслойной стали	0,1	(11) $S_1 - S_2 < 5 \text{ мм}^*$ Любое замеренное смещение не должно быть более 3 мм и не должно превышать толщины легирующего слоя $m > 0,7$
(12) Кольцевые	(13) Трубы диаметром более 108 мм	0,15	(14) $S_1 - S_2 < 5 \text{ мм}^*$ Наружное смещение не должно быть более 0,1S
"	(15) Трубы диаметром до 108 мм включительно	0,25	(14) Наружное смещение должно быть не более 0,15S и не более 0,015D _н

Key:: (1). Welds. (2). Cell/elements. (3). Limiting requirements.

(4). Longitudinal. (5). Shells. (6). Any measured shift must not be more than 4 mm for steels of ferrite and pearlitic class and 2 mm for austenitic steels. (7). Circular. (8). Any measured shift must not be more than 6 mm for steels of ferrite and pearlitic class and 3 mm for austenitic steels. (9). Longitudinal and circular. (10). Shells made of two-ply steel. (11). Any measured shift must not be more than 3 mm and must not exceed the thickness of the alloying layer. (12). Circular. (13). Tubes whose diameter is are more than 108 mm. (14).

External shift must not be more. (15). Tubes up to 108 mm in diameter inclusively. (16). External shift must be not more 0.15S and not more 0.015 D_H .

FOOTNOTE with the larger difference in wall thicknesses it is necessary to make the smooth taper of thick wall according to st. of 13 present rules. ENDFOOTNOTE.

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During the mating of the plates of dissimilar thickness in the longitudinal seams of shells, the output/yield of the edge of more light-gauge sheet beyond limits thicker must not exceed:

- a) with the thickness of the light-gauge sheet to 3.5 mm - 0.5 mm; from 3.5 to 7 mm - 0.7 mm;
- b) with the thickness of the light-gauge sheet more than 7 mm - 100% of the thickness of the light-gauge sheet.

During the mating of the plates of dissimilar thickness in the

transverse seams of shells, the output/yield of the edge of the light-gauge sheet beyond the limits of thicker plate must not exceed:

a) with the thickness of the light-gauge sheet to 3.5 mm - 0.6 mm; from 3.5 to 7 mm - 1.5 mm;

b) with the thickness of the light-gauge sheet more than 7 mm - 250/o of the thickness of the light-gauge sheet, but it is not more than 5 mm.

During the mating of the plates of identical thickness into the transverse seams of shells, the greatest shift of the edges of plates must not exceed 250/o of thickness of sheet, but must not be more than 5 mm.

111. Deviations as a result of any reasons for wall thicknesses of shells and bottoms must not derive/conclude them lower than thicknesses, which require according to calculation. The wall thickness of bottom of must be not lower than calculated the wall thickness of the nonweakened shell.

112. Ovality of shells (difference among large and minor axis of oval) must not be more than 1.00/o of D_n . but it is not more than 20 mm, but of bottoms - within limits of tolerance for diameter. The

ovality of the vessels, manufactured from tubes, must not exceed values, established/installed GOST by these tubes.

113. Shift of edges of cell/elements of identical thickness during welding of bottoms from several parts is allow/assumed within limits of 10o/o wall thicknesses, but it is not more than 4 mm; in this case on bottoms made of two-ply steel, amount of shift must not exceed thickness of facing layer.

114. Deviation of leg of fillet from size/dimension, indicated in drawing, to the side of decrease is not allow/assumed.

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IV. Fittings of vessels.

115. Vessels, to which are spread present rules, with the exception indicated in section X and XI, must be equipped by following fittings:

a) by locking organ/controls for disconnection/cutoff of vessel from conduit/manifolds, which supply into vessel, and which also

discharge from vessels vapor, gas or liquid; in the case of series connection of several vessels installation of locking organ/controls on conduit/manifolds between them it is not necessary;

b) by remover of located in vessel medium, or by device for blasting and removal of condensate;

c) by the manometer, equipped with adjuster of the test pressure gauge, the disconnection/cutoffs of manometer from vessel and joint with atmosphere - the three-way cock (with the diameter of the flange of 38 mm and with a thickness of 6 mm) or device, it replacing; the extra-gone around cases manometers in dependence from work conditions and from the properties of medium, which is located in vessel, must be supplied with siphons, with the oil dashpots or other devices, which prevent manometers from the direct effect of medium.

On the vessels, working under pressure above 25 atm(gage) or with the temperature of medium it is above 250°, and also with toxic or dangerously explosive medium, instead of the three-way cock is permitted the setting up of separate branch with locking organ/control for the connection of the second manometer. On the vessels of discontinuous action in the presence of possibility to test manometer with its removal from vessel, and also on mobile vessels the setting up of the three-way cock or devices, it

replacing, is not necessary;

d) are not less than by one lever/crank or spring safety valve with jacket or the cap/hood, which eliminates the possibility of an arbitrary increase in the load of valve; in the case of series connection of several vessels in the absence of locking organ/controls between them, is permitted the setting up of one safety valve on entire group of the indicated vessels;

e) the vessels, warmed directly by flame or the gases with temperature above 450°, in which there can be lowering the level of liquid lower than lines of fire heating, must be supplied with liquid level gauge. vessel- capacitance/capacities for liquefied gases must be supplied with liquid level gauge or with another device, which makes it possible to check the maximum permissible filling;

f) the vessels, working with toxic or dangerously explosive medium, and evaporator/vaporizers with fire or gas heating must have on the supplying line from pump or compressor the check valve, which is automatically closed by pressure from vessel.

116. Manometers must be tested and lead-sealed by local organ/controls of committee of standards, measures and measuring meters with Council of Ministers of USSR.

Testing and sealing of manometers must be produced not thinner than one times per annum, or each time after the manufactured repair. Furthermore, by operational personnel must be produced testing working manometers by control or in absence of the latter, as exception/elimination, by the checked working manometer within the periods, establish/installed by the administration of enterprise, but is not thinner than one times in six months with the recording of these testings onto journal.

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Manometers are not allow/assumed to application/use in cases when;

- a) there is no seal;
- b) is overdue the period of testing manometer;
- c) the rifleman/gunner of manometer with his disconnection does not return to fulcrum pin or, in the case of the absence of tag, it differs from the zero reading of the scale to the value, which exceeds the half of the permissible error for this manometer;

d) is broken glass.

117. Manometer must be selected with such scale, in order to at operating pressure of his rifleman/gunner it would be located in average third of scale.

118. To dial of manometer, must be plotted/applied red feature through scale division, which corresponds to solved operating pressure.

Instead of the red feature, applied to the dial of manometer, it is permitted to fasten outside manometer the metallic plate, painted in red color and closely fitted to glass of manometer.

119. For vessels must be applied manometers or vacuum-manometers of class of precision to 2.5 in accordance with GOST 2405-52. For the vessels, working under the pressure of hydrogen it is above 200° in temperature, is permitted the application/use of hydrogen manometers of the class of precision 4.

120. Manometer must be establish/installed so that its readings would be distinctly visible, to service personnel, in this case its

dial must be located in vertical plane or with slope/inclination forward to 30°.

The manometers, establish/installed on height/altitude 3.5-5 m of the level of run board must be diameter not less than 200 mm.

The setting up of manometers at height/altitude above 5 m of the level of run board is not permitted.

121. Each manometer must be well illuminated, shielded from effect of radiant heat and from freezing.

On the line, which leads to manometer, it is forbidden to produce connections for the selection of medium.

122. Quantity of safety valves, their size/dimensions and throughput capacity must be selected so that in vessel could not be formed pressure, exceeding working more than on 0.5 atm (gage) for vessels with pressure to 3 atm (gage) inclusively, on 150/o for vessels with pressure from 3 to 60 atm (gage) and on 100/o for vessels with pressure more than 60 atm (gage).

The throughput capacity of valves must be confirmed by calculation.

Under the operating pressure of vessel, one should understand the maximum solved pressure.

Is allow/assumed the excess of pressure in vessel not more than on 25o/o of worker in work of safety valves, on the condition that this excess of pressure is provided for by project and it is reflected in the log book of vessel.

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123. During calculation of throughput capacity of safety valves for gases and vapors, it is to use following formula

$$G = 220 FP \sqrt{\frac{M}{T}} \text{ kg/h,}$$

where G - throughput capacity of valve, kg/h, is selected taking into account maximally possible formation in vessel or entrance in it of gases or vapors from feeding source in the absence of expenditure/consumption from vessel;

F is working section/cut of valve, cm², determined for valves:

Q

a) full-lift with $h \geq 1/4 d$ by formula $P = 0.785 d^2$;

Q

b) nonfull-lift with $h \leq 1/20 d$ by formula $P = 2.22 dh$;

d is a bore of saddle, cm;

h - valve lift, cm;

P - absolute pressure, kg/cm²;

T - the absolute temperature of vapors or gases;

M - the molecular weight of the passing through the valve vapors or gases.

124. Safety valves are establish/installed directly on vessel and must be protected from blockage or bringing into idleness content of vessel. If on the kind of the constructions of vessel or according to the conditions of production this setting up is impracticable, safety valves must be establish/installed in immediate proximity of vessel to pipe or on special extension.

125. Between vessel and safety valve must not be of locking organ/control. Is permitted the setting up of the switching tap/crane or three-way switching valve/gate between protecting devices and the stationary vessels, intended for work under the pressure of toxic, combustibile either dangerously explosive gass, under the mandatory condition that the switching tap/crane or three-way the switching valve/gate is installed on the branch, which connects vessel with two protecting devices, and that in any position of cock plug or shaft of valve/gate with vessel they will be connected both or one of the two protecting devices.

In this case each of the protecting devices must have throughput capacity in accordance with present rules.

126. Each safety valve for the purpose of testing its soundness by blasting must be equipped by device for forced opening of the valve during operation of vessel.

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127. When on kind of production either as a result of action of content in vessel safety valve cannot reliably work, instead of it it is necessary vessel to supply with safety plate, which is broken up with pressure increase in vessel not more than on 250/o of solved

operating pressure, or this plate to establish/install before safety valve for prevention of action of medium on valve. Construction and the size/dimensions of plate must be such so that after its breakage it would be eliminated the possibility of a further pressure increase in vessel.

On the branch connection between the safety valve and the confronting it safety plate, must be establish/installed the branch with cock for the checking of working order of plate.

All safety plates must have trade mark with the indication of the pressure, which disrupts of plate, or special code. Is allow/assumed instead of mark the plotting of the required data by color/paint.

128. If design pressure of vessel is equal or more than pressure of feeding source and if in vessel is excluded possibility of pressure increase from chemical reaction or heating, then setting up on it of safety valve and manometer is not necessary under condition of their presence on source of pressure.

129. Vessel, working under pressure smaller than pressure of his feeding source, it must have on supply line automatic reduced device with manometer and safety valve, establish/installed on side of

smaller pressure, moreover safety valve must satisfy requirements Articles 122 and 124 present rules. Locking organ/control must be located on the conduit/manifold between the vessel and the reduced device.

For the group of the vessels, working at just one pressure, sufficient one reduced device with the manometer and the safety valve, establish/installed on common/general/total main line to the first branch. In these cases the setting up of safety valves on vessels themselves is not necessary, if in vessels is excluded the possibility of a pressure increase from chemical reaction or heating.

In cases when the automatic reduced device as a result of the physical properties of medium cannot reliably work, is allow/assumed the replacement of automatic reduction by the setting up of the manual reduced valve/gate, two safety valves and manometer on low-pressure end. The throughput capacity of each safety valve must satisfy the requirements st. for 123 present rules.

130. When into vessel are introduced or in it can be formed fire-explosion hazardous or poison gases, it is necessary to reliably prevent possibility of incidence/impingement of such gases or vapors into working location by means of branch/removal outside of tubes from safety valves or explosive plates.

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131. On each vessel must be device (valve/gate, tap/crane) for control of absence of pressure in vessel before its opening. When there is present on the vessel fittings, which makes it possible to test the absence of pressure in vessel, the setting up of the indicated device is not necessary.

The vessels, equipped bayonet and similar type as gates, must have the protecting devices, which eliminate the possibility of discovery/opening the cap/cover of vessel in the presence in it of pressure.

V. Requirements for the setting up of vessels.

132. Setting up of vessel must provide access to all parts, possibility of inspection, repair and purification/cleaning both from internal and from face.

133. Setting up of vessel-capacitance/capacities with their

sinking into soil is permitted under condition of protection of their walls from corrosion by proper anticorrosive coating and provision for access to reinforcement.

134. For convenience in maintenance, inspection and repair of vessels, must be arranged area/sites and staircases. The indicated devices must not disturb strength and stability of vessel, but their welding to vessel must be carried out on project in accordance with the requirements for present rules.

135. Setting up of vessels must eliminate possibility of their tilting/reversals.

136. External surface of vessels, manufactured from steel, must be protected from corrosion.

137. For each vessel after its setting up and recordings, must be plotted/applied by color/paint on visible place or on special tablet by size not less than 200 x 150 mm following data:

a) registration number;

b) solved pressure;

c) date (month and year) of following internal inspection and hydraulic test.

VI. Recording.

138. Vessels, which are subject to action of present rules, must be before launching/starting into work recorded in organ/controls of Gosgortekhnadzor of USSR or in republican and departmental organ/controls of boiler inspection on affiliation/accessory. This requirement is not spread to the vessels, indicated in st. of 139 present rules.

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139. Recordings in organ/controls of Gosgortekhnadzor of USSR or appropriate republic and departmental organ/controls of boiler inspection are not subject:

a) vessels, stationary or movable, workers under pressure to 16 atn(gage) of walls up to 200° in temperature, whose product of capacitance/capacity in liters by pressure in the atmosphere (surplus) does not exceed 500.

During the calculation/enumeration of the product of capacitance/capacity and pressure for the vessels, which consist of the separate housings, connected among themselves tubes in are not more than 100 mm bore, each housing must be considered as separate vessel;

b) fractionating columns for air, or the apparatuses, direct-connected with them, somehow the heat exchangers of separating apparatuses (column), boiler-condensers, evaporative vessels;

c) the vessels of cooling installations by cold output to 30 000 kcal/h, with the exception carbonic-acid are subject to recording in the organ/controls of supervision;

d) the vessels, which are the integral part of pipelines for the vapor and the hot water, which are not subject recordings in the organ/controls of supervision;

e) the reservoirs of air electrical switches;

f) bottles for transportation and storage of the compressed, liquified and dissolved gases and flanks for the transportation of

liquefied gases, indicated in paragraphs "b" and "c" of st. of 1 present rules;

g) air receivers of the autobrakes of cargo and passenger railroad cars, gasoline locomotives, diesel locomotives, electric locomotives, or the reservoirs of the pneumatic equipment of the self-discharging cars, of the railway cranes, automobiles and other conveying devices;

h) generators (reactors) for obtaining hydrogen of the hydrographic and weather service;

i) the vessels, connected in the closed system of the yield of petroleum (spurt and measuring ladders, gas separators, etc.).

140. Recording the vessels, which are non-removable part of the conduit/manifolds for the vapor and the hot water, which are subject recordings in the organ/controls of supervision, must be produced together with recording of these conduit/manifolds; in this case the log book of the indicated vessels they must be applied to documentation on conduit/manifold.

141. By owner of vessels to which in accordance with st. of 25 present rules of compilation of log books it is not required, must be

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brought book of account and examinations of these vessels. The book must be stored in person, carrying out supervision after vessels.

142. Recording vessel is produced on the basis of notification in writing of administration of enterprise - owner of vessel.

End section.

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for recording it must be represented:

- a) the log book of the vessel of the established/installed form
1;

FOOTNOTE 1. The technical specifications and records on the vessels,
supplied due to boundary/interface they must include:

1) the data on the quality of the metal from which are made the
cell/elements of vessel, with the indication of the mechanical
properties and the chemical composition;

2. the stress analysis of vessel;

3) the drawing of vessel;

4) the data on welding quality. ENDFOOTNOTE.

b) the event/report, which certifies, that the installation and the setting up of vessel are produced in accordance with present rules and that the vessel and all its cell/elements are found in working order;

c) the connection of vessel with the indication of the source of pressure and parameters of its working medium.

Documents, enumerated in paragraphs by "b" and "c" of present article, must be signed by the technical administration of enterprise.

143. Answer/response to statement about recording of vessel must be given to recording organ/controls of supervision to owner of vessel within period not later than 10 days from day of obtaining statement. In failure in recording to the owner of vessel must be interlocked about this in written form with the indication of the reasons for failure and with references to the appropriate articles of rules.

144. With compliance of documentation of vessel to requirements

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FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
RULES OF DEVICE AND SAFE OPERATION OF VESSELS, WORKING UNDER PR--ETC(U)
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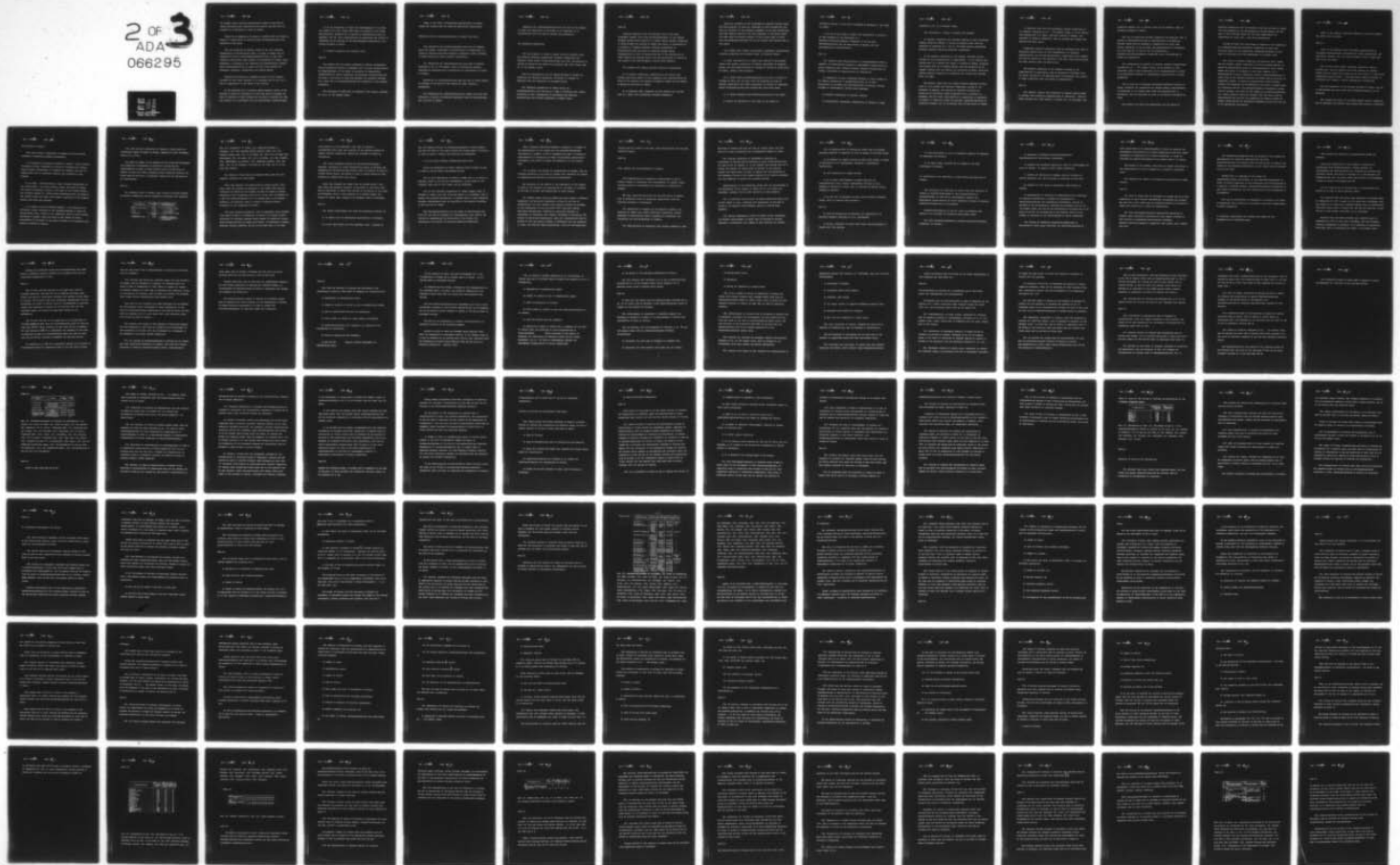
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for present rules recording organ/control places in log book of vessel die/stamp about registration and returns log book with all attached to it documents to owner of vessel.

During the transmission of vessel to another owner the vessel is subject to registration in routine before launching/starting into operation on new place.

145. For recording of vessels, which do not have technical documentation of manufacturing plant, by owner of vessel must be comprised log book of established/installed form, in this case instead of certificate about quality of manufacture of vessel, owner comprises k it fastens by his signature and press/printing evidence about fitness/suitability of vessel for work with provided for parameters (pressure, temperature) and working medium.

Indicated certificate is composed by owner for the vessels, intended for work under pressure to 16 atm(gage) and of wall up to 200° in temperature, on the basis of the results:

a) the performed by it verifying stress analysis (limit of the strength of metal for elongation in this case must be accepted not above 36 kgf/mm² for steel vessels and not above 12 kgf/mm² for cast iron vessels or in accordance with the manufactured investigations);

b) of the radioscopy of welds into size/dimension 10 % from the length of all butt welds; when there are present on the vessel specifications, hammered out by marking by manufacturing plant, on agreement with the local organ/controls of supervision the control by radioscopy can be replaced by the metallographic examination or by initial drilling of welds;

c) internal inspection and hydraulic test.

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For vessels with the higher parameters of medium, furthermore, must be produced according to agreement with the local organ/controls of Gosgortekhnadzor of the USSR, the republic and departmental organ/controls of boiler inspection the necessary investigations and the tests on the basis of which are accepted the allowable stresses for a metal and is establish/installed its conformity to the assigned parameters.

The radioscopy of welds must be produced at the length, provided for by st. of 102 present rules.

When, in the owner, corresponding specialists's is absent, vessel the evidence must be comprised specialized organization.

Resolution for the launching/starting of vessels into work.

146. Resolution for launching/starting into work of vessels, which are subject recordings in organ/controls of supervision, is issued by engineer-controller/inspector (inspector) after recording of these vessels and their technical examination.

147. Resolution for launching/starting into work of vessels, indicated in st. of 139 present rules, is overhung by persons, separated by administration of enterprise for realization of control of vessels.

Resolution for launching/starting into the work of these vessels is overhung on the basis of the results of their technical examination.

148. Resolution for launching/starting of vessel into work with indication of period of following examination must be record/written into log book of vessel.

Resolution for launching/starting into the work of the vessels to which the compilation of log books is not required, he is record/written into the book of account and examination.

VII. Technical examination.

149. Each vessel, to which is spread action of present rules, must undergo technical examinations (internal inspections and hydraulic tests) before launching/starting into work, periodically in process of operation and before the appointed time after repair (see st. of 152 present rules).

With the impossibility (on the design features of vessel) of conducting the internal inspection, the latter is replaced by hydraulic test and inspection in available places.

150. Technical examination of vessel before its launching/starting into work has as a goal to establish that vessel, connection of its, organization of maintenance and technical specifications and records correspond to present rules.

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Internal inspection and the hydraulic test of the newly adjustable vessels, which have adapter/attachments or the complex internal devices which difficult to remove before internal inspection or which prevent the filling of vessel with water, is permitted not to produce, if vessels underwent technical examination on manufacturing plant and were not obtained damages during transportation in site of installation and if the installation of these vessels was produced without the application/use of welding or the rations of the cell/elements, working under pressure.

151. Vessels must undergo periodic technical examinations:

a) to internal inspection, conducted are not thinner than through each three years. By this inspection are reveal/detected the state of the internal and external surfaces of vessel and the effect of medium on the walls of vessel;

b) to hydraulic test, conducted are not thinner than through each of 6 years, with preliminary internal inspection.

Spare air receivers of the autobrakes of railroad rolling stock, with the exception of spare air receivers of steam locomotives, and also air receivers of the pneumatic equipment of the self-discharging cars must undergo hydraulic test and inspection in available places with each major and medium overhaul of the rolling stock on which they are establish/installed, but is not thinner than through each of five years.

152. Vessels must undergo extraordinary (premature) examinations (internal inspection and hydraulic test) in following cases:

a) after reconstruction or repair with setting of patch/wages either cover plates, correction of bulges, replacement of separate plates, and also application/use of welding or rations of loose parts of vessel, workers under pressure;

b) if vessel before launching/starting into work is located in idleness of more than one year, with the exception of cases of storage conservation with which examination of vessels is compulsory before launching/starting with storage more than three years;

c) if vessel dismantled and establish/installed on new place;

d) before the imposition on the walls of the vessel of

protective coating, if the same is produced by enterprise - the owner of vessel;

e) if due to the state of vessel this examination it proves to be that necessary at the discretion of a engineer-controller/inspector (inspector) or of the face, heavy-duty/critical for the safe action of vessel, with the representation of substantiation.

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153. Engineer-controller/inspector of Gosgortekhnadzor USSR or inspector of corresponding republic or departmental organ/control of boiler inspection must produce following technical examinations of vessels, registered in organ/controls of supervision:

a) examination of newly adjustable vessels, if these vessels do not undergo examination on manufacturing plant or if their installation is produced with application/use of welding, rations, rollings of cell/elements, working under pressure;

b) periodic examination of vessels, working;

c) extraordinary (premature) examinations of vessels in cases,

indicated in st. of 152 present rules.

154. Enterprises - owners of vessels must produce:

a) internal inspection and hydraulic testing of newly adjustable vessels, which are subject to action of present rules, with the exception of indicated in p. "a" st. 153 whose primary examination produces engineer-controller/inspector (inspector);

b) the internal inspection of all vessels (recorded and not recorded in the organ/controls of supervision) - is not thinner than through each of 12 months with repair or opening of vessel, connected with removal from it of working medium, with the exception of the vessels, working with the medium, not corrosives of metal, which must undergo internal inspection by enterprise not thinner than through every two years.

The vessels, which have the complex internal removable devices which it is to remove with internal inspections (column of the synthesis of ammonia, the reactors of catalytic cracking and production of artificial liquid propellant etc.), according to agreement with the local organ/controls of supervision is permitted to subject to inspection within the periods, establish/installed by production command, but is not thinner than through every two years;

c) hydraulic test with the preliminary internal inspection of the vessels, indicated in st. of 139 present rules, it is not thinner than through each of 6 years. Hydraulic testing of vessels, not available to internal inspection, must be produced not thinner than through each three years.

Conducting technical examination must be entrusted with order on enterprise (institution) for the representative of technical administration, who realize/accomplishes a supervision after vessels, and must be produced in the presence of the face, heavy-duty/critical for their working order and safe action.

The internal inspection of the vessels, recorded in the organ/controls of supervision, must be produced in accordance with the graph, affirmed by the administration of enterprise. The results of these inspections must take shape by event/reports.

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155. vessels, working with dangerous for people's health gases or liquids, must undergo by administration of enterprise - owner of vessel leakage test; this testing is carried out, in accordance with

production command, air or another inert gas by pressure, equal to operating pressure of vessel.

156. Day of conducting internal inspection and hydraulic test of vessels is establish/installed by administration of enterprise, moreover vessel must be produced to examination not later than period, indicated in its log book. The administration of enterprise not later than for 10 days is due to prevent/warn a engineer-controller/inspector (inspector) about the readiness of vessel for examination.

157. Prolongation of periods of periodic technical examinations, provided for st. of 151 present rules, can be produced in each individual case by local organ/controls of Gosgortekhnadzor of USSR or by appropriate republic or departmental organ/controls of boiler inspection.

158. In the case of engineer-controller/inspector's failure to appear (inspector for examination of recorded vessel, administration of enterprise it is allowed right under its responsibility to manufacture this certification by board of enterprise, designated by order.

The results that which was manufactured and the period of

following examination will be brought in into the log book of vessel over the signature of the participating in board persons, but the copy of this recording heads for the local organ/control of supervision not later than 5 days after examination.

Allowed by board into work vessel is subject to the examination by a engineer-controller/inspector (inspector) no later than following period of the examination, establish/installed by this board in accordance with the requirements for present rules.

159. Prior to internal inspection and hydraulic test, vessel must be stopped, cooled, freed from its filling working medium, is opened by plug/silencers from all conduit/manifolds, which connect vessel with source of pressure or with other vessels, it is decontaminated to metal. Refractory lining, isolation/insulation or other forms of the surface protection of vessel must be partially or completely removed, if there are sign/criteria, which indicate possibly the emergences of flaw/defects in the metal of vessel under the protective coating: the leakage/looseness of refractory lining, bulge of gumming, the traces of the soaking of isolation/insulation, etc. During hydraulic tests the vessels, sunk into soil, must be free/released from soil for the inspection of external surface or undergo investigation for determining thickness of wall with the aid of the appropriate instruments.

When, in the vessels, electrical heating or drive are present, the latter must be opened.

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Prior to the hydraulic test the entire apparatus must be thoroughly decontaminated, tap/cranes and valves ground/wiped, but cap/covers, hatches, etc. are tightly placed so that through them will not be the leaks.

160. In work within vessel (internal inspection, repair, cleaning etc.) must be applied safe light sources, for example movable electric lamps with stress are not more than 12 V, while with dangerously explosive media - explosion-proof lighting fixtures in accordance with command on safety engineering of enterprise.

With the inspection of the internal surfaces of vessel, the use of the kerosene and other tubes with inflammable material is not permitted.

162. Vessels more than 2 m in height before internal inspection must be equipped with devices, which ensure safe access to inspection

of all parts of vessel.

163. With internal inspections of vessels, must be directed attention to following possible flaw/defects:

a) on internal and external surfaces of vessel - crack, strains, corrosion of walls, especially in places of flangings and cutouts, bulge, bulges, predominantly of vessels with jackets, and also of vessels with fire or electrical heating; gas inclusion in cast vessels;

b) in welds - welding defects, crack, strains, fumigations. In the riveted seams - the crack between rivets, the breaks of heads, the traces of passages, strains in the edges of the riveted plates, the corrosive damages of riveted welds (clearances under the edges of the riveted plates and under rivet heads), especially of the vessels, working with acids and alkalies;

c) in vessels with the shielded surfaces - the destruction of refractory lining, including of the leakage/looseness of layers of lining slats; bulge, cracks in the rubberized, lead or other coating, splittings of enamel, crack and bulge in the inserts of metal, flaw/defects in the metal of the walls of vessel in the places of the damage of protective coating.

164. With internal inspections of vessels, riveted seams are selectively tapped by hammer by weight, depending on wall thickness, from 0.5 to 1.5 kg.

The walls of vessel in the presence of the reveal/detect/exposed with inspection flaw/defects in protective coating must be decontaminated to metal in these places; during the detection of defects of metal and their propagation under protective coating, the latter must be partially or completely removed for the detection of all flaw/defects.

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165. Hydraulic test of welded, cast, forged and riveted vessels by periodic examination must be produced by following test pressure:

(1) Наименование сосуда	(2) Рабочее давление Р, ати	(3) Пробное давление при перио- дических испытаниях
(4) Все сосуда, кроме литых	(5) Ниже 5	(6) 1,5 Р, но не менее 2 ати(6a)
(7) То же	(8) 5 и выше	(6) 1,25 Р, но не менее Р + 3 ати
(9) Литые сосуда	(10) Независимо от давления	(6) 1,25 Р, но не менее 2 ати(6a)
(11) Эмалированные сосуда . .	(12) То же	(13) Давлением, указанным в паспорте, но не менее чем рабочим

Key: (1). Designation of vessel. (2). Operating pressure P, atm(gage). (3). Test pressure during periodic tests. (4). All vessels, except cast. (5). It is below. (6). but it is not less than (6)atm(gage). (7). The same. (8). and it is above. (9). Cast vessels. (10). Independent of pressure. (11). Enamelled vessels. (12). The same. (13). By the pressure, indicated in log book, but it is not less than working.

The vessels to which there are special Gosts, test with the pressure, indicated in these Gosts.

Under test pressure the vessel must be located during 5 min, after which the pressure is decreased to the worker with whom are overhauled of vessel and the tapping of welds by hammer by weight, depending on wall thickness, from 0.5 to 1.5 kg. Lift of pressure to a test and reduction/descent in it to working must to be produced gradually. The pressure, equal to worker is supported always, necessary for the inspection of vessel.

166. When conducting hydraulic test is impossible (high stresses from weight of water in foundation, in floors or in vessel itself, difficulty of drainage, presence within vessel of refractory lining, which prevents filling of vessel with water), is permitted to replace hydraulic testing pneumatic (by air or any inert gas) to the same

test pressure as with hydrotest. This type of testing is allow/assumed only under the condition of the positive results of careful internal inspection, testing the strength of vessel by calculation.

167. During pneumatic testing are accepted precautionary measures: valve/gate on filler pipeline from source of pressure and manometers are derive/concluded beyond limits of location in which is located tested vessel, and people on time of vessel testing by test pressure are removed into safe places.

Under test pressure the vessel must be located during 5 min, after which the pressure gradually is decreased to the worker with whom is overhauled of vessel with testing of the density of its welds and detachable joints a soap solution or in another manner. The tapping of vessel under pressure with pneumatic tests is forbidden.

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168. Vessel acknowledges that which was maintained testing, if:

a) in vessel will not render/show sign/criteria of breakage;

b) is not noted leaks, but with pneumatic tests - passage of

gas. The passage through the leakage/loosenesses of reinforcement, and also the yield of the water through the riveted seams in the form of dust or drops of "drops" leak they are not considered;

c) is not noted residual deformations after tests.

During the appearance of drops, sweating either passage of gas in welds or walled vessel acknowledges failed.

169. If with examination of vessel it seems that it is found in emergency state or has serious flaw/defects, calling doubt of its strength, then work of this vessel must be forbidden.

170. If with technical examination of vessel appears doubt of strength of vessel with that which was solved to it pressure, then to person, who produced examination, is allowed right to lower operating pressure. Decompression must be justified by the detailed recording in the log book of vessel.

With development/detection in the vessel of shortcomings with which all the same is possible its time/temporary work, person, who carried out examination, can solve work of this vessel with shortening in the period of following technical examination.

When a engineer-controller/inspector (inspector) is impeded in the determination of the reasons for the reveal/detect/exposed flaw/defects in vessel, to him is presented the right to propose to administration of enterprise to obtain corresponding specialists's conclusion on the state of vessel and possibility of his further work.

171. By those, who carried out examinations of vessels, must be produced recording in log books of vessels with indication of results of examination and periods of following examinations.

The recording of the results of the examination of the vessels to which is not required the compilations of log books, is produced in the book of account and examinations of these vessels.

172. Vessels whose action of medium can cause change in chemical composition and mechanical properties of metal to the side of deterioration, and also vessels with strongly corrosive environment or with temperature of wall are above 475°, they must undergo additional examinations, conducted by operating personnel of enterprises in accordance with command, developed by enterprise. The results of additional examinations, tests and investigations must be brought in into the special journal of enterprise over the signature of those, who produced these examinations, tests and investigations.

Journal must be located in the face, heavy-duty/critical for the safe action of vessel.

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VIII. Content and the maintenance of vessels.

173. Administration of enterprise (institution) is due to contain vessels in accordance with requirements for present rules, providing safety of maintenance and reliability of operation of vessels.

The face, heavy-duty/critical for the safe action of vessel, must be designated order on enterprise (institution) from the operating personnel of enterprise.

174. Maintenance of vessels can be charged to persons, who achieved 18- summer age, passed production instruction, testing knowledge in qualification board, organized by enterprise, and instruction for safe maintenance of vessels.

175. Administration of enterprise must develop commands on safe

servicing of vessels and hang out them on visible place, and also give out to each organization man corresponding command to hands.

176. Periodic inspection of knowledge of personnel on maintenance of vessels must be produced by face, heavy-duty/critical for safe action of vessels, it is not thinner than through each of 12 months. The results of testing must be brought in into special journal with marks about the date of testing and the evaluation of the knowledge of each of the checked persons of the service personnel over the signature of person, who produced testing.

Administration of the enterprise (shop) must not allow/assume to the maintenance of the vessels of those, who do not possess the knowledge, necessary for the safe operation of these vessels.

177. Is forbidden during action of vessel conducting repair work of this vessel or work, connected with liquidation of disorder of joints of its separate cell/elements, which are located under pressure.

178. Testing soundness of action of safety valves, manometers and another reinforcement of vessel must be produced by service personnel in accordance with command on safe servicing of vessels.

179. By administration of enterprise (shop) must be accepted necessary measures to cessation of work of vessel in following cases:

a) if pressure in vessel is built up that above solved, in spite of observance of all requirements, indicated in maintenance instructions;

b) with malfunction of safety valves;

c) if in basic cell/elements of vessel they will be reveal/detected crack, bulges, considerable thinning of wall, passages or sweating in welds, leak in riveting and bolted joints, breakage of packing;

d) in the case of emergence of fire, which directly threatens vessel, which is located under pressure;

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e) with the malfunction of monometer and impossibility to determine pressure according to other instruments;

f) during a decrease in liquid level lower than permissible in vessels with fire heating;

g) with malfunction or with an incomplete quantity of fasteners of cap/covers and hatches;

h) in other cases, provided for by command on the safe maintenance of vessels.

IX. Monitoring of the observance of rules during the operation of vessels.

180. Monitoring of observance of boiler code with operation of vessels is realized/accomplished by local organ/controls of Gosgortekhnadzor of USSR and by corresponding republic and departmental organ/controls of boiler inspection by means of periodic examination/inspections of enterprises.

Examination/inspection it has as a goal to establish that vessels to be contained in accordance with present rules.

181. Upon examination/inspection engineer-controller/inspector (inspector) is checked:

a) execution of engineer-controller/inspector's preceding/previous instructions (inspector);

b) presence and soundness required by rules of reinforcement and state of vessels - by means of their direct inspection;

c) content and servicing of vessels, state of training of service personnel, and also knowledge of personnel on work area;

d) presence on work areas of maintenance instructions of vessels;

e) opportuneness of conducting by administration of enterprise of technical examinations of vessels and elimination of reveal/detect/exposed with examination flaw/defects. testing is produced on the event/reports, comprised in accordance with st. of 154 present rules, and also on the recordings in log books and in the books of account and examinations of the vessels, which are not subject to recording in the organ/controls of boiler inspection.

182. Periods of conducting examination/inspections of enterprises or their shops (sections) are establish/installed by

local organ/controls of Gosgortekhnadzor of USSR, by republic and departmental organ/controls of boiler inspection so that each vessel, registered in organ/controls of boiler inspection, it would be enveloped by examination/inspection not thinner than in 12 months.

The content of the vessels, which are not subject recordings in the organ/controls of boiler inspection, is checked in selective order.

The inspection of vessels is produced during operation of these vessels.

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183. Work of vessel must be forbidden, if elapses period of next examination or were revealed flaw/defects, threatening its reliable and safe work, about which must be produced recording in log book of vessel with indication of reason for prohibition.

184. With development/detection among service personnel of persons, pasts production instruction of with respect occupied by them function or possessing unsatisfactory knowledge, engineer-controller/inspector (inspector) must require their removal from work.

185. Examination/inspection must be produced in the presence of representative of technical administration and face, heavy-duty/critical for working order and safe action of vessels. The results of the examination/inspection of each vessel must be recorded into its log book.

Besides this, is comprised in two copies the common/general/total event/report of the examination/inspection of object of boiler inspection in this enterprise with the indication of a quantity of examined objects, reveal/detect/exposed flaw/defects on each object individually, and also instructions on the elimination of flaw/defects.

One Copy of event/report is transferred to director or to chief of enterprise, and by another it is stored in the local organ/control of boiler inspection.

X. Additional requirements for cisterns and flanks for the transportation of liquefied gases.

186. Cisterns and flanks can be manufactured welded and seamless.

During the manufacture of the housings of cisterns and buoy/barrels from nonferrous metals, besides welding, is allow/assumed the application/use of a riveting and riveting with soldering through. The joint of branches for a reinforcement and communications, and also hatch covers with housing is allow/assumed to make on ration in accordance with TU.

For the rolling over of buoy/barrels, is allow/assumed the setting up on them of strong metallic bands.

187. Railroad tank cars whose vapor pressure of liquefied gases at temperature of $+50^{\circ}$ is equal or it is more than 8 atm(gage), with the exception of cisterns for liquified oxygen, must be manufactured from sheet carbon steel of brands 15K, 20K and 25K according to GOST 5520-50 or from another fine steel, by it equivalent.

Railroad tank cars whose pressure pair liquefied gases at temperature of $+50^{\circ}$ is less than 8 atm(gage), and also automatic cisterns, independent of pressure, it is permitted to manufacture from sheet steel in accordance with Table 1 are present rules.

Cisterns for liquified oxygen must be manufactured from sheet steel or nonferrous metals, provided for by present rules for the appropriate temperatures of wall.

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188. Of each railroad tank car in its upper part, must be arranged access not less than 450 mm in diameter and stage about access with metallic staircases, equipped with handles on both sides of cistern. The railroad tank cars, previously manufactured with the arrangement of access on bottom, they are allow/assumed to operation without the conversion of access. On the railroad tank cars for liquified oxygen, the device of stage about access is not necessarily.

189. Of each tank car in its upper part or on bottom must be arranged access of oval form with size/dimensions along the axes not less than 400×450 mm or circular not less than 450 mm in diameter. For tank cars up to 3000 l in capacitance the accesses of oval form is permitted to make with size/dimensions along the axes not less than 300 and 400 mm, circular by diameter not less than 400 mm.

Of cisterns up to 1000 l in capacitance instead of the access is allow/assumed device of inspection holes of the oval form of minor

axis not less than 80 mm in size/dimension or circular not less than 80 mm in diameter.

190. Cisterns and flanks for liquefied gases, with the exception of oxygen, must be designed for strength, for pressure which can arise in them at temperature of +50°, while of cistern for oxygen - to greatest pressure by which must be produced their emptying. During the calculation of cisterns, must be taken into account the stresses, which appear during transportation from dynamic load.

Tank cars for the liquified oil gases sometimes can be designed for the pressure, which corresponds to lower temperature, on the basis of the meteorological conditions of the locality where the tank cars will operate, but it is not below +35°, with indication about this in the log book of cistern.

The cisterns with output of gas, charged by supercooled ammonia with the temperature, which does not exceed at the torque/moment of the termination of filling -25°, can be designed on 4 atm(gage) in the presence of the proper thermal insulation.

191. For purpose of prevention/warning of heating gas in cistern more than calculated temperature of cistern, they must have thermal insulation or metallic protective shadow jacket, arrange/located

above upper half of cistern, thickness not less than 1.5 mm for railroad tank cars and not less than 1 mm for tank cars.

Thermal insulation must be made from the incombustible material. For the thermal insulation of cisterns for liquified oxygen, is allow/assumed the application/use of Mipor in accordance with project and technical specifications.

The thermo-insulating jacket of cistern for liquified oxygen must be equipped with burst diafragma for the output/yield of vapors of oxygen during the appearance of a leak in cistern and incidence/impingement of liquified oxygen into insulation

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192. With the delivery of cisterns and buoy/barrels from manufacturing plants on them should be hammered out following marks:

- a) designation of manufacturing plant;
- b) number of cistern or flanks on list of manufacturing plant;
- c) year of construction and date of examination;
- d) total weight of cistern in tons, flanks in kilograms;
- e) capacitance/capacity (for cistern in cu. meters and for buoy/barrels in characters);
- f) value of working and test pressure;
- g) mark of OTK [Quality Control Department] of manufacturing plant.

On the cisterns of mark, they must be hammered out in the circumference of flange for an access, while on flanks - on the bottoms where is furnished fittings.

On cisterns and the flanks, intended for the transportation of the liquefied gases, corrosive, the places of marking after the plotting of marks they must be covered with anticorrosive clear varnish.

For thin-walled buoy/barrels wall thickness up to 6 mm, in the inclusively indicated in this article specifications can be hammered out on the metallic plate, soldered or welded to the bottom where is furnished fittings.

The date of the examination of cisterns and buoy/barrels is indicated according to the following example:

cistern or flank is made and examiped during February 1956.
After its examination in accordance with st. of 221 present rules on it must be hammered out by marking date 2-56-59, that indicates which the examination produced during February 1956 and the period of following examination - February 1959.

193. On cisterns, besides indicated in st. 192 markings, on channel beam must be fastened metallic tablet with hammered out on it designations:

- a) designation of manufacturing plant;
- b) number of cistern on list of manufacturing plant;
- c) year of manufacture of cistern;
- d) total weight of cistern in tons and capacitance/capacity in cu. meters;
- e) value of working and test pressure;
- f) registration number of cistern (he is hammered out by owner of cistern after its recording in local organ/controls of Gosgortekhnadzor [State Committee of the Council of Ministers for Supervision of Industrial Safety and for Mining Inspection (RSFSR) ' of USSR or corresponding republic and departmental organ/controls of boiler inspection) ;

g) the period of the following examination of cistern.

194. For cisterns wall thickness up to 6 mm, in specifications, provided for st. of 192 present rules, can be hammered out on metallic plate, fixed to housing about access.

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On tank cars the tablet with the specifications, provided for by st. of 193 rules, must be fastened to the thermo-insulating jacket of cistern in the location of fittings.

195. Cell/elements of suspension or removable supports for fastening of housing of cistern it is allow/assumed to furnish with intersection of welds of housing.

196. On cisterns, with the exception of indicated in st. 199 and 200 present rules, must be establish/installed following reinforcement:

a) valve/gate for plum also of infusion of liquefied gas;

b) valve/gate for steam exhaust from upper part of cistern;

c) spring safety valve;

d) manometer;

e) device for inspection of liquid level.

197. If as a result of action of containing in cistern gas safety valve cannot reliably work, besides safety valve must be establish/installed before it safety plate, which is broken up with pressure increase in cistern not more than on 250/o of operating pressure.

198. Reinforcement on cisterns must be furnished on manhole door or elsewhere, convenient for maintenance, and have protective hood with vent holes in the case of discovery/opening safety valve. The area of holes in the protective hood must be not less than the one-and-one-half area of the working section/cut of the established/installed safety valve.

199. Cisterns for chlorine and phosgene, besides reinforcement, indicated in st. of 196 present rules, must be equipped by two valve/gates, which have siphons and special designation.

200. Cisterns with output of gas, intended for transportation of

supercooled ammonia with pressure to 4 atm(gage), must have following reinforcement:

- a) valve/gate of present;
- b) valve/gate drain (with siphon);
- c) manometer with siphon;
- d) two safety valves, to complete throughput capacity each;
- e) tap/crane with siphon for sampling;
- f) pet valve for inspection of liquid level.

201. Each valve/gate of cistern, intended for plum also of infusion of liquefied gas, must be equipped by plug/silencer.

The side branches of valve/gates for the plum also of the infusion of combustible gases must have left-handed thread.

202. Valve/gate and tap/cranes of cistern must have special coloration and labels, which indicate their designation/purpose.

Liquid valve/gates must be stained in the color, appropriated to this liquefied gas (see Table 14).

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Gas valve/gates are stained for a combustible gas in dark brown color, for incombustible into black/ferrous.

On branches must be plotted/applied to label or hammered out the letters: for a liquid valve/gate label "Liquid" either the letter "Zh", for a gas valve/gate label "Gas" or the letter "G".

203. Size/dimensions of safety valves, adjustable on cisterns, must be selected according to requirements, indicated in st. of 122 present rules. Safety valves must be connected with the upper (steam) part of the cistern.

204. Calculation of throughput capacity of safety valves of cisterns is produced by formula, indicated in st. of 123 present rules, on the basis of conditions of greatest heating of cistern in process of its operation, with the exception indicated in st. 205.

205. Throughput capacity of safety valve, adjustable on cistern for liquified oxygen, is determined from sum of calculated volatility

of oxygen and peak output of device for creation of pressure of cistern with its emptying.

By calculated volatility is understood the quantity of liquid oxygen in kilograms, which can be vaporized for hour because of the heat, obtained by cistern from the environment at the temperature surrounding air +50°.

For the peak output of device for the creation of pressure in cistern with its emptying, is accepted the quantity of gas in kilograms, which can be introduced into cistern for hour in work with the full load of evaporator/vaporizer or another source of pressure.

206. Manometers, adjustable on cisterns (with the exception of cisterns for liquified oxygen), must be equipped by adjuster of test pressure gauge - by three-way cock or device, it replacing. Hole in the flange of the three-way cock from outer side for cisterns with poison gases must be muffled by filler plug.

207. Of cisterns for poison gases on branch/removal for plum must be establish/installed directly of housing of cistern high-speed/velocity valve, which ceases automatically yield of gas with breakage of conduit/manifold.

208. On each buoy/barrel, with the exception of cases indicated in st. 209 of present rules, must be establish/installed on one of bottoms valve/gate for filling and drain of gas. During unit on concave bottom, it must be cover with cowled, while during the setting up of valve/gate on the dished bottom flanks, besides cap/hood, is compulsory the device of holding tape (skirt).

209. Buoy/barrels for chlorine and phosgene have to be of two shutoff valves for filling and drain of gas, equipped with siphons.

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210. Valve/gates of buoy/barrels must be equipped by plug/silencers, which are tightly installed on side branches. The thread of the side branches of the valve/gates of buoy/barrels for combustible gases must be left.

211. External surface of cisterns and buoy/barrels must be stained with enamel, oil or aluminum color/paint in light grey color and have labels and distinctive bands in accordance with Table 14.

212. Bottoms (or end walls) of cisterns, belonging to ministries and departments, with the exception of MPS, and intended for transportation on railway lines of common/general/total use, in

accordance with order, establish/installed on rail transport, must be stained in green color with bordering band of white color in the form of ring 350 mm in width. The frames of such cisterns are stained in green color.

213. Color of bands, coloration of housing and text of labels for cisterns and buoy/barrels of special designation/purpose, intended to use within limits of one ministry, are establish/installed by technical specifications, affirmed by this ministry.

214. Distinctive bands on cisterns must be applied to housing from both sides on center line of cistern to entire length of cylindrical part. The bandwidth on the railroad tank cars must be 300 mm and on automobile cisterns 200 mm.

215. Labels on cisterns, indicated in st. of 211 present rules, must be applied from each side of housing above band, moreover from left side is indicated nonnaming of gas, and from starboard remaining labels.

The height/altitude of the letters of the indicated labels on the railroad tank cars must be not less than 125 mm, and on motor transport cisterns it is not less than 100 mm.

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216. Distinctive bands on flanks must be applied in entire circumference at a distance 200 mm from each bottom.

Table 14.

(1) Назначение цистерн и бочек	(2) Надписи	(3) Цвет надписи	(4) Цвет полос
(5) Для аммиака	(6) «Аммиак», «ядовито», «сжиженный газ»	(7) Черный	(8) Желтый
(9) Для хлора	(10) «Хлор», «ядовито», «сжиженный газ»	(11) Зеленый	(12) Защитный
(13) Для фосгена	(14) «Ядовито», «сжиженный газ»	(15) Красный	(16) ,
(17) Для кислорода	(17) «Кислород» и слово «опасно»	(17) Черный	(18) Голубой
Для всех остальных негорючих газов (19)	(20) Наименование газа и слово «опасно»	(18) Желтый	(19) Черный
Для горючих газов (21)	(22) Наименование газа и слово «огнеопасно»	(19) Черный	(21) Красный

Key: (1). Designation/purpose of cisterns and buoy/barrels. (2). Labels. (3). Color of label. (4). Color of bands. (5). For ammonia. (6). "ammonia", "it is toxic", "liquefied gas". (7). Black/ferrous. (8). Yellow. (9). For chlorine. (10). "chlorine", "it is toxic", "liquefied gas". (11). Green. (12). Shielding. (13). For phosgene. (14). "It is toxic", "liquefied gas". (15). Red. (16). For oxygen. (17). "oxygen" and word "it is dangerous". (18). Azure. (19). For all remaining non-burning gases. (20). The designation of gas and word "is dangerous". (21). For combustible gases. (22). The designation of gas and word "is inflammable".

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Width of each band must be 50 mm.

The labels on flanks, provided for st. 211 present rules, must be applied on cylindrical part the flanks between bands of letters 50 mm in height.

217. Coloration of cisterns and buoy/barrels, and also plotting of bands and labels must be produced for new cisterns and buoy/barrels by manufacturing plant, but during operation - by plant-filler.

218. All cisterns, to which are spread present rules, with the exception of those who were indicated in st. 219, must be before launching/starting into work registered in organ/controls of Gosgortekhnadzor of USSR or in appropriate Republic or departmental organ/controls of boiler inspection on affiliation/accessory.

219. Recordings in organ/controls of Gosgortekhnadzor of USSR or in appropriate organ/controls of boiler inspection will not stay railroad tank cars and tank cars, intended for transportation of liquified oxygen at atmospheric pressure and emptied by means of pressure transfer (under pressure).

220. Barrels, to which is spread action of present rules, recording in organ/controls of supervision they are not subject and log book on them are not cranked up. The account of buoy/barrels in

enterprise must be produced according to the specifications, hammered out on flanks themselves.

221. Technical examination of cisterns and buoy/barrels must be produced in accordance with requirements, presented in section VII of present rules, after following changes and additions:

a) cistern and flanks, working and destination for filling with liquefied gases, corrosive (chlorine, hydrogen sulfide, etc.), must undergo by engineer-controller (by inspector) internal inspection and hydraulic test by test pressure, equal one-and-one-half from worker, it is not thinner than through every two years, but cistern and flanks for remaining gases, with the exception of provided for p. "b" of present article, it is not thinner than through each three years; the examination of the indicated cisterns and buoy/barrels must be produced at plant-filler or filler station;

b) cisterns, working into the industries, intended for the transportation of liquified oxygen at atmospheric pressure and and emptied by means of pressure transfer under pressure are more than 0.7 atm (gage), must undergo by enterprise-owner internal inspection not thinner than through each three years and to the hydraulic test by test pressure, equal one-and-one-half from worker, after each repair of the housing of cistern, connected with welding, soldering

or the replacement of loose parts or during the complete taking of isolation/insulation, but it is not thinner than one times into six years;

c) the cisterns and flanks, which are located idleness are more than three years, they are subject before launching/starting into work to technical examination in accordance with the requirements for present rules;

d) on cisterns and the flanks, acknowledged with the technical examination by engineer-controller (inspector) in working order, at plant-filler or filler station must be produced the new marking of the date of the manufactured and following examination, and also be hammered out engineer-controller's mark (inspector), that has the form of equilateral triangle whose side is equal to 12 mm, with indication within its code of the local organ/control of Gosgortekhnadzor of the USSR or corresponding republic or departmental organ/control of boiler inspection.

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Besides the indicated marks, on flanks must be hammered out the mark of the plant at which produced the examination (circular shape, by the diameter of 12 mm).

During change by engineer-controller (inspector) of operating pressure for cisterns or buoy/barrels on them must be made the new marking of the established/installed operating pressure;

e) the results of the examination of cisterns must be record/written by those, who produced examination, into appropriate of the log book of cisterns, and the results of the examination of buoy/barrels - into the test log book of buoy/barrels, which must be numbered, laced, fastened the press/printing of plant-filler or filler station and have the following complexes:

1) number in order; 2) manufacturing plant; 3) factory serial number; 4) the date of manufacture (month and year); 5) designation/purpose; 6) the date of the manufactured and following examination; 7) capacitance/capacity (l); 8) weight (kg); 9) operating pressure (kg/cm²); 10) test hydraulic pressure (kg/cm²); 11) mark about suitability flanks; 12) conclusion and the signature of person, who produced examination;

f) the administration of plant-filler or filler station is due not later as for 10 days to prevent/warn engineer-controller (inspector) about the need of conducting the examination of cisterns

or buoy/barrels and to match with it the day of conducting examination.

Filling of cisterns and buoy/barrels with gases.

222. Plant-fillers and filler stations, at which is produced filling of cisterns and buoy/barrels by liquefied gases, are due to conduct journal of filling in which they must be shown:

- a) date of filling;
- b) name of manufacturing plant of cisterns and buoy/barrels;
- c) plant and registration number for cisterns and factory serial number for buoy/barrels;
- d) capacitance/capacity for cisterns in cu. meters and capacitance/capacity for buoy/barrels in liters;
- e) weight of gas (for cisterns in tons, but for barrels in kilograms);

f) date of following examination.

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With filling on one plant or at one filler station of cisterns and buoy/barrels by different gases the administration of these enterprises must conduct for each gas the various journal of filling.

223. Before filling of cisterns and buoy/barrels by gases at plant-filler or filler station by responsible person, separated by administration, must be produced careful inspection of external surface and reinforcement of cisterns and buoy/barrels, is tested presence of residual pressure and conformity of available in them gas to designation/purpose of cistern or flanks. The results of the inspection of cisterns and buoy/barrels, intended to filling with gases, with the indication of the registration numbers of cisterns and factory serial numbers of buoy/barrels and conclusion about the possibility of the filling of the checked cisterns and buoy/barrels must be brought in by the responsible person of plant-filler or filler station into the special shop book which must be stored together with the journal of filling.

224. It is forbidden to charge by gas of cistern and flanks, if:

- a) elapsed period of assigned or next examination;
- b) were injured housing or bottoms (crack, noticeable change in form, severe corrosion);
- c) there is no log book to cistern or there are no established/installed marks and labels on cisterns and flanks;
- d) is absent or defective reinforcement, required by present rules, is disturbed seal;
- e) is absent proper coloration;
- f) is in cisterns either barrels not that gas for which they are intended, or if cistern or the barrels are contaminated by foreign objects or substances;
- g) if is defective the undercarriage of the cistern.

225. With development/detection in cisterns either flanks of gases, which do not correspond to their designation/purpose, or substances which in connection with charged in them gas can form dangerously explosive or combustible connections, these gases or substances before filling they must be removed (by flushing of

cisterns or buoy/barrels corresponding solvent or in another safe manner).

226. During emergence of doubts of plant-filler or in user of suitability of cisterns either buoy/barrels for transportation of liquefied gas at established/installed pressure cistern or flank they must be removed from operation for premature examination.

227. Soundness and seal of reinforcement of cisterns and buoy/barrels for all liquefied gases must periodically be checked at plant-filler or filler station, in accordance with requirements for production commands of this plant (station), with transmission/delivery of event/report about this testing to owner of cistern or flanks.

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228. Cisterns and flanks, which were being found, with the exception of cisterns for liquified oxygen, taken by plant-fillers and filler stations from users for filling of them with gases, must have residual pressure on less than 0.5 atm(gage).

For the liquefied gases the elasticity of vapors of which in winter time can be below 0.5 atm(gage), residual pressure is

establish/installed by the production command of plant-filler.

229. Filling of cisterns and buoy/barrels by liquefied gases must correspond to norms, indicated in Table 15:

A quantity of supercooled ammonia for a bay/molded edge into cisterns with output of gas is establish/installed by the command of plant-filler taking into account the quantity of ammonia, which vaporizes with bay/molded edge, and temperature conditions.

230. Degree of admission of cisterns and buoy/barrels by liquefied gases, not indicated in Table 15, is determined by production commands of plant-fillers, on the basis of the fact that with filling with liquefied gases whose critical temperature is above +50°, in cisterns and flanks must be sufficient volume of gas pillow, but with filling with liquefied gases whose critical temperature is below +50° so that at temperature of +50° pressure in cisterns or flanks would not exceed established/installed for them design pressure.

231. Filling of cisterns and buoy/barrels by liquefied gases must be produced with application/use of weights or other reliable methods of control, which eliminate possibility of overfilling.

232. If with filling of cisterns or buoy/barrels will be reveal/detected passage of gas, filling must be discontinued, gas from cistern or flanks is removed and their filling must be produced only after correction of available damages.

233. After filling of cisterns or buoy/barrels by gas to side branches of valve/gates must be tightly installed plug/silencers and to reinforcement of cisterns are put on protective hoods, which must be lead-sealed.

Table 15. Norms of the filling of cisterns and buoy/barrels by the different liquefied gases.

(1) Наименование газа	(2) Вес газа на 1 л емкости бочки или цистерны не более, кг	(3) Емкость цистерны или бочки на 1 кг газа не менее, л
Аммиак (4)	0,570	1,76
Бутан (5)	0,488	2,05
Бутилен (6)	0,526	1,90
Пропан (7)	0,425	2,35
Пропилен (8)	0,445	2,25
Фосген (9)	1,250	0,80
Хлор (10)	1,250	0,80
Кислород (11)	1,08	0,926

Key: (1). Designation of gas. (2). The weight of gas on 1 l of capacitance/capacity flanks or cisterns is not more, kg. (3). Tankage or flanks on 1 kg of gas are not less, l. (4). Ammonia. (5). Butane. (6). Butylene. (7). Propane. (8). Propylene. (9). Phosgene. (10). Chlorine. (11). Oxygen.

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Operation of cisterns and buoy/barrels.

234. Railroad tank cars, filled with liquefied gases, and also flanks with gases, establish/installed on flatcars, must be transported in accompaniment of conductor.

235. Cisterns and flanks with transportation of liquefied gases must be solidly attached.

236. With transportation, storage, and also with loading and unloading of buoy/barrels must be accepted measures against their incidence/drop and damage. Loading and the unloading of buoy/barrels must be mechanized.

237. With transportation or storage of buoy/barrels with liquefied gases, they must be protected from action of solar ray/beams and from local heating.

238. Apron and transportation of filled cistern for liquified oxygen with closed valve/gate for steam exhaust of oxygen are forbidden.

239. Cisterns and flanks, intended for transportation of toxic and dangerously explosive gases, must be checked against seal at plant-filler or filler station in accordance with st. 155 of these rules.

The internal surfaces of housings and reinforcement of cisterns

for liquified oxygen, working, must undergo degreasing in accordance with the production command of plant-filler (filler station), but it is not thinner than one times per annum.

240. Taking reinforcement for correction or for hydraulic test must be produced when, in cisterns and flanks, gases are absent,.

Holes in cisterns and flanks after taking of reinforcement must be closed by plugs on thread or by plug/silencers on flanges.

241. To maintenance of cisterns and buoy/barrels, can be allow/assumed persons, trained and checked in accordance with st. st. 174 and 176 present rules.

242. Order of filling, transportation and drain of cisterns and buoy/barrels for liquefied gases, and also order of accompaniment of cisterns or buoy/barrels in way and deliveries to their user must be regulated by production commands of those enterprises in which is produced filling and emptying of cisterns and buoy/barrels.

243. Transportation of railroad tank cars, and also buoy/barrels for liquefied gases on railway lines is realize/accomplished according to rules, establish/installed by Ministry of Railroads.

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XI. Additional requirements for bottles.

244. Bottle should be designed, so that voltages, which appear in its walls during hydraulic test, would not exceed 85o/o of yield point for this mark/brand of steel.

245. Bottles must have valve/gates, tightly screwed in into holes of neck or into expenditure-filler branches of special bottles, which do not have necks.

246. Bottles for compressed, liquified and dissolved gases with a capacitance/capacity of more than 100 ^l must stamped with in accordance with requirements st. for 24 present rules and be supplied with log books of established/installed form as for vessels, working under pressure. Such bottles must have safety valves or safety plates.

Bottles capacitancely than 100 ^l, adjustable as expenditure capacitance/capacities for the liquefied gases, utilized as fuel on the gas balloon automobiles and other conveying devices, besides

valve/gate, they must be equipped by safety valve and level indicator of maximum filling. On such bottles, besides the indicated reinforcement, is allow/assumed the setting up of special filler valve, valve/gate for a gas bleed in vaporous state, level indicator of liquefied gas in bottle and the drain cock.

Safety valve must be imparted with the upper steam part of the bottle. The working section/cut of safety valve must be such so that in the bottle could not be formed the pressure, exceeding working more than by 150/o.

247. Side branches of valve/gates for bottles, charged with hydrogen and other combustibile gases, must have left-handed thread, while side branches of valve/gates for bottles, charged by oxygen and other non-burning gases, must have right-hand thread.

Of the valve/gates of bottles for acetylene, besides branches with a left-handed thread, are allow/assumed the following forms of connections:

- a) with the aid of clamp to the neck of valve case;
- b) with the aid of the screwed in nut with right-hand thread (female thread in valve case).

248. Each valve/gate of bottle for poison gas must be equipped by plug/silencer, which is installed on side branch.

249. Valve/gates of bottles for oxygen must be screwed in on litharge, which does not contain fatty substances, on foil or with application/use of liquid sodash glass and must not have grease-saturated or oiled parts and packing.

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250. On bottles about neck or expenditure-filler branch, must be clearly hammered out following data:

- a) designation or mark/brand of manufacturing plant;
- b) type of bottle (for standard bottles);
- c) number of bottle;
- d) weight of bottle in kilograms actual: for bottles up to 8 l in capacitance with an accuracy to 0.1 kg, above 8 l with an accuracy to 0.2 kg; weight of nonstandard bottles with a capacitance/capacity

more than 55 л it is hammered out in accordance with TU [Technical Specifications] for their manufacture;

e) date (month and year) of manufacture (test) and of following examination;

f) operating pressure P , kg/cm^2 ;

g) test hydraulic pressure P , kg/cm^2 ; ⁴h) storage capacity in liters for bottles to 5 л inclusively - nominal, for bottles from 5 to 55 л - actual with an accuracy to 0.2 л , for bottles is more than 55 л - is hammered out in accordance with TU for their manufacture;

i) the mark of OTK of manufacturing plant (circular shape, by the diameter of 10 mm).

The height/altitude of the signs of marking on the bottles of low displacement (up to 12 л in capacitance inclusively) must be not less than 6 mm, and on the bottles of larger displacement - it is not less than 8 mm.

The weight of bottle, with the exception of bottles for acetylene, is indicated taking into account the weight of the plotted color/paint, without valve/gate and cap/hood, with ring for a

cap/hood and with shoe, if the same are provided for by construction.

The date of examination is indicated according to the following example: bottle for oxygen is made and tested during May 1955. After testing on bottle, must be hammered out by marking the date: 5-55-60, that indicates, when produced examination, and the date of following examination.

The place on bottles where are hammered out specifications, must be covered with clear varnish and it is encircled by color/paint in the form of the framework.

On the bottles with a capacitance/capacity of less 5 l either with wall thickness of less 5 mm the specifications can be shown on the plate, soldered to bottle, or are plotted/applied by enamel or oil paint.

251. Bottles, intended for dissolved acetylene, must be filled by appropriate quantity of porous mass and solvent according to GOST 5948-51. For the quality of porous mass and for the correctness of the filling with it of bottles for acetylene will bear responsibility plant-filler of porous mass. For the quality of solvent and for correct metering by it bottles for acetylene will bear responsibility the plant, which generates the filling of bottles with solvent.

After the filling of bottle with porous mass and solvent on its neck is hammered out tare weight (weight of cylinder without cap/hpod, but with porous mass and solvent, shoe, ring and valve/gate).

252. External surface of cylinders must be painted according to Table 16. The coloration of cylinders and labels on them they can be produced oil, by enamel and nitrocellulose enamels.

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Coloration and the plotting of labels on cylinders must be produced by manufacturing plants, but subsequently by plant-fillers, by filler stations or experimental point/items.

Table 16.

(1) Назначение баллонов	(2) Цвет окраски	(3) Текст надписи	(4) Цвет надписи	(5) Цвет полос
Для азота (6)	Черный (7)	Азот (8)	Желтый (9)	Коричневый (10)
Для аммиака (11)	Желтый (12)	Аммиак (13)	Черный (14)	—
Для аргона (сырого) (15)	Верхняя половина желтая, нижняя черная (16)	Аргон (17) сырой	То же (18)	—
Для аргона технического (19)	Черный (14)	Аргон (20) технический	Синий (21)	Белый (22)
Для аргона чистого (23)	Верхняя половина белая, нижняя черная (24)	Аргон (25) чистый	Черный (14)	—
Для воздуха (26)	Черный (7)	Сжатый воздух (27)	Белый (22)	—
Для ацетилена (28)	Белый (22)	Ацетилен (29)	Красный (30)	—
Для водорода (31)	Темно-зеленый (32)	Водород (33)	То же (18)	—
Для гелия (34)	Коричневый (55)	Гелий (36)	Белый (22)	—
Для кислорода (37)	Голубой (38)	Кислород (39)	Черный (14)	—
Для нефтегаза (40)	Серый (41)	Нефтегаз (42)	Красный (30)	—
Для углекислоты (44)	Черный (43)	Углекислота (46)	Желтый (9)	—
Для фреона (48)	Алюминиевый (44)	Фреон (50)	Черный (14)	—
Для фосгена (51)	Защитный (4)	—	—	Красный (53)
Для сероводорода (54)	Белый (55)	Сероводород (56)	Красный (30)	То же (18)
Для хлора (58)	Защитный (4)	—	—	Зеленый (54)
Для сернистого ангидрида (60)	Черный (14)	Сернистый ангидрид (61)	Белый (22)	Желтый (9)
Для псевдобутилена (62)	Красный (30)	Бутилен (64)	Желтый (9)	Черный (14)
Для закиси азота (65)	Серый (41)	Закись азота (67)	Черный (14)	—
Для циклопропана (68)	Оранжевый (69)	Циклопропан (70)	То же (18)	—
Для всех других горючих газов (71)	Красный (30)	Наименование газа (73)	Белый (22)	—
Для всех остальных негорючих газов (74)	Черный (7)	То же (18)	Желтый (9)	—

Key: (1). Designation/purpose of cylinders. (2). Color of coloration. (3). Text of label. (4). Color of label. (5). Color of band. (6). For nitrogen. (7). Black/ferrous. (8). Nitrogen. (9). Yellow. (10). Brown. (11). For ammonia. (12). yellow. (13). Ammonia. (14). Black/ferrous. (15). For argon (damp/crude). (16). Upper half yellow, lower black/ferrous. (17). Argon. (18). The same. (19). For argon of technical. (20). Argon is technical. (21). Blue. (22). White. (23). For argon of pure/clean. (24). Upper half white, lower black/ferrous. (25). Argon is pure/clean. (26). For air. (27). Compressed air. (28).

For acetylene. (29). Acetylene. (30). Red. (31). For hydrogen. (32). Dark green. (33). Hydrogen. (34). For helium. (35). Brown. (36). Helium. (37). For oxygen. (38). Azure. (39). Oxygen. (40). For petroleum gas. (41). Gray. (42). Petroleum gas. (43). Red. (44). For carbonic acid. (45). Black/ferrous. (46). Carbonic acid. (47). Yellow. (48). For Freon. (49). Aluminum. (50). Freon. (51). For phosgene. (52). Shielding. (53). Red. (54). For hydrogen sulfide. (55). White. (56). Hydrogen sulfide. (57). Red. (58). For chlorine. (59). Green. (60). For sulfurous anhydride. (61). Sulfurous anhydride. (62). For pseudobutylene. (63). Red. (64). Butylene. (65). For a nitrous oxide. (66). Gray. (67). Nitrous oxide. (68). For cyclopropane. (69). Orange. (70). Cyclopropane. (71). For all other combustible gases. (72). Red. (73). Designation of gas. (74). For all remaining non-burning gases.

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Labels on the cylinders with a capacitance/capacity of more than 12 L will be applied in circumference to length not less than 1/2 circumferences, and bands - in an entire circumference, moreover the height/altitude of the applied letters on cylinders must be 60 mm, but the width of transverse band 25 mm. The size/dimensions of labels and bands on the cylinders of low displacement must appliedding area

of cylinders.

The cylinders, establish/installed on the motor vehicles and other conveying devices as tight expenditure capacitance/capacities, can be stained under the color of the machine in which they are establish/installed.

The color of coloration and the text of labels for cylinders; utilized in special units or intended for filling with special-purpose gases, are establish/installed by the interested ministries according to agreement with the organ/controls of Gosgortekhnadzor of the USSR or the appropriate republic or departmental organ/controls of boiler inspection.

253. Quality control, examination and inspection/acceptance of manufactured cylinders are produced by workers of quality control department of manufacturing plant in accordance with requirements for present rules, GOST for cylinders and of technical specifications for their manufacture.

Weight cylinders on manufacturing plant undergo by the hydraulic and pneumatic pressure test: the standard cylinders according to GOST, nonstandard - according to technical specifications.

254. Cylinders during hydraulic test under test pressure must be not less than 1 min, after which pressure gradually decrease to worker by whom is produced inspection of cylinders. Cylinders acknowledge those who were maintained hydraulic test, if in them will not be reveal/detected breakage, the visible deformations, leaks, drops or sweatings.

255. Cylinders, with the exception of cylinders for acetylene, after hydraulic test must undergo pneumatic testing, by duration it is not less than 2 min, by pressure, equal to worker. During pneumatic testing the cylinders must be submerged in bath with water. Cylinders for acetylene must undergo pneumatic testing on plant-fillers of porous mass.

256. During testing of new constructions of cylinders of general purpose or cylinders, manufactured of previously not applied brands of steels or materials, several cylinders from manufactured batch (on TU) they must be subjected to destruction under action of hydraulic pressure, in this case pressure, which destroys cylinders, must be not less triple operating pressure with conversion for lower limit of strength of metal and smallest wall thickness without addition for corrosion.

257. Results of examination of manufactured cylinders will be brought in OTK manufacturing plant into sheet/table/list in which must be reflected following data:

- 1) number in order;
- 2) type of cylinder (for standard cylinders);
- 3) number of cylinder;
- 4) date (month and year) of manufacture (test) of cylinder and following examination;
- 5) weight of cylinder, kg;
- 6) storage capacity, l;
- 7) operating pressure, kg/cm²;
- 8) test hydraulic pressure, kg/cm²;
- 9) the signature of the representative of OTK of manufacturing

plant.

All the filled sheet/table/lists must be numbered, laced and be stored in the businesses of OTK of plant.

258. Cylinders, working, must undergo periodic examination not thinner than through each of 5 years, with the exception of cylinders, intended for filling with gases, corrosive (chlorine; chloride methyl, phosgene, hydrogen sulfide, sulfurous anhydride, hydrogen chloride), or cylinders for compressed and liquefied gases, used as fuel instead of gasoline for gas balloon automobiles and other conveying devices, subjects to periodic examination are not thinner than through every two years.

The periodic examination of cylinders must be produced on plant-fillers or on the specially organized experimental point/items by the separated by order on enterprise workers of these plants (experimental point/items).

Resolutions to the production of the examinations of cylinders are overhung to plant-fillers (experimental point/items) by the local organ/controls of Gosgortekhnadzor of the USSR or by the appropriate republic or departmental organ/controls of boiler inspection after testing by them:

a) the presence in the enterprise of production locations, the techniques, which ensure the possibility of the good-quality of conducting examination, and also the corresponding commands;

b) the presence specially assigned by order on the enterprise of persons, responsible for the production of examinations, required by present rules, that have the corresponding technical training.

During the transmittal of resolution to the production of examination, the organ/controls of supervision must record in themselves the mark, appropriated to this plant-filler (experimental point/item) according to st. 268.

259. Examination of cylinders, with the exception of cylinders for acetylene, is included:

a) inspection of internal and external surface of cylinder;

b) testing weight and capacitance/capacity;

c) hydraulic test.

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Testing weight and storage capacities to 12 $\frac{1}{2}$ inclusively and more than 55 $\frac{1}{2}$ is not produced.

260. Inspection of bottles has as a goal to explain state of their walls in ratio of corrosion, presence of cracks, captivity, dents and other damages for setting of suitability of bottles to further work. Before inspection the bottles must be thoroughly decontaminated and washed in water, but in the necessary cases they must be washed with appropriate solvent or degassified.

261. With inspection of external and internal surface of bottle, can be revealed following flaw/defects, employed by base/root for rejection of bottle: crack, captivities, dents, bulges, gas inclusions and risks deeply than 100/o of nominal wall thickness, strains also chipping, wear of thread of throat/neck and absence of specifications.

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① the weakening of ring on the throat/neck of bottle cannot serve

as a reason for the quality inspection of the latter. In this case the bottle can be allowed to further new.

Bottle with the slantwise or weakly mounted shoe to subsequent forms of examination is not allow/assumed to resetting of shoe.

262. Storage capacity is determined from difference between weight of bottle, filled with water, and weight of bottle in empty state or with the aid of measured small tanks.

263. Seamless standard bottles with weight loss of within limits of 7.5-10o/o or increase in their capacitance from 1.5 to 2o/o are shifted into pressure, lowered against initially establish/installed to 15o/o.

With weight loss of from 10 to 15o/o or of increase of capacitance from 2 to 2.5o/o, bottles are shifted into the pressure, lowered against that which was establish/installed not less than to 50o/o.

With weight loss of from 15 to 20o/o or an increase in the capacitance from 2.5 to 3o/o, bottles are shifted into the pressure, lowered spoiling that which was establish/installed not less than to 75o/o, and they can be allowed to work by pressure not higher 6

atm(gage).

With weight loss of more than 20o/o or an increase in the capacitance more than by 3o/o bottles are scrapped.

During the translation/conversion of standard bottles into reduced pressure, new operating pressure is hammered out on them in accordance with GOST to these bottles.

264. On bottles, transferred of one type in another, they must be branded type of bottle, weight, capacitance, are working and test pressure, and are also hammered out marks about examination of bottle in accordance with st. 268 present rules. In this case, old marks, with the exception of the mark of the designation of plant, the dates of manufacture and number of bottle, one should drive in.

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265. During detection of explicit nonconformity of actual weights and capacitance that which was hammered out on bottle is produced new marking of weight and storage capacity by person, who generates examination, in this case old marks are clogged.

266. All bottles (except bottles for acetylene) with periodic

examinations undergo hydraulic test by test pressure, equal one-and-one-half from worker for bottles, intended to filling by compressed gases, and according to Table 17 for liquefied gases.

During hydraulic test the bottle must have strong solid enclosure/protection not less than 2 m in height, that allow/assumes the possibility of the inspection of bottle during decompression to worker.

267. When breakage, leak or visible deformation of walls of bottle, and also of drops or local misting is absent, bottle acknowledges that which was maintained hydraulic test.

268. After satisfactory results of examination of bottles on each bottle, are hammered out following marks:

a) mark of plant-filler (experimental point/item) on which produced examination of bottle (circular shape with a diameter of 12 mm);

b) date of manufactured and following examination (is hammered out in one line with mark of plant - filler or experimental point/item).

269. Results of examination of bottles, with the exception of bottles for acetylene, they are record/written by administration of plant-filler or experimental point/item into test log book; having following complexs:

- 1) number in order;
- 2) manufacturing plant;
- 3) number of bottle;
- 4) type of bottle;
- 5) date (month and year) of manufacture of bottle;
- 6) date of manufactured and following examination;
- 7) results of external and internal inspections;
- 8) weight, hammered out on bottle, kg;
- 9) the weight of bottle, establish/installed with examination, kg;

- 10) the capacitance, hammered out on bottle, 1;
- 11) the storage capacity, establish/installed with examination, 1;
- 12) operating pressure $\overset{R}{P}$, kg/cm²;
- 13) test hydraulic pressure $\overset{P}{p}$, kg/cm²;
- 14) mark about the suitability of bottle;
- 15) the signature of the representative of administration.

The test log book of bottles must be stored at the plant where was produced their examination.

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270. Examination of bottles for acetylene is produced not thinner than through each of 5 years and includes:

- a) inspection of external surface of bottle in accordance with st. of 261 present rules;

b) testing porous mass;

c) pneumatic testing.

271. State of porous mass in bottles for acetylene must be checked on plant- fillers not thinner than through each of 12 months, or it is direct before each examination of bottles.

After checking of porous mass on each bottle, must be hammered out the following marks:

a) year and the month of testing porous mass;

b) the mark of a plant-filler;

c) the mark, which certifies testing porous mass, which has the form of square with the side, equal to 12 mm, with the image within it of letters PM.

272. Bottles for acetylene, filled with porous mass, with examinations test with nitrogen under pressure 30 atm(gage), in this case bottles must be submerged into water at depth not less than 1 m.

The purity/finish of nitrogen, used for bottle testing, must be

not below 97o/o by volume.

The examination of bottles for acetylene must be produced only on plant- fillers of acetylene after testing of porous mass. After the satisfactory results of examination on bottles, are hammered out the marks according to st. 268 present rules.

273. Results of examination of bottles for acetylene on plant-filler will be brought in into test log book, which has following complexs:

- 1) number in order;
- 2) number of bottle;
- 3) manufacturing plant and date (month and year) of manufacture of bottle;
- 4) date of manufactured and following examination;
- 5) date of filling with porous mass;
- 6) water storage capacity, l;

7) weight of tank without porous mass, valve/gate and cap, but with shoe and ring, kg;

8) the weight of bottle without cap/hood, but with porous mass, ring, shoe, valve/gate and solvent (tare), kg;

9) complete space, cm³;

10) test pressure by nitrogen, kg/cm²;

11) operating pressure, kg/cm²;

12) the signature of the responsible representative of administration.

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274. On bottles, rejected in accordance with Articles 261 or 263 of present rules, next to date of last/latter examination by person, who produced examination, is hammered out circular mark with a diameter of 12 mm with image of cross within circle/wheel, and bottles themselves must be given into unsuitability (by means of plotting of cuts on thread of throat/neck), eliminating possibility of their further use.

275. Examinations of bottles must be produced in separate specially equipped locations. The temperature of air in these locations must be not below $+12^{\circ}$. For the internal inspections of bottles, is allow/assumed the application/use of electrical illumination with voltage/stress not above 12 V.

With the inspection of the bottles, which were being charged by dangerously explosive gases, the fittings of inspection lamp and its plug connection must be for explosion-proof performance.

276. Filled with gas bottles, which are found in prolonged storage, with onset of their next periods of examination undergo representatives of administration to certification in selective order in quantity not less than 5 pcs. from batch to 100 bottles, 10 pcs. from batch to 500 bottles and 20 pcs. from batch more than 500 bottles. With the satisfactory results of examination, period of storage is establish/installed by person, who produced examination, for one year. Selective examination must be produced yearly and take shape by the appropriate event/report.

By the unsatisfactory results of examination, is produced the repeated examination of the same quantity of bottles.

In the case of obtaining the unsatisfactory results with repeated examination, further storage of an entire batch of bottles is not allow/assumed, gas from bottles must be removed within the period, indicated by person, who produced examination, and bottles must be subjected to complete periodic examination.

277. It is forbidden to charge by gas bottles which have:

- a) elapsed period of periodic examination;
- b) there is not established/installed marks;
- c) are defective valve/gates;
- d) it is injured housing (cracks, severe corrosion, noticeable change in form);
- e) coloration and labels they do not correspond to requirements st. 252 present rules;
- f) are injured, slantwise or weakly mounted shoes.

278. Repair of bottles (resetting of shoes and rings for cap/hoods) and of valve/gates must be produced on plant- fillers. On the resolution of the local organ/controls of Gcsgortekhnadzor or corresponding organ/controls of boiler inspection, the repair of bottles and valve/gates can be allowed in special shops.

Valve/gate after the repair, connected with its dismantling, must be tested to density at operating pressure.

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279. To produce adapter/attachment of shoes to bottles is permitted only with released gas and inverted valve/gates after appropriate degassing of bottles.

Purification/cleaning and the colcration of the filled with gas bottles, and also the reinforcement of rings on their throat/necks is forbidden.

280. Filler stations, which generate filling of bottles with compressed, liquified and dissolved gases, are due to conduct journal of filling of bottles, in which they must be shown:

a) date of filling;

- b) number of bottle;
- c) date of next (next) examination;
- d) storage capacity, l;
- e) stagnation pressure of gas with filling, kg/cm²;
- f) quantity of filled into bottle gas, kg;
- g) painting of person, who filled bottles.

If at one plant is produced the filling of bottles with several gases, then for each gas must be maintained the various journal of filling; with the filling of bottles with compressed gases the filling of paragraphs "d" and "f" of journal not is compulsory.

With the filling of the bottles, establish/installed on the motor vehicles or other conveying devices, in the form of tight expenditure capacitance for the compressed or liquefied gases, the utilized explosives the quality of fuel for the engines of these machines, into the journals of filler stations will be brought in the

following data:

- a) the date of filling;
- b) the designation of the enterprise (organization) - the owner of gas balloon machine;
- c) identification number;
- d) the number of path or route plate;
- e) the stagnation pressure of gas with filling (for compressed gas), kg/cm²;
- f) storage capacity (for liquefied gases), l;
- g) a quantity of gas in bottles after filling (for liquefied gases), kg;
- h) the painting of person, who filled bottles.

Information on paragraphs "b", "c", "d", "f" will be brought in into journal according to the data of the path or route plate in which the suitability of bottles to filling must be confirmed by the

setting of right-angled die/stamp, by the size/dimension of 15 x 60 mm, with text "bottles are tested", over the signature of the face, heavy-duty/critical for testing of bottles and their working order before filling.

This face must be assigned by the special order of the management/manual of enterprise (organization) - the owner of gas balloon machine.

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When, on the communicating bottles, safety valve is present, and on each bottle of level indicators of maximum filling with liquefied gas about this is made the mark in the journal of filling, but paragraphs "f" and "g" of journal it is permitted not to fill.

281. Filling of bottles with liquefied gases and test hydraulic pressures in their periodic examinations must correspond to norms, indicated in Table 17.

The design pressure of bottles for the indicated in Table 17 liquefied gases is taken as equal to $2/3$ test hydraulic pressures.

282. Operating pressure of gas in filled with acetylene bottle

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in accordance with GOST 5457-50 must not exceed 6 kg/cm² in manometer at temperature of +20°. At other temperatures the gas pressure in bottle for acetylene must be not more indicated in Table 18.

Table 17.

(1) Наименование газа	(2) Вес газа на 1 л емкости баллона не более, кг	(3) Емкость баллона, приходящаяся на 1 кг газа, не менее, л	(4) Пробное гидравлическое давление баллонов, кг/см ²
(5) Аммиак	0,570	1,76	30
(6) Блаугаз (нефтегаз)	0,400	2,50	190
(7) Бутан	0,438	2,05	12
(8) Бутилен	0,526	1,90	10
(9) Изобутилен	0,526	1,90	10
(10) Окись этилена	0,716	1,40	10
(11) Пропан	0,425	2,35	25
(12) Пропилен	0,445	2,25	25
(13) Сероводород	1,250	0,80	12
(14) Углекислота	0,750	1,34	190
(15) Фосген	1,250	0,80	30
Фреон 11	1,2	0,83	30
Фреон 12	1,0	1,0	30
Фреон 13	0,6	1,67	90
Фреон 22	0,9	1,11	30
(17) Хлор	1,250	0,80	30
(18) Хлористый метил	0,800	1,25	16
(19) Хлористый этил	0,800	1,25	10
(20) Этилен	0,286	3,50	225

Key: (1). Designation of gas. (2). The weight of gas on 1 l of storage capacity is not more, kg. (3). The storage capacity, which is necessary on kg of gas, is not less, l. (4). Test hydraulic pressure of bottles, kg/cm². (5). Ammonia. (6). Blau gas (petroleum gas). (7).

Butane. (8). Butylene. (9). Isobutylene. (10). Ethylene oxide. (11).
 Propane. (12). Propylene. (13). Hydrogen sulfide. (14). carbon
 dioxide. (15). Phosgene. (16). Freon. (17). Chlorine. (18). methyl
 chloride. (19). chloride ethyl. (20). Ethylene.

Table 18.

(1) Окружающая температура, град.	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40
(2) Давление по маномет- ру, кг/см ²	7	8	9	10,5	12	14	16	18	20	22,5	25

Key: (1). Ambient temperature, deg. (2). Gauge pressure, kg/cm².

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283. ^Ffiller footlights at plant- fillers and stationary filler
 stations must be located in separate single-stage location,
 isolate/insulated from compressor station and from other locations by
 fundamental incombustible walls.

The height/altitude of the location in which are establish/installer filler footlights, must be not less than 3.25 m from sex/floor to the lower protruding parts of the roofing coating.

Within the walls, which separate/liberate filler footlights from compressor station, the device of apertures it is not allow/assumed.

284. Bottles, charged by gas, must be solidly fastened and are tightly connected to filler footlight.

285. Pressure bottles, taken as plant-fillers from users, must have residual gas pressure not less than 0.5 kg/cm². Bottles with dissolved acetylene must have residual pressure not less indicated in Table 19.

286. The emission of gases from bottles in capacitance for lower pressure must be produced through reducer, intended exclusively for this gas, painted in appropriate color.

Low-pressure chamber of reducer must have manometer and the spring safety valve, adjusted to the appropriate maximum operating pressure of the capacitance into which will pass the gas.

With the impossibility of applying reducer for strongly

corrosive gases (chlorine, sulfur dioxide, phosgene) is allow/assumed by authorization of the local organ/controls of Gosgortekhnadzor of the USSR or corresponding organ/controls of boiler inspection the application/use of another reliably effective device.

287. With impossibility on the spot of consumption to release gas due to malfunction of valve/gates bottles must be returned to filler station. Gassing from such bottles at filler station must be produced with the acceptance of the special precautionary measures.

Table 19.

(1) Температура, град.	(2) Ниже 0	(3) От 0 до + 15	(4) От +15 до +25	(5) От +25 до +35
(5) Минимальное допускаемое остаточ- ное давление по манометру, кг/см ²	0,5	1,0	2,0	3,0

Key: (1). Temperature, deg. (2). It is below. (3). From. (4). to.
(5). Minimum permissible residual gauge pressure, kg/cm².

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288. Gas containers, set up in locations, must be located from radiator of heating and another space heaters at a distance not less than 1 m, from gas stoves and similar devices - it is not less than 1.5 m and of furnaces and other heat sources with free flame - it is not less than 5 m.

When, in space heaters, shields are present,, which prevent bottles from localized heating, the distance between shields and the adjustable bottles must be not less than 100 mm.

289. Bottles, establish/installed as expenditure capacitance for compressed and liquefied gases on automobiles and other conveying devices, must be solidly fastened and they are hermetically sealed connected to exhaust conduit/manifolds. Rearrangement and the replacement of the bottles, not removed for filling, without the resolution of face, heavy-duty/critical for the operation of the conveying devices pointed out above, is forbidden.

290. In weld-shop in the presence not more than ten welding points is allow/assumed for each post to have on one spare oxygen tank and acetylene. Spare bottles must be stored in special annexes from the incombustible materials or must be protect/surrounded by steel panels. In the presence in shop, is more than ten welding posts must be arranged centralized gas supply.

291. Cylinders with poison gases must be stored in special closed premises whose device is regulated by appropriate norms and circumstances. Cylinders with all other gases can be stored both in the special locations and in the open air with protection from the effect of residue/settlings and solar ray/beams.

Storage storage in one location of oxygen tanks and of cylinders with combustible gases is forbidden.

292. Filled cylinders with mounted on them shoes must be stored on storages in vertical position. For a preservation from incidence/drop, the cylinders must be establish/installed in the specially equipped seats, cells or be guarded by barrier.

293. Cylinders, which do not have shoes, can be stored in a horizontal position on wooden frames or shelves. With storage on the open pads, it is permitted to also pack cylinders with blocks in piles with packing of cord, wooden bars or rubber between horizontal series of cylinders. during the packing into piles, the height/altitude of piles must not exceed 1.5 m and all valve/gates must be directed to one side.

294. Warehouses for storage of cylinders, filled with gases, must be single-stage with light/lung type coatings and not have garret compartments. Walls, partition/baffles, the coatings of storages for storage of gases must be of the incombustible materials not below II degree of refractoriness. Windows and doors must be open/disclosed outside. Window and door glasses must be dull or are painted by white paint.

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The height/altitude of storages must be not less than 3.25 m from

sex/floor to the lower protruding parts of the roofing coating.

The device of light/lung coatings for the storages of cylinders, filled with oxygen, and also with nitrogen, carbonic acid and other inert gases, they are not necessary.

The hems of storages must be even with nonskid surface, and for the storages of cylinders with combustible gases - from the materials, which eliminate sparking with the impact/shock about them by any object/subjects.

The device of storages for cylinders with poison gases must correspond to the effective norms and positions.

295. Temperature in closed storage locations must not exceed +35°. With an increase in the temperature above +35° must be accepted the measures to cooling of the locations of warehouses.

296. Illumination of storages for cylinders with combustible gases must answer norms, which exist for locations, dangerous in relation to explosions.

297. Heating of closed storages is allow/assumed only central - water, steam or air.

298. In storages must be hung out commands and rules on inversion with cylinders, which are found on storage, and also posters about prohibition of smoking, etc.

299. Storages of cylinders, filled with gas, must have natural or mechanical ventilation. Storages for cylinders with combustible gases must have ventilation, which ensures the safe norms of gas concentration in accordance with the requirements for the sanitary norms of the layout of industrial enterprises.

Equipment for removal of dangerously explosive gases from storages must be for explosion-proof performance. The gases, abstract/removed through air conduits, must not proceed to the sources of the free flame and into the locations where can be located people. When the removed by ventilation gases can create dangerous concentration in the surrounding zone, removal of gas must be produced into special absorbers.

300. In storage for storage, of cylinders with poison gases is permitted to enter only for persons, who put on gas mask or another means of defense from gas.

301. Warehouses for storage of filled by gas cylinders must be provided by resources of state fire supervision ^{MVD} M.I.

302. Storages for cylinders with fire-hazardous gases must be located in zone of protection by lightning controls.

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303. Maximum total capacitance of separate storage location for storage of cylinders must be not more than 3000 cylinders in conversion for 40- liter, moreover this location must be divided by incombustible walls to sections, in each of which is allow/assumed storage not more than 500 cylinders (40- liter) with combustible and poison gases and not more than 1000 cylinders (40- liter) with incombustible and nontoxic gases. Each section must have independent output/yield outside.

304. Breakage between storages of cylinders, filled with gases, and between storages and adjacent production buildings, public locations, habitable houses must satisfy the requirements for rules of fire-fighting norms and must not be less given in Table 20.

The breakage between storage with cylinders those filled with chlorine or phosgene, and habitable houses must be in accordance with

the rules of the arrangement/permutation, device and contents of storages for storage of the strong toxic substances.

305. At a distance 10 m around storage with cylinders, it is prohibited to store any fuels and to produce works with free flame, somehow: forging, welding, soldering.

306. Displacement/movement of cylinders in point/items of filling and use of gases must be produced on specially fitted out for this trucks or with the aid of other devices. Workers, that operate cylinders, must be well instructed.

307. Transportation of filled with gas cylinders can be produced on spring transport or on platform trucks in a horizontal position is compulsory with packing between them.

Table 20.

(1) № по пор.	(2) Емкость склада наполненных газом баллонов (в пересчете на 40-литровые баллоны)	(3) Между какими зданиями определяются разрывы	(4) Величина разрыва не менее, м
1	(5) До 500 баллонов включительно	(6) Между складами, а также складскими и производственными помещениями	20
2	(7) От 500 до 1500 баллонов включительно	(8) То же	25
3	(9) Свыше 1500 баллонов	(10) Между складами и жилыми домами	30
4	(11) Независимо от емкости склада	(12) Между складами и общественными помещениями	50
5	(12) То же	(13) То же	100

Key: (1). on pores. (2). Capacitance of storage of the filled with gas gallons (in conversion for 40- liter cylinders). (3). Between which buildings are determined the breakage. (4). The value of breakage is not less, m. (5). To 500 cylinders inclusively. (6). Between storages, and also storage and production locations. (7). From 500 to 1500 cylinders inclusively. (8). The same. (9). It is more than 1500 cylinders. (10). Between storages and habitable houses. (11). Independent of the capacitance of storage. (12). between storages and public locations.

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As packing can be applied wooden bars with the cut out seats for cylinders, and also string either rubber rings are not less than 25 mm in thickness, on two rings to cylinder, or other packing, the preventing cylinders from the impact/shocks against each other. All cylinders during transportation must be packed by valve/gates in one side. Is permitted the transportation of cylinders in vertical position, it is compulsory with packing between them and enclosure/protection from possible incidence/drop.

With loading-unloading works, transportation and the storage of cylinders, must be accepted the measures against their incidence/drop, damage and contaminations.

Transportation and the storage of the standard cylinders of large displacement (whose capacitance is more than 12 l) must be produced with the installed protective hoods. Storage of the filled cylinders on a plant-filler before transmission/delivery to their user is allow/assumed without the protective hoods.

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FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
RULES OF DEVICE AND SAFE OPERATION OF VESSELS, WORKING UNDER PR--ETC(U)
JAN 78 A STUGAREV

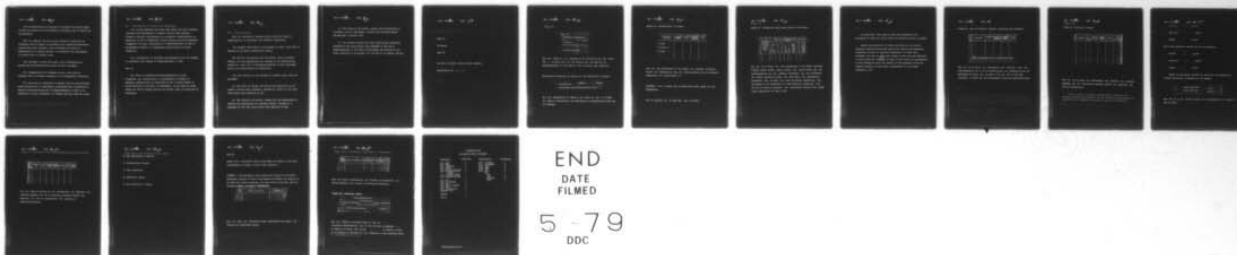
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With transportation and storage of cylinders with poison gases on each side branch of the valve/gate of cylinder, must be placed the plug/silencer.

308. All persons, who have direct relation to operation of cylinders, must be taught in accordance with production maintenance instructions after cylinders, their knowledge are tested by administration on building ground, in accordance with requirements for section VIII of present rules.

309. Cylinders, filled with gases, with transportation or storage must be protected from action of solar ray/beams.

310. Transportation of cylinders by rail, water and air transport must be produced according to of corresponding ministries.

311. Monitoring of observance of present rules at plant-fillers, filler stations and on experimental point/items must be produced by engineer-controller/inspectors of Gosgortekhnadzor of USSR or by inspectors of boiler inspection not thinner than one times per annum.

XII. Investigation of accidents and emergencies.

XII. Investigation of accidents and emergencies.

312. On each emergency and about each lethal and heavy accident, connected with maintenance of vessels, working under pressure (vessels, cisterns, buoy/barrels and cylinders), administration of enterprise is due to immediately inform engineer-controller/inspector (inspector) and local organ/control of Gosgortekhnadzor of USSR or corresponding republic or departmental organ/control of boiler inspection.

313. Investigation of accidents and emergencies must be produced in accordance with command of Gosgortekhnadzor of USSR.

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314. Prior to engineer-controller/inspector's arrival (inspector) for collaboration in investigation of accident or emergency administration of enterprise is due to ensure safety of entire situation of accident (to emergency), if this does not cause danger for life of people and does not disturb order of production of enterprise.

XIII. Final positions.

XIII. Final positions.

315. For violation of present rules, guilty are drawn on responsibility in accordance with effective legislation.

316. Present rules enter on the strength of from 1 July 1957 in relation to all newly manufactured vessels.

The need for correlation with the present rules of working vessels, and also manufactured and locating in the manufacturing process on 1 July 1957, is establish/installed in each individual case by the organ/controls of supervision.

317. With entrance on the strength of present rules, they are abolished:

a). The "rules of device, setting up and examination of the vessels, working under pressure", affirmed on 2 April by 1951 main state boiler code committee of MES;

b). The "rules of the device, content and the examinations of cisterns and buoy/barrels for liquefied gases", affirmed on 3 September by 1952 main state boiler code committee of MES;

c). The "rules of the device, content and certification of cylinders, for the compressed, liquified and dissolved gases" affirmed MES 3 October 1949.

d). the circular letters and other instructional materials, released by main state boiler code committee of MES and by Gosgortekhnadzor of the USSR to development and addition of the rules, indicated in paragraphs "a", "b" and "c" of present article.

End Section.

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No typing.

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Log book of vessel, working under pressure.

Registration No. _____

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(Стр. 1) (Р)

(1) Разрешение на изготовление № . . .
(2) от 196 . . г. выдано
(3) Управлением
(4) округа Госгортехнадзора СССР или
.
(5) инспекцией котлонадзора
.

Key: (A). (Pages 1). (1). Resolution for manufacture No. (2). from...
196 ... is given out. (3). By control. (4). the district of
Gosgortekhnadzor of the USSR or. (5). by boiler code committee.

Certificate concerning the quality of the manufacture of vessel.

. (1) заводской № изготовлен (2) (3)
(наименование сосуда)
. (4) (дата изготовления, наименование завода-изготовителя и его адрес)

Key: (1). (designation of vessel). (2). plant No. (3). it is made.
(4). (date of manufacture, the designation of manufacturing plant and
its address).

(Pages 2). Characteristic of vessel.

Наименование (1) частей сосуда	(2) Давление (избыточное), кг/см ²	(3) Температура, град.	(4) Рабочая среда и ее коррозионные свойства	(5) Емкость, л ¹
(6) В корпусе				
(7) В трубной части . . .				
(8) В рубашке				

Key: (1). Unit designation of the vessel. (2). Pressure (surplus), kg/cm². (3). Temperature, deg. (4). Working medium and its corrosive properties. (5). Capacitance, l¹.

FOOTNOTE ¹. For a cistern must be shown also total weight in tons.
ENDFOOTNOTE.

(6). In housing. (7). In tube part. (8). In jacket.

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(Pages 3). Information about basic parts of the vessel.

(1) № по пор.	(2) Наименование частей сосуда (корпус, днища, горловины, решетки, трубы, рубашка)	(3) Кол-во, шт.	Размеры, мм (4)			Основной металл (5)		Данные о сварке (пайке) (11)			
			(5) Диаметр (внутренний)	(6) Толщина стенки	(7) Длина (высота)	(8) наименование, марка	(9) № ГОСТ	(12) способ изготовления соединения (сварка, пайка)	(13) вид сварки (пайки)	(14) электроды, сварочная проволока, припой (тип, марка, № ГОСТ или ТУ)	

Key: (1). No on pores. (2). Unit designation of the vessel (housing, bottoms, necks, grates, tubes, jacket). (3). Quantitative, pcs. (4). Size/dimensions, mm. (5). diameter (internal). (6). wall thickness. (7). length (height/altitude). (8). Base metal. (9). designation, mark/brand. (10). No GOST. (11). Data on welding (soldering). (12). the method of the manufacture of joint (welding, soldering). (13). the form of welding (rations). (14). electrodes, welding wire, solder (type, mark/brand, No GOST or TU).

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In graph/count "base metal" along with designation and mark/brand of steel for carbon steel is indicated boiling or steady.

During the manufacture of vessel according to the special technical specifications which provide for testing the mechanical properties of metal at operating temperatures or after heat treatment, and also in cases when vessel is made from the materials to which there are no ^{GOSTs} GOSTs, the data of this table are supplemented by the information about the results of the mechanical tests and chemical analysis of base metal, manufactured in the volume, indicated in TU.

(Pages 4). Data on branches, flanges, cap/covers and fasteners.

№ по пер.	Наименование	Количество, шт.	Размеры, мм или № по спецификации	Наименование и марка металла	№ ГОСТ или ТУ
(7)	Данные о термообработке сосуда и его элементов (вид и режим) . . .				

Key: (1). No on pores. (2). Designation. (3). Quantity, a pcs. (4). Size/dimensions, mm or No on specification. (5). Designation and the mark/brand of metal. (6). No GOST or TU. (7). Data on the heat treatment of vessel and its cell/elements (form and mode/conditions).

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(Pages 5). Fittings of vessel.

(1) № по пор.	Наименование (2)	Количе- ство (3)	Условный проход, мм (4)	Условное давление, кг/см ² (5)	Материал (6)	Место установки (7)

Key: (1). No on pores. (2). Designation. (3). Quantity. (4). Internal diameter, mm. (5). Conditional pressure, kg/cm². (6). Material. (7). Site of installation.

Vessel is made in complete conformity with "rules on the vessels, working under pressure" and by technical specifications for manufacture, it underwent the hydraulic test by test pressure:

Other data on the setting up of the vessel:

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housing . . . kg/cm²

tube part . . . kg/cm²

jacket . . . kg/cm²

and to the pneumatic leakage test by the pressure:

housing . . . kg/cm²

tube part . . . kg/cm²

jacket . . . kg/cm².

Vessel is considered suitable for work with the indicated in present certificate parameters and the medium.

(1) м. п. (2) Главный инженер завода (3) (подпись)
(4) Начальник ОТК завода (подпись)
..... 19 . . г.

Key: (1) . m. p. (2) . Chief of plant. (3) . (signature). (4) . Chief of
OTK of plant.

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Log book must involve the drawings of vessel with the indication of basic dimensions and stress analysis with the application/appendix of the draft/drawings: the walls vessel, necks, cap/covers, tube walls and flanges.

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(Pages 6). Information about the location of vessel.

(1) Наименование предприятия-владельца	(2) Местонахождение сосуда	(3) Дата установки

Key: (1). enterprise-owner's designation. (2). Location of vessel.
(3). Date of setting up.

(Pages 7). Face, heavy-duty/critical for the safe action of vessel.

(1) № и дата приказа о назначении	(2) Должность, фамилия имя и отчество	(3) Роспись

Key: (1). No and the date of order about designation/purpose. (2).
Function, surname is name and patronymic. (3). Painting.

(Pages 8). Information about the established/installed fittings.

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(Pages 8). Information about the established/installed fittings.

Дата устано- вки	(2) Наименова- ние	(3) Количе- ство	(4) Условный проход, мм	(5) Условное давление, кг/см ²	(6) Материал	(7) Место установки	(8) Респись ответ- ственного

Key: (1). Date of setting up. (2). Designation. (3). Quantity. (4). Internal diameter, mm. (5). Conditional pressure, kg/cm². (6). Material. (7). Site of installation. (8). Painting of heavy-duty/critical.

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Other data on the setting up of the vessel:

a) the corrosivity of medium;

b) anticorrosive coating;

c) heat insulation;

d) refractory lining;

e) the connection of vessel.

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(Pages 9-12). Information about replacement and repair of the basic cell/elements of vessel, workers under pressure ¹.

FOOTNOTE ¹. The documents, which confirm the quality of the newly adjustable (instead of worn) cell/elements of vessel, the quality of the used with repair materials, and also welding (rations), must be stored in special millboard. ENDFOOTNOTE.

(1) Дата	(2) Сведения о замене и ремонте	(3) Подпись ответственного лица

Key: (1). Date. (2). Information about replacement and repair. (3).
Painting of responsible person.

(Pages 12-13). Recording of the results of examination.

(Pages 13-31). Recording of the results of examination.

(1) Дата освиде- тельствования	(2) Результаты освидетельствования	(3) Разрешенное давление	(4) Срок следующего освиде- тельствования
		1	

Key: (1). Date of examination. (2). Results of examination. (3). Solved pressure. (4). Period of following examination.

(Pages 32). Recording vessel.

(1) Сосуд зарегистрирован за №

(2) в
(регистрирующий орган)

(3) В паспорте пронумеровано страниц и прошнуровано

(4) всего листов, в том числе чертежей на

(5) (должность регистрирующего лица)

(6) (подпись)

(7) м. п. 19 . . г.

Key: (1). Vessel is recorded after No. (2). in . . .
(recording organ/control). (3). In the log book is numbered . . .
of pages it is laced. (4). in all . . . of plates, in that
of the numbers of drawings in. (5). (function of the recording face).
(6). (signature). (7). m. p.

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LAB/FIO		FTD	
C513 PICATINNY ARSENAL	1	CCN	1
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		NIA/PHS	1
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