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Standard Reference Materials.

STANDARD SAMPLES ISSUED IN THE USSR

(A translation from the Russian)

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¹ Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D. C. 20234.

² Part of the Center for Radiation Research.

³ Located at Boulder, Colorado 80506.

Standard Reference Materials:

Standard Samples Issued in the USSR

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FOREWORD

The National Bureau of Standards is grateful to Dr. B. M. Issaev, Vice President, State Committee on Standards, Measures and Measuring Instruments, USSR, for providing this paper for translation and publication for the benefit of NBS and other U. S. scientists concerned with standard reference materials. The publication will contribute materially to the opportunities for international cooperation in reference materials now under discussion in the International Committee of Weights and Measures. We shall all follow these discussions with interest.

This publication presents a literal translation into English from the original Russian text, carried out by M. C. Selby of the Boulder Laboratories, National Bureau of Standards.

LEWIS M. BRANSCOMB
DIRECTOR

Translator's Note

The Standard Reference Materials Handbook of the USSR was translated primarily for the use of the National Bureau of Standards and other readers concerned with prospects of standardization and coordination of benefit to the international community. The Russian copy was given to Dr. L. M. Branscomb during his recent visits of Eastern Europe.

M. C. Selby

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ISSUED IN THE USSR

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This reference handbook contains information on standard samples of properties and composition of substances and materials including areas of their application, nomenclature, certified characteristics, and values of the certified quantities.

The handbook was prepared for personnel of metrological establishments, for laboratories of ferrous and non-ferrous metallurgy, for all branches of industry employing metals and alloys, for the mining industry, geological research service, oil refining industry, scientific research organizations, and institutes of higher education.

FROM THE EDITOR

Competence and results of physical-science investigations depend upon the information at our disposal on properties and composition of substances. The information is also indispensable for the operation of technological processes and for the quality control of raw materials and products.

The need of such information has been continuously increasing during the last decades. The number of substances studied and put to use, as well as the range of measured characteristics is continuously increasing. At the same time the demand for faster and more accurate traditional and new types of measurements are sharply increasing.

Standard samples play a major role in the solution of the above problems. They are the means towards reproduction of units of the measured quantities characterizing the properties or the composition of substances and materials. A partial listing of the branches of industry making use of standard samples include prospecting and mining of raw minerals, ferrous and nonferrous metallurgy, all branches employing metals and alloys, the chemical and oil refining industry, instrument making industry and the radioelectronic industry. These standards are growing in importance in connection with testing the qualities of export and import goods in international trade.

The reasons that brought about the tendency of expanding the application of standard samples are not accidental.

One of the reasons is the increasing need of means of calibration of physical methods applied for quantitative determinations of a chemical substance (e.g. spectral emission analysis in the optical area, roentgenoscopic spectra etc.).

Another reason is that there is a number of broad and very important measurement areas where one can not use standard checking methods and instruments, or where the realization of such methods is technically complex and uneconomical. Examples are analytical measurements of elementary components or of their compounds performed in geological research, in processing of mineral raw material, in metallurgy and in other industrial branches. This is the case especially in analyzing materials applied in

modern technology. Other examples are measurements of many thermal quantities in physics and chemistry and of optical characteristics.

A third reason is that standard samples retain the numerical values of their quantities (which need to be reproduced) with a higher degree of stability by comparison with, for example, standard instruments.

Finally, the considerable economic advantage is an additional reason. Investment on the preparation of standard samples is, as a rule, much less than on manufacture of standard instruments and these samples can be relatively easily produced in large quantities. Improved organization of numerous kinds of tests is another source of economy. Because standard samples can be used immediately at the location of the working means of measurements, one saves the cost of reassembling checking setups and instrumentation, of their transportation to and from the test location, and of maintaining a reserve of measurement equipment to replace those sent out to a test site.

Increasing attention is being paid in the USSR to the problem of standard samples. The production of such standards started during the first years of industrialization - in the beginning at the Supreme Palace of Weights and Measures (present All-Union Mendeleev Scientific-Research Institute of Metrology), and later on in the laboratory of the trust "VOSTOKOSTAL I" (Eastern steels). The latter was subsequently reorganized into the Laboratory of Standard Samples of the Ural Metallurgical Institute (the present All-Union Scientific-Research Institute of Standard Samples at the USSR Ministry of Ferrous Industry - VNIISO MChM). The metrological institutes and the institutes of the ministries of industrial branches are at present manufacturing more than 130 thousand samples annually and of more than 600 nomenclatures.

However, the growth of the industrial production and the widening extent of scientific research call for a sharp increase in the production of samples. Orientation estimates are that the annual output of samples has to be increased to 2 to 2.5 fold and the nomenclature 6 to 8 fold.

The listing of standard samples as of 1965-1966 was done at the Mendeleev VNIIM under the direction of B. N. Oleinir.

The objective of this handbook is to inform the users on the properties and composition of the standard samples presently issued at the USSR as well as on their characteristics. It is assumed that the All-Union Scientific-Research Center of the State Service for Standard Samples (VNITs GSSO) will in the future issue such references periodically.

Comments and recommendations on the contents of this handbook are invited and should be addressed to VNITs GSSO (Sverdlovsk, Center, Krasnoarmeiskaia, 2-a).

A. Shaievitch

INTRODUCTION

The material in this handbook is arranged in accordance with the classification criteria envisaged by the GOST 14263-69 "State System to secure uniformity in measurements. Standard samples of substances and materials. General requirements". Information on standard samples for properties are given first, and for samples of composition-next.

The samples of the first-type are in turn split into groups designated to measure mechanical, thermal, optical, magnetic, electric, physicochemical and industrial characteristics.

As a rule, for each group the following items are indicated; the substance which is the carrier of the property, the value of the certified quantity, and the metrological designation of the sample (the standard measure of various categories or the working measure of various accuracy classifications).

The composition samples are subdivided according to application in the most prevalent kinds of analysis (this classification is occasionally conditional*). Each of the indicated groups of samples, for example, the spectral analysis samples, is in turn subdivided according to the basic industrial classes of substances - the tested objects as follows: samples for analysis of rock extractions, raw minerals, metals and alloys, of other products of processing metallurgical raw materials (slags, matte, etc.), and of artificial silicate materials.

One must keep in mind that some metals and alloys can not always be definitely identified as ferrous or nonferrous metallurgical objects. Thus, metallic chromium, prepared by ferrous metal enterprises is a nonferrous metal. Many precision alloys are also fabricated by these enterprises on a nickel base-a nonferrous metal. It is difficult to realize a uniform approach in such cases when one considers generated traditions. Therefore, it is necessary to refer to the tables of ferrous as well as the nonferrous metals and alloys.

* The term "spectral samples", used occasionally by manufacturers and users, is not recommended because it is metrologically incorrect. The term "standard samples for spectral analysis" should be used in accordance with GOST 14263-69.

In addition to data on chemical composition, additional characteristics are given (when this is necessary) and application particulars of the samples are indicated.

The numbering of the samples adopted by their producers is retained in the handbook. The letter index attached to the number means that the sample is repeatedly or several times issued. An asterisk at the number indicates those standards the composition of which is provisional. A dashed line through all the columns of a given line means that the certification of the respective sample has not been completed. Dashes in some columns mean that the particular element is not being certified.

The contents of the elements or of their combinations in the samples is given in percent by weight. Some of them are indicated in brackets. This means that the corresponding quantities are not certified but are given for general characterization.

The numerical data given in the tables should not be used directly at the tests and calibrations. To avoid errors one must use only the values given in the certificates of the samples (or stamped on them).

For brevity the term "standard sample" is sometimes replaced in the text by the abbreviation - SS.

STANDARD SAMPLES OF PROPERTIES OF SUBSTANCES AND MATERIALS

1. Standard Samples of Mechanical Properties

Standard Sample (SS) of Hardness

Purpose: To check instruments measuring Brinell, Rockwell, Super Rockwell, and Vickers hardness in accordance with the GOST (All Union State Standard) 9031-63.

Area of application: for quality control of metals and alloys delivered without additional treatment, also after thermal, thermochemical, thermomechanical and other treatments; for scientific investigations.

Data on hardness of Class I and II SS's, certified by VNIIM (All-Union Scientific Research Institute of Metrology) are given in table 1.

Table 1

Certified characteristic	Nominal value of certified characteristic	Spread of hardness values	
		Class I	Class II
Brinell Hardness		In % of hardness number	
HB 30 D ^{2*}	200±50	1.5	3.0
HB 10 D ²	100±25	2.0	4.0
HB 2.5 D ²	30±10	3.0	4.0
Rockwell Hardness		In units of hardness	
HRC	65±5	0.3	0.5
HRC	45±5	0.4	0.8
HRC	25±5	0.5	1.1
HRB	90±10	0.5	1.2
HRA	75±5	0.4	0.8
Superficial Rockwell Hardness		In units of hardness	
HR 15N	92±2	0.5	1.0
HR 30N	80±4	0.5	1.0
HR 30N	45±5	0.8	1.6
HR 45N	49±6	0.8	1.6
HR 30T	76±6	0.9	1.8
HR 30T	45±5	1.5	3.0

Translator's footnote:

*30 D² means a load in kg of 30 times the square of the diameter of the ball used in the hardness test, i. e., 30 D² = 30 (10)² = 3000 Kg, etc. This terminology is not common in the U. S.

Table 1 continued

Certified characteristic	Nominal value of certified characteristic	Spread of hardness values	
		Class I	Class II
Vickers Hardness		In % of hardness number	
HV 5	450±75	1.5	3.0
HV 5; 10	800±50	1.5	3.0
HV 30	450±75	1.0	2.0
HV 100	450±75	1.0	2.0

SS OF ROUGHNESS

Purpose: To evaluate roughness of components made of steel and cast iron, for the following kinds of machining: external turning; internal boring, reaming; face and cylindrical milling; planing; circular, plane, face, and internal grinding, polishing and lapping.

Produced in accordance with GOST 9378-60 (table 2)

Table 2

Substance	Class of purity per GOST 2789-59	Value of certified characteristic	Allowable tolerances
Steel	▽4÷▽5*	$R_z 32 \pm 16$	+15
	▽6÷▽9	$R_a 2 \pm 0.25$	-20
Cast iron	▽10÷▽12	$R_a 0.125 \pm 0.032$	±20
	▽13	$R_z 0.08$	

SS FOR DILATOMETRY

Purpose: Calibration and check of instruments for dilatometry.

Area of Application: Investigation and control of various materials used in the radio-technical industry in the low and medium temperature ranges.

SS's are issued by VNIFTRI (All-Union Scientific Research Institute of Physicotechnical and Radiotechnical measurements). The dependence of the relative expansion of brass, and of single-crystal quartz and corundum on temperature is certified at 185 to 900°C. Values of 0 to 20,000 micrometers per meter are certified.

SS OF VISCOSITY

Purpose: To calibrate and check viscosity meters by comparative methods.

* The sign ÷ indicates an interval or range.

Area of application: Quality control of raw materials and products of the chemical, petroleum-processing, petrol-chemical, pulp and other branches of industry.

The nominal values of the SS kinetic viscosity certified at VNIIM are: 2.5, 5, 10, 15, 20, 50, 100, 150, 200, 300, 500, 1000, 1500, 2000, 5000, 7000, 9000, and 10,000. The relative error in the values is 0.1%.

2. Standard Samples of Heat Properties

Purpose: SS of the quantity of heat to calibrate calorimeters used to determine the combustion heat of fuels; SS of coefficients of heat conduction, thermal conductance for calibration and check of thermal physical instruments, and setups.

Samples of benzoic acid are issued in accordance with GOST 10440-63.

Area of application: Quality control of gaseous, liquid and solid fuels; scientific investigations.

Data on SS for measurement of heat certified by VNIIM in Moscow and by its branch in Sverdlovsk are given in table 3.

Table 3

Substance	Certified characteristic	Value of certified characteristic	Relative error %
Benzoic acid K-1 (Class I)	Specific heat of combustion	26,434 KJ/Kg	$\pm(0,03 \div 0,06)$
Benzoic acid K-2 (Class II)	Specific heat of combustion	26,460 KJ/Kg	$\pm(0,1 \div 0,3)$
Polymethacrylate	Coefficient of thermal conductivity Dependence of the thermal conductivity coefficient on temperature within 20 to 80°C Dependence of the temperature-conduction coefficient upon temperature	$0.1 \div 0.3 \text{ W/m.degree } \pm$ $\chi = 0.18 (1 + 3.310^{-4}t)$ W/m.degree $\alpha = 1.2 (1 - 1.7 \cdot 10^{-3}t) \cdot 10^{-7}$ m ² /sec	

Table 3 continued

Substance	Certified characteristic	Value of certified characteristic	Relative error, %
Corundum	Enthalpy Specific heat	$0 \div 1500^{\circ}\text{C}$ $0 \div 1500^{\circ}\text{C}$	About 0.3 About 1

3. STANDARD SAMPLES OF OPTICAL PROPERTIES

SS FOR COLORIMETRY

Purpose: Color atlas - for checking colorimetric instruments (objective and visual colorimeters, spectrophotometers, etc.), color comparators, industrial catalogs, cards, color scales; atlas of supporting colors - to measure color by direct comparison of the unknown with a SS scale, SS of a white surface - for spectrophotometric and color measurements.

Area of Application: Industrial testing of products of textile, paper, varnishing and other branches of industry. Scientific investigations. Work in the sphere of the art industry.

Colorimetric atlases are certified as measurement means of Class I and Class II.

Characteristics of SS's for colorimetry are certified by VNIIM and are given in Table 4.

Table 4

Type of SS	Certified characteristic	Relative error
Colorimetric atlas	450 colors	0.5 - 1.0 for light samples
	450 colors	1 - 3% for samples with reflection coefficients near 30
	450 colors	3 - 10% for dark samples
Supporting scales (abridged atlas)	129 colors	3 - 10% for dark samples
SS of white surface	Special reflection coefficient	0.5%
SS of transparent colored glass plates	Absorption coefficient	0.5%
SS of the general brightness coefficient and of the reflection coefficient (barium sulfate and type MC-14 glass)	General brightness coefficient 0.9	$\pm (0.2 - 0.5)\%$
	General reflection coefficient 0.9	

Table 4 continued

Type of SS	Certified characteristic	Relative error
SS of angle of rotation of the plane of polarization (quartz polarimetric plates)	Set 100°S, 75°S, 50°S, 25°S-clockwise, 25°S-counterclockwise Set 100°S, 80°S, 60°S, 40°S-clockwise	0.05±0.005°S

SS FOR PHOTOMETRY

Purpose: Reproduction of units of brightness for light measurements; calibration and check of light-measuring instruments.

Area of application: Light-source industrial measurements; scientific investigations.

Certification is done by VNIIM and the data is given in table 4.

SS OF THE ANGLE OF ROTATION OF THE PLANE OF POLARIZATION

Purpose: To check polarimeters and saccharimeters.

Area of application: Mechanical optics, food and other branches of industry; scientific investigations.

Certification is done by VNIIM and data is given in table 4.

4. STANDARD SAMPLES OF MAGNETIC PROPERTIES

Purpose: Calibration and check of instruments to measure magnetic properties of substances and materials; quality control by comparison.

Area of application: Quality control of electrotechnical and of low-carbon steels, also of other high- and low-permeability materials, high-frequency materials, (ferrites, magnetic dielectrics etc.), hard-magnetic, magnetostrictive and other materials (in dc and alternating fields) in metallurgical electrotechnical, radiotechnical and other branches of industry; scientific investigations.

The characteristics of the indicated samples, certified by VNIIM and its Sverdlovsk-branch and by VNIIFTRI is given in table 5.

Table 5

Substance	Field	Certified characteristic	Relative error %
Para- and dia-magnetic substances	Dc	Magnetic susceptibility	2÷3
Magnetically weak materials with permeability to 40	Dc	Magnetic susceptibility, magnetic permeability	2—3
High-permeability materials:			
Electrotechnical and low carbon steels	Dc	Coercive force, dependence of magnetic induction on field strength	To 3
Thin-sheet and rolled silicon steels	Dc, ac, low frequency	Dependence of magnetic induction on field strength, dependence of losses on magnetic inductance in low-frequency fields	For a dc field to 3, for an ac field -5 to 7
Iron-nickel alloys of high permeability	Dc, ac, low-frequency, ac to 10 KHz	Dependence of magnetic induction on field strength, dependence of losses on induction over a wide range of frequencies, coefficient of rectangularity (squareness ratio), residual induction, coercive force, initial permeability, maximum permeability	For a dc field to 3, for an ac field -5 to 7
Ferrites	Impulse	Remagnetization time, magnetization curve	5÷7
High-frequency materials: ferrites	Ac 10 KHz	Initial permeability	1÷5
magnetic-dielectrics, thin-sheet iron-nickel alloys	1 MHz	Dependence of permeability on field strength, temperature coefficients loss tangent, loss coefficients	For temperature coefficients and loss factors -10
Low-permeability materials: Alloys for permanent magnets with coercive force to 10^5 a/m	Dc	Remanent induction, coercive force, maximum magnetic energy, recovery coefficient	3
Magnetostriction materials	Dc	Magnetostriction in static condition	—
Diphenyl-picryl hydrazine (DFPG)	—	Number of paramagnetic centers (intervals of values) $10^{13} \div 10^{16}$	—
polycrystal	—	Number of paramagnetic centers (intervals of values) $10^{13} \div 10^{16}$	—
Carbonized glucose	—		

5. STANDARD SAMPLES OF ELECTRICAL PROPERTIES

Purpose: Control of characteristics of material employed in radio-electronics.

Area of application: Radio-electronic industry, scientific research.

Dielectric constant and loss, $\text{tg} \delta$, are certified (at 9400 MHz). The ranges of the dielectric constants, ϵ , and $\text{tg} \delta$ for samples of fused quartz, polystyrene, and organic glass, are 2 to 10,000 and 10^{-5} to 10^{-2} respectively. The order of accuracy is 0.2 to 1.0.

The samples are certified by VNIIFTRI.

6. STANDARD SAMPLES OF IONIZED RADIATION AND OF RADIOACTIVITY

Purpose: Reproduction of units of activity, external radiation, of neutron discharge and other characteristics; checking and calibration of measuring instruments.

Area of application: All branches of the national economy where ionizing radiation and active materials are controlled or made use of.

The All-Union Association "Isotop" of the State Committee for the utilization of atomic energy in the USSR furnishes radioactive sources. The latter are certified as class III sources.*

Radioactive sources of classes I and II are certified by VNIIM and by VNIIFTRI. Their characteristics are listed in table 6.

Table 6

Type of SS	Certified characteristic	Value of certified characteristic	Class	Limit of error %
Sources of α : Plutonium-239	Activity	$2 \cdot 10^1 \div 2 \cdot 10^5$ disintegrations/sec.	I	5
			II	7
			III	10
Natural uranium	Activity	$2 \div 2 \cdot 10^2$ disintegrations/sec.	I	5
			II	7
			III	10
Uranium 234	Activity	$2 \div 2 \cdot 10^2$ disintegrations/sec.	I	5
			II	7
			III	10
Sources of β Strontium-90+ + yttrium-90	Activity	$2 \cdot 10^2 \div 2 \cdot 10^7$ disintegrations/sec.	I	5
			II	10
			III	15

*These can be certified as class I and II standards after procurement. The nomenclature of the class III sources is given in publications V/O (All-Union Association) "Isotop".

Table 6 continued

Type of SS	Certified characteristic	Value of certified characteristic	Class	Limiting error %
Thallium-204	Activity	$2 \cdot 10^2 \div 2 \cdot 10^5$ disintegrations/sec.	I	5
			II	10
			III	15
Cobalt-60	Activity	$2 \cdot 10^2 \div 2 \cdot 10^5$ disintegrations/sec.	I	5
			II	10
			III	15
γ-sources Cobalt-60	Activity	$1 \cdot 10^{-3} \div 5$ curie	I	5 ÷ 7 in the interval $10^{-6} \div 10^{-4}$ curie
				II
Cesium-137	Activity	$1 \cdot 10^{-3} \div 5$ curie	I	7 in the interval $10^{-4} \div 5$ curie 5 ÷ 7 in the interval $10^{-6} \div 10^{-4}$ curie
				II
Radium-226	Activity	$1 \cdot 10^{-3} \div 5$ curie	I	7 in the interval $10^{-4} \div 5$ curie 5 ÷ 7 in the interval $10^{-6} \div 10^{-4}$ curie
				II
Yttrium-88, cadmium-109, cobalt- 57, cobalt-60, manga- nese-54, sodium-22, mercury-203, cerium- 137, zinc-65	Activity of sample spectro- metric sources γ radiation	$10^3 \div 10^5$ disintegrations/sec.	—	$10^{-4} \div 5$ curie 5

Table 6 continued

Type SS	Certified characteristic	Value of certified characteristic	Class	Limiting error %
Non-emanating radium-226	Activity	$10^{-9} \div 5 \cdot 10^{-7}$ curie	II	2÷3
Liquid sources of radium-226	Activity	$10^{-10} \div 10^{-8}$ curie	II	2÷3
Sample solutions	Specific activity	$10^3 \div 10^6$ disintegrations/sec.	I II	$\pm(2\div3)$ $\pm(3\div5)$
Sources of α Plutonium - 239	External radiation	$2 \cdot 10^2 \div 2 \cdot 10^5$ disintegrations/sec.	I II III	3 5 7
Natural uranium	External radiation	$2 \cdot 10^1 \div 2 \cdot 10^5$ disintegrations/sec.	I II III	3 5 7
Uranium-234	External radiation	$2 \cdot 10^1 \div 2 \cdot 10^5$ disintegrations/sec.	I II III	3 5 7
Sources of β Strontium-90 + yttrium-90	External radiation	$2 \cdot 10^2 \div 2 \cdot 10^7$ disintegrations/sec.	I II III	3 5 10
Thallium-204	External radiation	$2 \cdot 10^2 \div 2 \cdot 10^5$ disintegrations/sec.	I II III	3 5 10
Cobalt-60	External radiation	$2 \cdot 10^2 \div 2 \cdot 10^5$ disintegrations/sec.	I II III	3 5 10
Sources of γ Cobalt-60	Power of dose of exposure (at a distance of 1 meter)	$3 \cdot 10^{-8} \div 1,5 \cdot 10^{-3}$ (roentgen) r/sec.	I II	1,5÷3 4
Cesium-137	Same	$2 \cdot 10^{-8} \div 4,5 \cdot 10^{-4}$ (roentgen) r/sec.	I II	1,5÷3 4
Radium-226	Same	$2 \cdot 10^{-8} \div 4 \cdot 10^{-5}$ (roentgen) r/sec.	I II	1,5÷3 4
Cobalt-60	Same	$2 \cdot 10^{-5} \div 1,3 \cdot 10^{-5}$ (roentgen) r/sec.	III	5÷7
Cesium-137	Same	$2 \cdot 10^{-8} \div 4 \cdot 10^{-4}$ (roentgen) r/sec.	III	5÷7
Radium-226	Same	$10^{-6} \div 2 \cdot 10^{-1}$ g(gram)	III	5÷7
Sources of neutrons	Neutron output	$10^3 \div 10^6$ neutrons	I II	± 7 ± 7
Isotopes (10)	Activity of spectrometric sources of γ	$10^3 \div 10^5$ disintegrations/sec	I II	— —

Data on sources of γ -radiators and on sample solutions and certified radio contents are given in part two (standard samples of compositions) of this reference manual.

7. STANDARD SAMPLES OF SCINTILLATION DETECTORS

Strictly speaking these measuring means serve as transfer standards.

Purpose: Check of γ -spectrometric instruments.

Area of application: All branches of the national economy, where measurements are made with γ -spectrometers.

VNIIM is certifying monocrystals. The data are given in table 7.

Table 7

Detector	Certified characteristic	Size of detector (diameter X height) mm	Value of certified characteristic
Based on the stilbene monocrystal	Luminescence yield relative to the stilbene monocrystal 40 mm in diameter and 40 mm in height	10×10	1.00±1.20
		16×10	1.10±1.30
		16×16	1.00±1.20
		25×10	1.10±1.30
		25×16	1.05±1.30
		25×25	0.95±1.20
		40×10	1.15±1.40
		40×16	1.10±1.30
		40×25	1.00±1.20
		40×40	0.90±1.10
Based on the monocrystal NaI(Tl)	Luminescence yield relative to the stilbene monocrystal 40 mm in diameter and 40 mm in height	10×10	3.00±3.70
		16×10	3.30±4.00
		16×16	3.00±3.60
		25×10	3.45±4.20
		25×16	3.20±3.90
		25×25	2.90±3.50
		25×40	2.40±3.00
		40×10	3.55±4.35
		40×16	3.30±4.10
		40×25	3.10±3.80
		40×40	2.75±3.35
		40×63	2.25±2.75

8. STANDARD SAMPLES OF ENGINE FUELS

Purpose: Control of accuracy of measurements of anti-knock stability of petroleum fuels at test installations.

Area of application: Petroleum industry and all branches of the national economy employing oil fuels for internal combustion motors.

The samples are produced in accordance with the All Union State Standard (AUSS) 511-66 of the Ministry of the petroleum industry of the USSR and of the SSR of Azerbaijan. Certified in accordance with test results with the help of primary "standard" fuels (n-heptane and isooctane). Fit for service during 2 years from the moment of certification.

Values of octane number certified according to the motor method (AUSS 511-66), are as follows:

Number of control fuel	Octane number
3	$66 \pm 0.5/M$
4	$70 \pm 0.5/M$
5	$91 \pm 0.5/M$
7	$95 \pm 0.5/M$
8	$99 \pm 0.5/M$

In addition to those listed above, standard samples are in the preparatory stage on electrical resistance of aluminum, samples of colored optical glasses, white and colored reflecting glasses, glass samples for calibration of viscosimeters, samples of carbonyl iron of cylindrical and toroidal form, of solid dielectrics, of plastic scintillation detectors, samples of some pharmaceutical and biochemical compounds and of a series of others.

STANDARD SAMPLES OF COMPOSITION OF SUBSTANCES AND MATERIALS

1. STANDARD SAMPLES FOR RADIOMETRIC MEASUREMENTS

SS WITH CERTIFIED CONTENTS OF RADIUM

Purpose and area of application - see page 13.

Certified by VNIIM as means for measurements of classes I and II.
The characteristics are given in table 8.

Table 8

Type of SS	Value of certified characteristics	Class	Limits of error %
Radium γ - source	$10^{-4} - 10^{-3}$ mg	I	± 3
		II	± 5
	10^{-2} mg	I	± 2
		II	± 3
	10^{-1} mg	I	± 1.5
		II	± 2.0
Sample solutions	$10^{-8} - 10^{-5}$ mg/cm ³	I	± 1
		II	± 1.5
		I	± 1.5
		II	± 2

SS FOR THE DETERMINATION OF THE ABSOLUTE AGE OF GEOLOGICAL FORMATIONS

Purpose: Determination of the absolute age of geological formations in connection with their genesis and practical application of the results in research in geology.

Area of application: Geochemical and geophysical investigations, search of stores of useful minerals.

The samples are certified by the Institute of Geology of Mineral Deposits, Petrography, Mineralogy and Geochemistry of the Academy of Sciences of the USSR. The characteristics are given in table 9.

Table 9

Number of the SS	Substance	Certified characteristic	Value of certified characteristic
2/65	Amazonite-microcline	Rubidium contents Contents of radiogenic strontium	About 0.11% About 1.75 $\mu\text{g/g}$
3/66	Amazonite-microcline	Rubidium contents Contents of radiogenic strontium	About 0.8% About 4.0 $\mu\text{g/g}$
1/65	Felsitic quartzitic liparitic porphyry	Contents of potash Contents of radiogenic argon	4.013 \pm 0.38% 79.27 \pm 1.35 ng/g

2. STANDARD SAMPLES FOR CHEMICAL ANALYSIS

Purpose: Control of accuracy of chemical analyses performed for regulation of technological processes and for evaluation of the quality of raw materials and products.

Area of application: Analyses of rocks and raw materials, of crude iron, ferro alloys, steels, precision alloys, non-ferrous and rare metals and of their alloys, of heat-resisting products in geological-service organizations and on mining-industry projects, of ferrous and non-ferrous metallurgy, also for all branches of industry employing metals and alloys.

The samples are furnished by the All-Union Scientific Research Institute of Standard Samples of the Ministry of the Ferrous Metallurgy of the USSR - VNIISO MChM, in the form of a homogeneous crushed material (shavings, grit, powder), packed in bottles of 150 to 250 g.

FERROUS METALS AND ALLOYS

Iron. A list of samples is given in table 10. A peculiarity of the application of the standard sample of foundry iron is the likelihood of releasing of graphite contained in the form of impurities. Therefore it is not recommended to mix the material of the sample in the bottle nor to use its residue at the bottom of the bottle.

Ferroalloys. A list of SS is given in table 11.

Carbon steels. A list of SS is given in table 12.

Electrotechnical steels. A list of SS is given in table 13.

Alloyed structural steels. A list of SS is given in table 14.

Table 10

Number of SS	Kind of iron	Brand of iron	Contents of elements, %													
			Carbon	Graphite	Manga- nese	Silicon	Phos- phorus	Sulfur	Arsenic	Copper	Titanium	Chrome	Nickel			
70-V*	Bessemer	B1	3.38	2.78	0.84	1.38	0.067	0.029	—	—	—	—	—	—	—	—
228	Foundry roll	VK1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
282*	Rolled	VK1	2.76	—	0.27	0.68	0.33	0.13	—	—	—	—	—	—	0.09	0.45
313	Malleable	KK	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17-1*	Foundry coke	KK	2.91	—	1.35	3.12	0.21	0.015	—	—	—	—	—	—	—	—
17-n	Foundry coke	IK-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
62-V*	Foundry coke	IK-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
61-9*	Foundry coke	IK-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
221-a	Foundry chrom- nickel	ChNK3-2	—	—	0.54	3.19	0.37	0.021	—	—	—	—	—	—	—	—
72-a*	Martin open hearth	M2	4.17	0.04	2.03	0.49	0.103	0.031	—	—	—	—	—	—	—	—
64-V*	Martin open hearth with arsenic	M2	3.96	0.92	1.68	0.37	1.66	0.068	0.182	—	—	—	—	—	—	—
23-j*	Cast iron conversion coke	M2	3.82	1.76	0.68	0.62	0.140	0.026	—	—	—	—	—	—	—	—
101-V*	Superior quality	ПБК-3	4.08	—	0.83	0.27	0.020	0.013	—	—	—	—	—	—	—	—

Number of SS	Ferroalloy	Brand of ferroalloy	Contents of						
			Silicon	Manganese	Carbon	Chrome	Tungsten	Molybdenum	Vanadium
269-a*	Ferroboron	—	2.40	—	0.26	—	—	—	—
254	Ferroboron	БЖР2	—	—	—	—	—	—	—
77-V	Ferrovandium	Вд1	1.67	—	0.55	—	—	—	45.84
202-a*	Ferrotungsten	В1	0.32	0.11	0.14	—	74.64	1.40	—
161*	Ferrotungsten	ВМ1	1.0	0.12	0.04	—	81.0	4.3	—
201-b	Ferromanganese	Мн2	2.03	92.08	1.04	—	—	—	—
201-V	Ferromanganese	Мн2	—	—	—	—	—	—	—
35-b*	Ferromanganese blast-furnace	Мн7	0.90	70.1	6.44	—	—	—	—
168-V*	Ferromolybdenum	Мо1	0.24	—	0.05	—	—	59.52	—
162-a	Ferriobium	НБ1	11.18	—	0.06	—	—	—	—
301	Ferriobium as an ingredient of non-ferrous metals	—	—	—	—	—	—	—	—
36-V	Ferrosilicon	Сн 75	76.2	0.13	0.07	0.09	—	—	—
37-a*	Ferrosilicon	Сн 45	44.27	0.35	0.046	—	—	—	—
38-V	Ferrosilicon	Сн 10	9.38	1.22	1.74	—	—	—	—
222-a	Ferrotitanium	Тн 2	4.48	—	0.05	—	—	—	—
306	Ferchromium	Хр000	—	—	0.04	—	—	—	—
200-b*	Ferchromium	Хр1	1.58	—	1.06	63.8	—	—	—
243	Ferchromium	Хр6	0.27	—	7.06	69.0	—	—	—
308*	Ferchromium	Хрн1	0.80	—	0.023	65.94	—	—	—
175	Calcium-silicon	Касн1	60.53	—	—	—	—	—	—
176-a*	Manganese-silicon	СнМн20	21.10	68.8	0.64	—	—	—	—
285	Manganese-silicon	СнМн17	—	—	—	—	—	—	—
210	Chromium-silicon	Снхр 50	53.61	—	0.052	27.45	—	—	—
270	Zirconium-silicon	—	26.27	—	0.09	—	—	—	—

Table 11

Elements, %													
Titanium	Calcium	Nitrogen	Phosphorus	Sulfur	Aluminum	Copper	Iron	Antimony	Tin	Zirconium	Boron	Sum of niobium and tantalum	Arsenic
—	—	—	—	0.034	0.28	0.38	—	—	—	—	6.88	—	—
—	—	—	0.098	0.027	—	—	—	—	—	—	—	—	0.003
—	—	—	0.037	0.03	—	0.09	—	—	—	—	—	—	0.01
—	—	—	0.02	0.007	3.9	0.04	—	—	—	—	—	—	—
—	—	—	0.263	0.001	—	—	4.59	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	0.39	0.014	—	—	—	—	—	—	—	—	—
—	—	—	0.047	0.036	—	0.64	—	0.011	0.018	—	—	—	—
—	—	—	0.15	0.028	5.81	—	—	—	—	1.50	—	57.82	—
6.85	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	0.032	0.001	1.26	—	—	—	—	—	—	—	—
0.11	—	—	0.040	0.003	0.61	—	—	—	—	—	—	—	—
—	—	—	0.123	0.039	—	—	—	—	—	—	—	—	—
0.10	—	—	—	—	—	—	—	—	—	—	—	—	—
27.86	—	—	0.027	0.035	8.82	1.75	—	—	—	—	—	—	—
—	—	—	0.014	—	—	—	—	—	—	—	—	—	—
—	—	—	0.041	0.004	—	—	—	—	—	—	—	—	—
—	—	—	0.011	0.078	—	—	—	—	—	—	—	—	—
—	—	8.3	0.029	0.029	0.10	—	—	—	—	—	—	—	—
—	30.10	—	0.039	0.050	1.57	—	2.25	—	—	—	—	—	—
—	—	—	0.058	—	—	—	—	—	—	—	—	—	—
—	—	—	0.243	—	—	—	—	—	—	—	—	—	—
—	—	—	0.031	0.004	0.97	—	16.35	—	—	—	—	—	—
1.62	—	—	0.082	0.005	5.70	—	—	—	—	51.4	—	—	—

Table 12

Number of SS	Steel	Brand of steel	Contents of elements, %												
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chromium	Nickel	Aluminum	Copper	Nitrogen	Arsenic		
85-e*	Free Machining	A12	0.13	0.29	0.79	0.103	0.102	—	—	—	—	—	—	—	—
85-j	Free Machining	A12	—	—	—	—	—	—	—	—	—	—	—	—	—
84-m*	Bessemer, rail with aluminum	NB62	0.59	0.28	0.81	0.039	0.058	—	0.147	—	—	—	—	—	—
206-a*	Bessemer for nitrogen	—	—	—	—	—	—	—	—	—	—	—	—	—	—
207-a*	Open hearth for nitrogen	—	—	—	—	—	—	—	—	—	—	—	0.013	—	—
207-b	Open hearth for nitrogen	Steel 10	—	—	—	—	—	—	—	—	—	—	0.006	—	—
10-p*	SS for manganese	—	—	—	0.68	—	—	—	—	—	—	—	—	—	—
10-s	SS for manganese	Steel 50	—	—	—	—	—	—	—	—	—	—	—	—	—
199-V*	Open hearth rail with arsenic	—	0.78	0.19	0.93	0.034	0.021	—	—	—	—	—	—	—	0.141
199-g	Open hearth rail with arsenic	M76	—	—	—	—	—	—	—	—	—	—	—	—	—
8-p	SS for sulfur	—	—	—	—	0.028	—	—	—	—	—	—	—	—	—
8-r	SS for sulfur	Steel 20	—	—	—	—	—	—	—	—	—	—	—	—	—
15-m	SS for sulfur	—	—	—	—	0.078	—	—	—	—	—	—	—	—	—
12-i	SS for carbon	Steel 10	0.13	—	—	—	—	—	—	—	—	—	—	—	—
12-m	SS for carbon	Steel 10	—	—	—	—	—	—	—	—	—	—	—	—	—
13-n*	SS for carbon	Steel 20	0.17	—	—	—	—	—	—	—	—	—	—	—	—
16-m	SS for carbon	Steel 50	0.56	—	—	—	—	—	—	—	—	—	—	—	—
16-n	SS for carbon	Steel 50	—	—	—	—	—	—	—	—	—	—	—	—	—
19-m*	SS for carbon	Steel 60	0.64	—	—	—	—	—	—	—	—	—	—	—	—
19-n	SS for carbon	Steel 60	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 12 continued

Number of SS	Steel	Brand of steel	Contents of elements, %										
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chromium	Nickel	Aluminum	Copper	Nitrogen	Arsenic
20-r*	Open hearth for carbon and other elements	Steel 35	0.37	0.24	0.57	0.030	0.022	0.14	0.11	—	0.18	—	—
83-m	Open hearth for carbon and other elements	—	0.33	0.29	0.60	0.044	0.013	0.16	0.10	—	0.18	—	—
7-p*	SS for phosphorus	—	—	—	—	—	0.028	—	—	—	—	—	—
7-s	SS for phosphorus	Steel 20	—	—	—	—	—	—	—	—	—	—	—
9-m	SS for phosphorus	—	—	—	—	0.061	—	—	—	—	—	—	—

Table 13

Number of SS	Steel	Brand of steel	Contents of elements, %										
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chromium	Nickel	Vanadium	Aluminum	Copper	Arsenic
5-i*	Dynamo steel	—	0.077	1.48	0.24	0.026	0.035	0.073	—	—	—	—	—
126-d	Low-carbon	A	0.014	0.005	0.020	0.015	0.003	0.025	0.11	0.003	—	0.16	0.017
126-e	Low-carbon	A	—	—	—	—	—	—	—	—	—	—	—
312	Electrotechnical	322	0.093	2.89	0.37	0.016	0.032	0.10	—	—	—	—	—
155-V	Transformer	—	0.10	4.18	0.13	0.004	0.016	0.11	—	—	0.057	0.18	—
284-a*	Transformer	—	0.044	3.13	0.075	0.005	0.009	0.032	0.074	—	0.009	0.11	—

Table 14

Number of SS	Steel	Brand of steel	Contents of elements, %							
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chromium	Nickel	
103-V*	Silicon	55C2	—	1.91	—	—	—	—	—	—
253-a*	Silicon-manganese(manganiferous)	33ГC	0.345	0.72	1.01	0.016	0.048	0.06	0.06	0.06
252-a*	Manganese	45Г2	0.44	0.30	1.50	0.025	0.028	0.19	0.21	—
240-a*	Manganese-silicon-copper	10Г2СД (МК)	0.12	0.99	1.33	0.030	0.032	0.08	0.05	—
224-a*	Molybdenum	30МА	0.30	0.27	0.56	0.024	0.020	0.28	0.08	—
209-b	Nickel	13Н2А	0.13	0.27	0.45	0.011	0.013	0.44	1.80	—
208-a*	Nickel	21Н5А	0.20	0.32	0.49	0.006	0.009	0.13	4.77	—
21-c	Chrome	20X	—	—	—	—	—	—	0.96	0.10
33-c*	Chrome	11Х15	1.04	0.23	0.30	0.013	0.021	1.42	0.084	—
225-a	Chrome	38ХА	0.37	0.25	0.69	0.021	0.026	0.93	0.20	—
151-b*	Chrome with boron	15ХРА	0.17	0.31	0.46	0.013	0.010	0.93	0.09	—
124-g*	Vanadium-chrome	50ХФА	0.52	0.23	0.65	0.013	0.016	0.98	0.23	—
223	Chrome-tungsten-vanadium-aluminum	38ХВФ10А	0.38	0.23	0.25	0.005	0.012	1.66	0.11	—
223-a	Chrome-tungsten-vanadium-aluminum	38ХВФ10А	—	—	—	—	—	—	—	—
28-j*	Nickel-chrome	12ХН3А	0.13	0.23	0.48	0.024	0.024	0.77	2.83	—
28-i	Nickel-chrome	12ХН3А	—	—	—	—	—	—	—	—
29-e	Nickel-chrome	12Х2Н4А	0.14	0.29	0.52	0.018	0.015	1.54	3.39	—
31-i	Nickel-molybdenum-chrome	35ХН3МА	—	—	—	—	—	—	—	—

Table 14 continued

Number of SS	Steel	Brand of steel	Contents of elements, %						
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chromium	Nickel
258-a	Chrome-silicon-manganese	11X15CF	1.03	0.47	1.07	0.007	0.012	1.47	0.09
157-v*	Chrome-silicon-nickel-copper	15XCHD (H, F-2)	0.18	0.62	0.48	0.024	0.026	0.78	0.43
32-c	Chrome-manganese	50XΓ	0.51	—	0.98	—	—	1.11	—
215-a*	Chrome-manganese-silicon	15XΓCA	0.20	0.71	0.97	0.013	0.014	0.73	0.10
109-g*	Chrome-manganese-silicon	30XΓCA	0.36	1.22	0.97	0.008	0.021	0.90	0.20
119-g*	Chrome-manganese-silicon	35XΓCA	0.34	1.27	1.03	0.020	0.020	1.35	0.14
131-v*	Chrome-manganese-molybdenum	38XΓM (40XΓM)	0.40	0.20	0.99	0.010	0.023	1.01	0.17
127-g*	Chrome-manganese-titanium	16XΓTA (ЭИ274)	0.16	0.38	1.15	0.010	0.021	1.62	0.11
246-a*	Chrome-manganese-nickel-titanium-boron	20XΓHTPA	0.17	0.28	0.99	0.020	0.029	0.59	0.47
245-a	Chrome-molybdenum	30XMI	0.30	0.27	0.56	0.009	0.018	0.99	0.18
86-d*	Chrome-molybdenum-aluminum	38XMOA	0.39	0.27	0.44	0.004	0.018	1.48	0.19
310	Chrome-molybdenum-vanadium	P2M	0.27	0.33	0.58	0.015	0.021	1.41	0.22
256-a	Chrome-nickel	45XH	0.47	0.26	0.66	0.024	0.018	0.51	1.05
30-j	Chrome-nickel-vanadium	50XH4ΦA	0.22	0.29	0.36	0.010	0.015	0.93	3.86
104-g	Chrome-nickel-tungsten	18X2H4BA (18XHBA)	0.16	0.30	0.42	0.010	0.010	1.51	4.21
31-j*	Chrome-nickel-molybdenum	33X113MA	0.33	0.224	0.66	0.012	0.018	0.98	2.78

Table 14 continued

Number of SS	Steel	Brand of steel	Contents of elements, %													
			Tungsten	Molybdenum	Vanadium	Titanium	Aluminum	Nickel	Copper	Cobalt	Boron					
103-V*	Silicon	55C2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
253-a*	Silicon-Manganese	35TC	—	—	—	—	—	—	—	—	—	0.08	—	—	—	—
252-a*	Manganese	45T2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
240-a*	Manganese-silicon-copper	10T2C1 (MK)	—	—	—	—	—	—	0.02	—	—	0.07	—	—	—	—
224-a*	Molybdenum	30MA	—	0.50	—	—	—	—	—	—	—	—	—	—	—	—
209-b	Nickel	13H2A	—	—	—	—	—	—	—	—	—	0.17	—	—	—	—
208-a*	Nickel	21H5A	—	—	—	—	—	—	—	—	—	0.14	—	—	—	—
21-e	Chrome	20X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33-e*	Chrome	III15	—	—	—	—	—	—	—	—	—	0.12	—	—	—	—
225-a	Chrome	38XA	—	—	—	—	—	—	—	—	—	0.19	—	—	—	—
151-b*	Chrome with boron	15XPA	—	—	—	—	—	—	—	—	—	0.11	—	—	—	0.00†
124-g*	Chrome-vanadium	50XΦA	—	—	—	—	—	—	—	—	—	0.16	—	—	—	—
223	Chrome-tungsten-vanadium-aluminum	38XBΦOA	0.32	—	—	—	—	—	—	—	—	—	—	0.49	—	—
223-a	Chrome-tungsten-vanadium-aluminum	38XBΦOA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
28-j*	Chrome-nickel	12XH3A	—	—	—	—	—	—	—	—	—	—	—	—	—	—
28-i	Chrome-nickel	12XH3A	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29-e	Chrome-nickel	12X2H4A	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31-i	Chrome-nickel-molybdenum	35XH3MA	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 14 continued

Number of SS	Steel	Brand of steel	Contents of elements, %																	
			Tungsten	Molybdenum	Vanadium	Titanium	Aluminum	Nickel	Copper	Cobalt	Boron									
25S-a	Chrome-silicon-manganese	ШХ15СГ	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
157-V*	Chrome-silicon-nickel-copper	15XCHL (H.1-2)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
32-c	Chrome manganese	50XГ	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
215-a*	Chrome-manganese-silicon	15XГСА	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
109-g*	Chrome-manganese-silicon	30XГСА	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
119-g*	Chrome-manganese-silicon	35XГСА	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
131-V*	Chrome-manganese-molybdenum	38XГМ (40XГМ)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
127-g*	Chrome-manganese-titanium	16XГТА (Э11274)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
246-a*	Chrome-manganese-nickel-titanium-boron	20XГНТРА	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
245-a	Chrome-molybdenum	30XМ	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
86-d*	Chrome-molybdenum-aluminum	38XМЮА	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
310	Chrome-molybdenum-vanadium	Р2М	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
256-a	Chrome-nickel	45XН	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30-j	Chrome-nickel-vanadium	20XН4ФА	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
104-9	Chrome-nickel-tungsten	18X2H4BA (15XHBA)	0.90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
31-j*	Chrome-nickel-molybdenum	33XН3МА	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 15

Number of SS	Steel	Brand of steel	Contents of elements, %															
			Carbon	Silicon	Manganese	Sulphur	Phosphorus	Chromium	Nickel	Tungsten	Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Copper	Cobalt	
107-a*	Vanadium	Φ	1.03	0.20	0.31	0.013	0.012	0.18	0.17	—	—	—	—	—	—	—	—	—
122-g	Tungsten	P9	0.79	0.37	0.22	0.009	0.026	4.13	0.15	17.78	0.34	1.23	—	—	—	—	—	—
205-a*	Tungsten	P18	0.97	0.27	0.29	0.003	0.029	4.10	0.17	9.47	0.28	2.25	—	—	—	—	—	—
251-b*	Tungsten-cobalt	P9K5 (ΦH705)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18-1*	Carbon steel	Y8A	0.78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
293-a	Carbon steel	Y8A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14-m	Carbon steel	Y10A	1.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
102-g*	Carbon steel	Y12A	1.16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27-g*	Chrome steel	7X3(Φ7X3)	0.65	0.21	0.33	0.010	0.018	3.34	—	—	—	—	—	—	—	—	—	—
247-a*	Chrome-vanadium	X12Φ1	1.32	0.33	0.39	0.011	0.017	11.63	0.33	—	—	0.76	—	—	—	—	—	—
120-b	Chrome-tungsten	4X8B2 (ΦH160)	0.42	0.24	0.24	0.006	0.023	8.02	0.15	2.80	—	—	—	—	—	—	—	—
257	Chrome-tungsten	XB5	1.39	0.16	0.115	0.007	0.011	0.60	0.03	4.93	—	0.18	—	—	—	—	—	—
122-V	Chrome-tungsten-vanadium	P9(ΦH262)	0.90	0.26	0.39	0.003	0.021	4.17	0.22	8.77	0.38	2.17	—	—	—	—	—	—
135	Chrome-tungsten-vanadium	3X2B8Φ (3X2B8)	0.33	0.24	0.30	0.006	0.021	2.49	0.18	7.77	—	0.29	—	—	—	—	—	—
259-a	Chrome-tungsten-vanadium	9X5BΦ (X5BΦ)	0.11	0.64	0.18	0.009	0.015	5.60	0.10	0.58	—	0.55	—	—	—	—	—	—
146-a	Chrome-tungsten-silicon	5XB9C (5XBC)	0.48	0.74	0.33	0.009	0.025	1.02	0.15	2.30	—	—	—	—	—	—	—	—
145-b	Chrome-tungsten-manganese	XB1	1.01	0.20	0.93	0.005	0.019	1.03	0.20	1.39	—	—	—	—	—	—	—	—
53-d*	Chrome-molybdenum	X12M	1.42	0.20	0.35	0.007	0.024	10.90	0.21	—	—	0.50	0.25	—	—	—	—	—
53-e	Chrome-molybdenum	X12M	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
303	Chrome-nickel-tungsten	5XHB	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
326	Chrome-nickel-molybdenum	5XHM	0.57	0.22	0.68	0.012	0.020	0.73	1.48	—	0.21	—	—	—	—	—	—	—
248-a*	Chrome-nickel-titanium	5XHT	0.53	0.23	0.625	0.013	0.016	1.09	1.50	—	—	—	—	—	—	—	—	—

Table 16

Number of SS	Steel	Brand of steel	Contents of elements, %						
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chrome	Nickel
34-C*	Chrome steel	2X13(ЭЖК-2)	0.19	0.31	0.38	0.003	0.022	13.56	0.26
34-J	Chrome steel	2X13	0.51	2.47	0.49	0.018	0.019	8.89	—
108-b*	Chrome silicon	4X9C2 (X9C2)	0.38	2.27	0.40	0.004	0.021	9.42	0.18
237	Chrome-silicon-molybdenum	4X10C2M (X10C2M, Э1107)	0.15	0.75	1.26	0.008	0.022	23.01	13.08
134-V*	Chrome-nickel	ЭН319	0.47	0.44	0.48	0.003	0.021	13.66	13.79
111-b	Chrome-nickel-tungsten-molybdenum	4X14H14B2M (ЭН69)	0.15	0.33	0.57	0.012	0.025	14.31	3.27
249-a*	Chrome-nickel-tungsten-vanadium-boron	13X14H BΦPA	0.127	0.50	0.20	0.010	0.029	11.05	1.65
280	Chrome-nickel-tungsten-molybdenum-vanadium	1X12H2BMΦ (ЭН961)	0.087	0.32	0.38	0.010	0.027	16.19	15.98
307	Chrome-nickel-tungsten-molybdenum-niobium-boron	X16H16B2 M5P (ЭН184, ЭН713) ЭН494	0.37	0.87	0.90	0.015	0.012	12.51	11.97
158-b*	Chrome-nickel-cobalt-tungsten-molybdenum-niobium	X14H14CB2M (ЭН240)	0.50	3.30	0.36	0.006	0.022	13.72	14.16
133-b	Chrome-nickel-silicon-tungsten-molybdenum	3X13H7C2 (X13H7C2, ЭН72)	0.29	2.58	0.43	0.010	0.024	12.00	6.83
125-b	Chrome-nickel-silicon	ЭН72	0.19	0.55	8.78	0.014	0.029	13.54	4.25
128-b	Chrome-nickel-manganese	2X13H4T9 (X13H4T9, ЭН100)	0.10	0.71	1.45	0.012	0.015	16.21	25.08
159-b*	Chrome-nickel-molybdenum with nitrogen	X16H25AM (ЭН185)							

Table 16 continued
Contents of elements, %

Number of SS	Steel	Brand of steel	Tungsten	Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Copper	Cobalt	Boron	Nitrogen
34-c*	Chrome steel	2X13 (ЭЖ-2)	—	—	—	—	—	—	—	—	—	—
34-j	Chrome steel	2X13	—	—	—	—	—	—	—	—	—	—
10S-b*	Chrome-silicon	4X9C2 (X9C2)	—	—	—	—	—	—	—	—	—	—
237	Chrome-silicon-molybdenum	4X10C2M (X10C2M, ЭИ107)	—	0.77	—	—	—	—	—	—	—	—
134-V*	Chrome-nickel	X23H13 (ЭИ319)	—	—	—	—	—	—	0.11	—	—	—
111-b	Chrome-nickel-tungsten-molybdenum	4X14H14B2M (ЭИ169)	2.36	0.315	—	—	—	—	—	—	—	—
249-a*	Chrome-nickel-tungsten-vanadium-boron	13X14H ВФРА	1.95	—	0.25	0.027	—	—	—	—	0.005	—
250	Chrome-nickel-tungsten-molybdenum-vanadium	(ЭИ736) 1X12H2BMФ	1.67	0.44	0.26	—	—	—	—	—	—	—
307	Chrome-nickel-tungsten-molybdenum-niobium-boron	(ЭИ961) X16H16B2 МБР (ЭИ18-, ЭИ713)	2.65	0.60	—	—	0.80	—	—	—	0.004	—
15S-b*	Chrome-nickel-cobalt-tungsten-molybdenum-niobium	ЭИ434	3.03	2.09	0.16	0.09	—	1.21	—	9.70	—	—
133-b	Chrome-nickel-silicon-tungsten-molybdenum	X14H14CB2M (ЭИ240)	2.30	0.36	—	—	—	—	—	—	—	—
125-b	Chrome-nickel-silicon	3X13H7C2 (X13H7C2, ЭИ72)	—	—	—	—	—	—	—	—	—	—
128-b	Chrome-nickel-manganese	2X13H4Г9 (X13H4Г9, ЭИ100)	—	—	—	—	—	—	0.14	—	—	—
159-b*	Chrome-nickel-molybdenum with nitrogen	X16H25AM (ЭИ395)	—	6.33	—	—	—	—	0.11	—	—	0.15

Table 16 continued

Number of SS	Steel	Brand of steel	Contents of elements, %						
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chrome	Nickel
236	Chrome-molybdenum-tungsten-vanadium	20X3MBΦ (ЭИ415)	0.19	0.32	0.39	0.009	0.017	2.71	0.18
170-b*	Chrome-nickel-manganese	Св. X20H10Г6 (ЭИ478)	0.10	0.45	6.46	0.015	0.028	18.72	9.68
314*	Chrome-nickel-manganese	0X20H10Г6 (ЭП109)	0.03	0.38	5.93	0.007	0.015	21.30	10.45
260	Chrome-nickel-manganese-vanadium-molybdenum-silicon	4X15H7Φ2MC (ЭИ388)	0.45	0.69	6.67	0.007	0.032	15.24	6.80
231-a	Chrome-nickel-manganese-molybdenum-vanadium-niobium	4X12H8Г8 МФБ (ЭИ481)	0.37	0.56	9.42	0.004	0.026	12.18	8.41
316	Chrome-nickel-molybdenum-copper-titanium	0X23H28M3 Д3Т (ЭИ943)	0.05	0.64	0.42	0.005	0.020	23.78	27.62
164-9*	Chrome-nickel-molybdenum-titanium	X17H13X3Т (X18H12M3Т, ЭИ432)	0.11	0.78	1.43	0.010	0.033	17.29	12.77
160-b*	Chrome-nickel-niobium	0X18H12Б (X18H11Б, ЭИ402)	0.02	0.61	1.08	0.003	0.020	18.49	13.07
52-j	Chrome-nickel-titanium	X18H9Т (1X18H9Т, ЭИ11)	0.10	0.50	1.20	0.005	0.026	17.80	9.01
315*	Chrome-nickel-titanium-boron	X12H20ГЗР (ЭИ696)	0.05	0.44	0.48	0.007	0.019	10.88	19.43
315a	Chrome-nickel-titanium-boron	X12H20ГЗР (ЭИ696)	0.055	0.56	0.43	0.010	0.021	18.30	0.34
279	Chrome-titanium	X17Т (ЭИ636)	0.048	0.51	0.44	0.008	0.022	18.03	0.25
218-a	Chrome-titanium-vanadium	X18ТФ (ЭИ635)							

Table 16 continued

Number of SS	Steel	Brand of steel	Contents of elements, %													
			Tungsten	Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Copper	Cobalt	Boron	Nitrogen				
236	Chromium-molybdenum-tungsten-vanadium	20X3MBΦ (ЭИ415)	—	0.43	0.71	—	—	—	—	—	—	—	—	—	—	—
170-b*	Chromium-nickel-manganese	Св. X20H10Г6 (ЭИ478)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
314*	Chromium-nickel-manganese	0X20H10Г6 (ЭП109)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
260	Chromium-nickel-manganese-vanadium-molybdenum-silicon	4X15H7Φ2MC (ЭИ388)	—	0.92	1.85	—	—	—	—	—	—	—	—	—	—	—
231-a	Chromium-nickel-manganese-vanadium-molybdenum-niobium	4X12H8Г8 MΦБ(ЭИ481)	—	1.15	1.39	0.06	—	—	0.37	—	—	—	—	—	—	—
316	Chromium-nickel-manganese-copper-titanium	0X23H28M3 Д3Т(ЭИ943)	—	2.77	—	0.71	—	—	—	—	—	—	—	—	2.90	—
164-g*	Chromium-nickel-molybdenum-titanium	X17H13M3T (X18H12M3T, ЭИ432)	—	3.50	—	0.34	—	—	—	—	—	—	—	—	0.22	—
160-b*	Chromium-nickel-niobium	0X18H12Б (X18H11Б, ЭИ402)	—	—	—	—	—	—	0.99	—	—	—	—	—	—	—
52-j	Chromium-nickel-titanium	X18H9T (X18H9T, ЭИТ)	—	—	—	0.51	—	—	—	—	—	—	—	—	0.15	—
315*	Chromium-nickel-titanium-boron	X12H20Г3P (ЭИ696)	—	—	—	—	—	—	—	—	—	—	—	—	0.35	—
315a	Chromium-nickel-titanium-boron	X12H20Г3P (ЭИ696)	—	—	—	—	—	—	—	—	—	—	—	—	0.35	0.005
279	Chromium-titanium	X17T	—	0.36	0.37	—	—	—	—	—	—	—	—	—	—	—
218-a	Chromium-titanium-vanadium	(ЭИ636) X18TΦ (ЭИ635)	—	0.35	0.34	0.69	—	—	—	—	—	—	—	—	—	—

Table 17

Number of SS	Alloy	Brand of alloy	Contents of elements, %								
			Carbon	Silicon	Manga- nese	Sulfur	Phosphorus	Chrome	Nickel	Tungsten	
309	Aluminum-nickel-copper-cobalt	ЮНДК	0.055	—	—	—	—	—	—	13.3	—
324*	Aluminum-nickel-copper-cobalt-titanium	ЮНДК24Т	—	—	—	—	—	—	—	17.5	—
318*	Cobalt-chrome-nickel-molybdenum	40КХНМ (К40НХМ, ЭИ995)	0.11	0.27	2.07	0.008	0.016	19.38	—	16.25	—
244-a	Nickel	5Н	0.021	0.23	0.72	0.006	0.005	0.033	—	45.98	—
244-b	Nickel	45Н									
276	Nickel	ЭИ99									
286	Nickel	ХН 60МВТО (ЭИ487)									
261-a	Nickel-cobalt	29НК (Н29К18)	0.022	0.16	0.30	0.006	0.005	—	—	29.00	—
320*	Nickel-cobalt-copper	32НКД (Н30К4Д, ЭИ630А)	0.03	0.10	0.26	0.009	0.006	—	—	32.45	—
273	Nickel-molybdenum	ЭИ461									
319*	Nickel-molybdenum-copper	74НМД (ЭИ233)	0.02	0.19	0.56	0.009	0.006	—	—	75.13	—

Table 17 continued

Number of SS	Alloy	Brand of alloy	Contents of elements, %																				
			Molybdenum	Titanium	Aluminum	Niobium	Copper	Cobalt	Boron	Iron	Cerium	Lead											
309	Aluminum-nickel-copper-cobalt	ЮНДК	—	0.38	9.4	1.0	3.05	23.3	—	—	—	—	—	—	—	—	—	—	—	—	—		
324*	Aluminum-nickel-copper-cobalt-titanium	ЮЛДК24Т	—	4.0	7.5	—	2.5	32.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
318*	Cobalt-chrome-nickel-molybdenum	40КХМ (К40ХМ, ЭИ995)	7.08	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
244-a	Nickel	45Н	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
244-b	Nickel	45Н	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
276	Nickel	ЭИ99	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
286	Nickel	XH 60MBTIO (ЭИ487)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
261-a	Nickel-cobalt	29HK (H29K18)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
320*	Nickel-cobalt-copper	32HKД (H30K4Д, ЭИ630А)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
273	Nickel-molybdenum	ЭИ461	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
319*	Nickel-molybdenum-copper	ЭИ461	3.82	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 17 continued

Number of SS	Alloy	Brand of alloy	Contents of elements, %							
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chrome	Nickel	Tungsten
321*	Nickel-chrome-silicon	80XHC	0.03	1.31	0.96	0.008	0.006	2.96	—	—
321-a	Nickel-chrome-silicon	80XHC	—	—	—	—	—	—	—	—
123-b	Chrome-aluminum	0X27Ю5А (взамен 1X25Ю5, ЭИ340)	0.046	0.40	0.16	0.004	0.013	26.68	0.27	—
232-a	Chrome-molybdenum-tungsten-titanium-aluminum-niobium on a nickel base	XH70MBTЮБ (ЭИ598)	0.06	0.58	0.28	0.003	0.006	17.15	—	2.84
139-V*	Chrome-nickel	X15H60 (XH60)	0.13	0.88	0.87	0.007	0.015	16.03	54.55	—
325*	Chrome-nickel-tungsten-titanium	1X15H24B4T (X15H24B4T, ЭИ1164)	No more than 0.08	No more than 0.5	1.0	0.02	0.03	15.5	24.0	4.5
317*	Chrome-titanium-aluminum-boron on a nickel base	XH77TЮP (ЭИ437Б)	0.05	0.37	0.24	0.006	0.007	21.02	—	—
167-b	Chrome-on a nickel base	X20H80T3 (ЭИ1437)	0.046	0.38	0.27	0.005	0.007	20.56	—	—
167-V	Chrome-on a nickel base	X20H80T3 (ЭИ1437)	—	—	—	—	—	—	—	—

Table 17 continued

Number of SS	Alloy	Brand of alloy	Contents of elements, %														
			Molybdenum	Titanium	Aluminum	Niobium	Copper	Cobalt	Boron	Iron	Cerium	Lead					
321*	Nickel-chrome-silicon	80XHC	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
321-a	Nickel-chrome-silicon	80HXC	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
193-b	Chrome-aluminum	0X27IO5A (BA3AHE) 1X23IO5, ЭИ1340	—	0.023	5.24	—	—	—	—	—	—	—	—	—	—	—	—
232-a	Chrome-molybdenum-tungsten-titanium-aluminum-niobium on a nickel base	XH70MBTIO5 (ЭИ1598)	4.82	2.16	1.45	1.13	0.03	0.003	1.38	—	—	—	—	—	—	—	—
139-V*	Chrome-nickel	X13H60 (XH60)	—	—	0.017	—	—	—	—	—	—	—	—	—	—	—	—
325*	Chrome-nickel-tungsten-titanium	1X15H24B4T (X15H24B4T, ЭИ1164)	—	1.7	—	—	—	—	—	—	—	—	—	—	—	—	—
317*	Chrome-titanium-aluminum-boron on a nickel base	XH77TIOP (ЭИ437Б)	—	2.70	0.85	—	0.03	0.01	0.44	—	—	—	—	—	—	—	0.0005
167-b	Chrome-titanium on a nickel base	X20H80T3 (ЭИ437)	—	2.78	0.85	—	0.029	0.008	1.52	—	—	—	—	—	—	—	—
167-V	Chrome-titanium on a nickel base	X20H80T3 (ЭИ437)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 18

Number of SS	Metal	Brand of metal	Contents of elements, %														
			Copper	Lead	Zinc	Iron	Bismuth	Antimony	Nickel	Silicon	Tin	Arsenic	Manganese				
74-d*	Aluminum	Al	0.012	—	0.012	0.29	—	—	—	—	—	—	—	—	—	—	—
177-b	Cadmium	K20	0.0025	0.027	—	0.0008	—	—	—	—	—	—	—	—	—	—	—
212-a*	Silicon crystal	Kp0	—	—	—	0.43	—	—	—	—	—	—	—	—	—	—	—
266	Metallic manganese	Mp1	—	—	—	1.47	—	—	—	—	—	—	—	—	—	—	97.2
266-a	Metallic manganese	M1	99.96	0.001	0.0003	0.0016	0.0001	0.0001	0.0009	0.0004	0.0009	—	—	—	—	—	—
71-d	Electrolytic copper	M1	99.96	0.001	0.0003	0.0016	0.0001	0.0001	0.0009	0.0004	0.0009	—	—	—	—	—	—
173-b*	Converted copper	MK-1	99.58	—	—	—	0.0002	0.0002	0.016	0.016	0.11	—	—	—	—	—	—
172-V*	Metallic nickel	H1	0.015	0.0004	0.0004	0.019	—	—	0.00004	0.00004	0.0011	—	—	—	—	—	0.0005
91-V*	Metallic nickel	H4	0.55	—	—	1.02	—	—	—	—	97.6	0.03	—	—	—	—	—
238-a	Metallic nickel	HI13	—	—	—	0.060	—	—	—	—	—	0.002	—	—	—	—	—
301	Metallic niobium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
99-b*	Metallic tin	01	0.0015	0.033	0.0012	0.0036	0.004	0.007	0.007	0.007	—	—	—	—	—	—	0.003
99-V	Metallic tin	01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
214-a	Metallic tin	02	0.004	0.19	Less than 0.001	0.004	0.034	0.014	0.014	0.014	—	—	—	—	—	—	0.007
187-V*	Antimony	Cy0	0.004	0.033	No more than 0.0002	0.015	No more than 0.0003	No more than 0.0003	—	—	0.003	—	—	No more than 0.005	No more than 0.013	—	—
302	Metallic titanium	—	—	—	—	0.11	—	—	—	—	—	—	—	—	—	—	—
291	Metallic chromium	X0	0.010	—	—	0.61	0.0003	0.0003	0.0003	0.0003	—	—	—	0.016	—	—	—
73-V*	Metallic zinc	II0	0.0011	0.010	—	0.0018	—	—	—	—	—	—	—	0.26	0.0018	—	—
73-g	Metallic zinc	II0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 18 continued

Number of SS	Metal	Brand of metal	Contents of elements, %															
			Aluminum	Phosphorus	Sulfur	Molybdenum	Cobalt	Cadmium	Tantalum	Nitrogen	Titanium	Carbon	Calcium	Sodium	Chromium			
74-d*	Aluminum	Al	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
177-b	Cadmium	KC-0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
242-a*	Silicon crystal	Kp0	0.25	—	—	—	—	—	—	—	—	—	—	—	0.39	—	—	—
266	Metallic manganese	Mp1	—	0.053	—	—	—	—	—	—	—	—	—	—	—	—	—	—
266-a	Metallic manganese	M1	—	0.0002	—	—	—	—	—	—	—	—	—	—	—	—	—	—
71-d	Electrolytic copper	—	—	—	0.0017	—	—	—	—	—	—	—	—	—	—	—	—	—
173-b*	Converted copper	MK-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
172-v*	Metallic nickel	H1	—	—	—	—	—	0.072	—	—	—	—	—	—	—	—	—	—
91-v*	Metallic nickel	H4	—	—	—	—	—	0.60	—	—	—	—	—	—	—	—	—	—
288-a	Metallic nickel	HT3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
304	Metallic niobium	—	—	—	—	—	—	—	0.002	—	—	—	—	—	—	—	—	—
99-b*	Metallic tin	01	0.002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
99-v	Metallic tin	01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
214-a	Metallic tin	02	Less than 0.001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
187-v*	Antimony	Cy0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
302	Metallic titanium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
291	Metallic chrome	X0	0.49	0.003	—	—	—	—	—	—	—	—	—	—	—	—	—	—
73-v*	Metallic zinc	II0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
73-g	Metallic zinc	II0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Note: In the SS 187V* (antimony) the contents of silver and gold is less than 0.0001% of each

Table 19

Number of SS	Alloy	Brand of alloy	Contents of elements, %										
			Copper	Lead	Zinc	Iron	Bismuth	Antimony	Nickel	Silicon	Tin		
268	Aluminum-manganese, antifriction on a zinc base	ЦАМ 9-1.5	1.51	0.009	—	0.023	—	—	—	—	—	0.018	—
268-a	Aluminum-manganese, antifriction on a zinc base	ЦАМ 9-1.5	—	—	—	—	—	—	—	—	—	—	—
69-g*	Duraluminum	Д1	4.43	—	—	0.28	—	—	—	—	—	0.50	—
68-d	Bronze: aluminum-iron-manganese.	БрАЖАи 10-3-1.5	85.83	—	0.04	2.91	—	—	0.0006	—	—	0.037	0.002
234*	aluminum-iron	БрАЖ 9-1	87.0	Maximum 0.02	Maximum 1.0	3.0	—	—	Maximum 0.002	Maximum 0.5	—	—	Maximum 0.1
110-b*	beryllium	Бр Б2	97.4	0.004	—	Ne- vice 0.1	Less than 0.001	—	—	0.30	Less than 0.1	—	—
192-b	silicon-nickel	Бр КН1-3	95.48	0.002	0.033	0.060	—	—	—	2.89	1.02	0.049	—
67-g	tin-zinc	Бр ОЦ4-3	93.2	0.0024	3.02	0.006	0.0003	—	0.0006	—	—	—	3.72
89-v*	tin-zinc-lead	БрОЦ6-6-3	85.15	3.59	5.68	0.16	—	—	0.12	0.33	—	—	4.95

Table 19 continued

Number of SS	Alloy	Brand of alloy	Contents of elements, %																	
			Copper	Lead	Zinc	Iron	Bismuth	Antimony	Nickel	Silicon	Tin									
193-b*	Chrome	БрХ	99.45	Maximum 0.003	Maximum 0.3	Maximum 0.08	—	—	—	—	—	—	—	—	—	—	—	—	—	—
143-V	Brass:	Л62	62.29	0.011	37.68	0.012	—	—	0.0002	—	—	—	—	—	—	—	—	—	—	—
191-a	aluminum-nickel	ЛАН 59-3-2	58.36	0.008	36.34	0.022	0.0001	0.0003	2.49	—	—	—	—	—	—	—	—	—	—	—
65-g	iron-manganese	ЛЖМЦ 59-1-1	58.77	0.054	38.81	0.86	0.0001	0.0005	—	—	—	—	—	—	—	—	—	—	—	0.47
66-g	lead	ЛС 59-1	58.49	1.18	40.22	0.072	—	—	0.0007	0.032	0.004	—	—	—	—	—	—	—	—	—
113-V	Silumin	Сил 0	0.007	—	0.017	0.22	—	—	—	—	10.86	—	—	—	—	—	—	—	—	—
113-g	Silumin	Сил 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
217*	Tin tombac	ЛТО 90-1	89.4	0.006	9.9	0.018	Traces	Traces	Traces	—	—	—	—	—	—	—	—	—	—	0.52
	HARD ALLOYS			Residue of hydro-chlorination																
220	Carbide tungsten	—	—	0.12	—	0.049	Free of carbon	0.03	—	—	—	—	—	—	—	—	—	—	—	—
219	Carbide titanium	—	—	—	—	0.28	0.54	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 19 continued

Number of SS	Alloy	Brand of alloy	Contents of elements, %														
			Arsenic	Manganese	Aluminum	Phosphorus	Sulfur	Cadmium	Magnesium	Beryllium	Titanium	Carbon	Calcium	Chromium			
268	Aluminum-magnesium antifriction on zinc base	IIAM 9-1.5	—	Less than 0.001	8.63	—	—	—	—	0.0026	0.03	—	—	—	—	—	—
268-a	Aluminum-magnesium antifriction on zinc base	IIAM 9-1.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69-g*	Duraluminum	Д1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Bronze:																
68-d	aluminum-iron- manganese	Бр.АЖ.Ал 10-3-1.5	0.0006	0.02	9.54	0.002	—	—	—	—	—	—	—	—	—	—	—
234*	aluminum-iron	Бр.АЖ 9-1	Maximum 0.1	Maximum 0.5	9.0	Maximum 0.01	—	—	—	—	—	—	—	—	—	—	—
110-b*	beryllium	Бр Б2	—	—	Less than 0.03	Less than 0.005	—	—	—	—	Less than 0.04	2.10	—	—	—	—	—
192-b	silicon-nickel	Бр КН1-3	—	0.40	—	Less than 0.005	—	—	—	—	—	—	—	—	—	—	—
67-g	tin-lead	Бр ОЦ4-3	—	—	0.0009	—	—	—	—	—	—	—	—	—	—	—	—
89-y*	tin-zinc-lead	Бр ОЦЦ6-6-3	0.023	—	—	0.009	—	—	—	—	—	—	—	—	—	—	0.41

Table 19 continued

Number of SS	Alloy	Brand of alloy	Contents of elements, %															
			Arsenic	Manganese	Aluminum	Phosphor	Sulfur	Cadmium	Magnesium	Beryllium	Titanium	Carbon	Calcium	Chromium				
193-b*	Chrome Brass:	Бр.Х	—	—	—	Maximum 0.02	Maximum 0.01	—	—	—	—	—	—	—	—	—	—	—
143-V	—	Л162	—	—	2.80	0.03	—	—	—	—	—	—	—	—	—	—	—	—
191-a	aluminum-nickel	ЛАН 59-3-2	—	—	—	0.001	—	—	—	—	—	—	—	—	—	—	—	—
65-9	iron-manganese	ЛЖМЦ 59-1-1	—	0.72	0.28	—	—	—	—	—	—	—	—	—	—	—	—	—
66-9	lead	ЛС 59-1	—	—	—	0.0005	—	—	—	—	—	—	—	—	—	—	—	—
113-V	Silumin	Сил 0	—	0.007	—	—	—	—	—	—	—	—	0.015	—	—	—	—	—
113-9	Silumin	Сил 0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
217*	Tombac tin HARD ALLOYS	ЛТО 90-1	—	—	—	0.005	—	—	—	—	—	—	—	—	—	—	—	—
220	Tungsten carbide	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.00
219	Titanium carbide	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.32

Table 20

Number of SS	Material	Contents of elements and of their components, %													
		Silicon dioxide	Aluminum oxide	Iron	Ferrous oxide	Titanium dioxide	Calcium oxide	Vanadium pentoxide	Magnesium oxide	Manganese oxide	Phosphorus pentoxide	Phosphorus	Sulfur	Copper	Molybdenum
79-V*	SLAGS														
267	Blast-furnace	30.7	7.8	0.64	—	0.24	45.6	—	6.05	7.49	—	3.11	—	—	
267-a	Blast-furnace	36.90	15.53	0.25	—	0.86	37.66	—	6.73	1.08	—	0.58	—	—	
311	Blast-furnace	—	—	—	—	—	—	—	—	—	—	—	—	—	
262	Converter vanadium	—	—	—	—	—	—	13.80	—	—	—	0.069	—	—	
50-V*	Converter (smelting in oxygen)	—	—	—	—	—	—	—	—	—	—	—	—	—	
203-b	Basic open hearth	24.36	3.01	12.30	15.9	0.36	37.24	0.10	9.41	8.55	1.04	0.122	—	—	
204-a*	Open hearth	—	—	—	—	—	—	—	—	—	—	0.17	—	—	
205-a*	Open hearth	—	—	—	—	—	—	—	—	—	—	0.280	—	—	
47	Open hearth	—	—	—	—	—	—	—	—	—	—	0.39	—	—	
185	Copper smelting	35.60	—	30.56	—	—	5.32	—	—	—	—	—	0.24	—	
186	RESIDUES	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Copper flotation	—	—	—	—	—	—	—	—	—	—	—	0.24	—	
	Molybdenum	—	—	—	—	—	—	—	—	—	—	—	—	0.053	

Table 21

Number of SS	Material	Contents of elements and of their components, %															
		Silicon dioxide	Aluminum oxide	Chromic oxide	Iron	Ferrous oxide	Ferric oxide	Titanium dioxide	Calcium oxide	Magnesium oxide	Manganese oxide	Manganese dioxide					
AGGLOMERATES																	
211	Iron-ore	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
233	Flux	13.30	—	—	42.40	16.48	—	—	15.38	—	—	—	2.95	—	—	—	
235-b*	Flux	8.49	2.78	—	51.93	14.60	—	—	11.53	3.19	—	—	0.79	—	—	—	
241-a*	Flux	16.03	3.07	—	49.92	11.65	—	—	9.54	0.35	—	—	0.39	—	—	—	
255*	Flux	6.14	Not determined	—	56.0	16.74	—	—	6.88	—	—	—	—	—	—	—	
CONCENTRATES																	
112-a	Manganese	—	1.90	—	—	—	—	—	—	1.68	—	—	—	47.64	—	43.80	
130-a	Manganese	1.77	—	—	—	—	—	—	—	0.59	—	—	—	58.86	—	91.88	
250	Copper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
297	Nickel	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
281	Niobium	12.5	—	—	—	—	—	—	—	—	—	10.16	—	—	—	—	—
275*	Chromic oxide	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
290*	Vanadium pentoxide	—	—	—	—	97.9	—	—	—	0.10	—	—	—	—	—	—	—
138	Tin	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
148	Tin	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
154-a	Titanium	4.05	2.39	0.55	32.57	—	—	—	—	—	—	44.64	—	—	—	—	—
90	Chrome	0.86	10.15	59.15	10.98	—	—	—	—	—	—	—	0.26	12.77	—	—	—
296	Zirconium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 21 continued

Number of SS	Material	Contents of elements and of their components, %														
		Phosphorus	Sulfur	Vanadium pentoxide	Arsenic	Nickel	Carbon	Zinc oxide	Zinc	Tin	Lead	Copper				
AGGLOMERATES																
211	Iron-ore	—	—	—	0.125	—	—	—	—	—	—	—	—	—	—	—
233	Flux	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
235-b*	Flux	0.047	0.046	—	—	—	—	—	—	—	—	—	—	—	—	—
241-a*	Flux	0.048	0.025	—	—	—	0.13	—	—	—	—	0.42	—	—	—	—
255*	Flux	Not determined	Not determined	0.6	—	—	—	—	—	—	0.43	—	—	—	—	—
CONCENTRATES																
112-a	Manganese	0.163	0.278	—	—	—	—	—	—	—	—	—	—	—	—	—
130-a	Manganese	0.217	0.058	—	—	—	—	—	—	—	—	—	—	—	—	—
250	Copper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
297	Nickel	—	—	—	—	—	—	—	—	6.05	—	—	—	—	—	—
281	Niobium	0.058	0.16	—	—	—	—	—	—	—	—	—	—	—	—	—
275*	Chromic Oxide	—	0.040	—	0.0007	—	—	—	—	0.09	—	—	—	—	—	—
290*	Vanadium pentoxide	0.051	—	83.1	—	—	—	—	—	0.06	—	—	—	0.0003	—	0.0001
138	Tin	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
148	Tin	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
154-a	Titanium	0.12	0.039	0.12	—	—	—	—	—	—	—	—	—	—	—	—
90	Chrome	—	0.005	—	—	—	—	—	—	—	—	—	—	—	—	—
296	Zirconium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

In the niobium concentrate the sum of the pentoxides of niobium and tantalum is 42.1%

Table 22

Number of SS	Ore	Contents of elements and of their components, %															
		Silicon dioxide	Aluminum oxide	Chromic oxide	Iron	Ferrous oxide	Ferric oxide	Titanium oxide	Calcium oxide	Magnesium oxide	Manganese	Manganous oxide	Manganese dioxide	Phosphorus Pentoxide of phosphor	Sulfur	Vanadium pentoxide	Arsenic
288	Beryllium	—	—	—	—	—	2.22	—	—	—	—	—	—	—	—	—	—
190-a*	Bauxite	3.74	51.5	—	—	22.69	2.22	2.02	—	—	—	—	—	0.84	—	—	—
198-a	Alumina	0.020	—	—	—	0.033	—	—	—	—	—	—	—	—	—	—	—
1-V	Iron	10.51	0.75	—	51.81	—	—	0.17	0.87	—	2.27	—	0.006	0.010	—	—	—
2-g*	Iron	14.48	4.18	—	44.06	—	0.17	1.01	0.71	—	1.07	—	1.33	0.111	0.10	0.153	—
3-V	Iron	19.19	1.30	—	54.70	0.70	—	0.04	0.04	—	0.01	—	0.030	0.010	—	—	—
4-V*	Iron	14.37	4.22	—	46.83	20.33	—	0.34	5.78	5.13	0.37	—	0.174	0.024	0.13	—	—
95-V*	Iron	9.09	6.22	0.66	46.10	27.02	—	12.65	1.50	4.94	0.20	—	0.019	0.13	0.69	—	—
195-a*	Iron	18.30	1.15	—	52.68	—	—	0.01	1.50	3.46	—	—	0.062	0.018	—	—	—
194-b*	Iron	12.64	6.55	—	53.80	0.69	—	0.20	0.11	0.21	—	—	0.067	0.015	—	—	—
294	Cobalt	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
44-b	Manganese	8.00	1.42	—	1.38	—	0.104	3.19	1.39	47.46	—	—	0.185	0.035	—	0.004	—
183	Copper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
184	Copper	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
277	Niobium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
136	Tin	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
140	Lead-zinc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
287	Selenium-tellurium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
216-a*	Siderite	6.14	—	—	28.85	35.82	—	—	—	—	—	—	—	—	—	—	—
132-a*	Chromite	5.91	—	36.8	14.51	—	—	0.65	16.1	—	—	—	0.008	0.087	—	—	—
166-b	Chromite	5.93	—	45.44	13.64	—	—	0.71	12.70	—	—	—	0.003	0.01	—	—	—

Tool steel. A list of SS is given in table 15.

Rust resisting and heat resisting steels. List of SS's is given in table 16.

Special heat-resisting alloys. List of SS's is given in table 17.

Non-Ferrous Metals and Alloys

Non-ferrous metals. List of SS is given in table 18.

Alloys of non-ferrous metals, hard alloys. List of SS is given in table 19.

Other Products of Treatment of Metallurgical Raw Material

Slag, residue. List of SS is given in table 20.

Concentrated Metallurgical Raw Material

Agglomerates and concentrates. List of SS is given in table 21.

Mineral Raw Material

Ores of ferrous and non-ferrous metals. List of SS is given in table 22.

Limestone and dolomite. List of SS is given in table 23.

Table 23

Number of SS	Material	Contents of elements and of their components %				
		Silicon dioxide	Calcium oxide	Magnesium oxide	Phosphorus	Sulfur
60-B*	Dolomite	0.69	31.44	20.85	0.009	—
59-v*	Limestone	0.12	55.26	—	0.005	0.005
59-g	Limestone	—	—	—	—	—

Artificial Silicate Materials

Refractory materials and welding flux. List of SS is given in table 24.

3. Standard Samples for pH-Measurement

Purpose: Reference materials for the preparation of standard buffer solutions according to MRTU (Interrepublic Technical Specifications) 6-09-1289-64.

Table 24

Number of SS	Material	Contents of elements and of their components, %														
		Silicon dioxide	Aluminum oxide	Chromic oxide	Ferric oxide	Titanium dioxide	Calcium oxide	Sum of oxides of alkali metals	Magnesium oxide	Manganous oxide	Phosphorus	Sulfur	Potassium oxide	Fluorine	Firing losses, %	
56-b*	Dinas brick	95.05	0.63	—	1.30	0.12	2.47	—	0.06	0.028	—	—	—	—	—	0.10
239	Chrome-magnesite	4.57	10.3	22.02	14.4	—	1.98	—	47.05	—	—	—	—	—	—	—
278	Welding flux	43.2	2.01	—	1.09	—	10.43	—	0.61	39.11	0.0360	0.038	—	3.74	—	—
55-a	Chamotte (refractory clay)	58.57	34.0	—	1.79	1.24	0.47	3.13	0.84	0.021	—	—	2.5	—	—	—

Area of application: tests of pH-meters, investigations in analytical chemistry, chemical analyses for quality control of raw materials and of products in the chemical, petro-chemistry, oil-processing, cellulose-paper, food and other industrial branches.

The characteristics listed in table 25 are certified by the enterprises of the Ministry of the chemical industry.

Table 25

Substance	Value of certified characteristic at 25°C	
	pH	E, mv
Potassium tetraoxalate, 0.05 m	1.68	302.4±0,6
Potassium hydrogen tartrate, saturated at t = 25°C	3.56	415.2±0,6
Potassium hydrogen phthalate, 0.05 m	4.01	441.1±0,6
Potassium dihydrogen phosphate, 0.025 m	} 6.86	609.9±0,6
Disodium hydrogen phosphate, 0.025 m		
Sodium tetraborate 0.01 m	9.18	747.1±0,6

4. STANDARD SAMPLES FOR EMISSION SPECTRUM ANALYSIS

Purpose: accelerated (and lately semiautomated) and economical control of engineering processes on chemical composition of processed materials, inlet and outlet control of raw material and of finished product, mass determination of composition of substances in geological research.

Area of application: metallurgy of ferrous, nonferrous and of rare metals; all branches of the national economy, using metals and alloys; geological service; ore mining industry, and other branches.

With some exceptions all standard samples for spectral analysis, the characteristics of which are given below, are furnished by the All-Union Scientific-Research Institute for standard samples of the Ministry of Ferrous Metallurgy of the USSR. The exceptions are as follows. Standard samples for the analysis of high- and engineering purity aluminum and of primary silumin is furnished by the All-Union Aluminum-Magnesium Institute (VAMI). Standard samples for the analysis of cobalt and nickel are furnished by the institute "Gipernickel" (Hypernickel). Standard samples for the analysis of some rocks are furnished by the Institute of Geology on rockbeds, petrography, mineralogy and geochemistry of the Scientific Academy of the USSR.

FERROUS METALS AND ALLOYS

Cast iron. Table 26 lists standard samples (SS) for the analysis of foundry and converter iron. Samples are furnished in the form of cast bars.

Ferrous alloys. Table 27 lists SS's for the analysis of ferrous alloys. Samples are furnished in powdered form.

Carbon steels. Table 28 lists SS's for the analysis of carbon (0.05 - 1.01%C) steels. Samples of this group are certified together with the contents of elements - metals with carbon, sulfur and phosphorus. Designated for the accelerated spectrometric analysis (with photoelectric registration). Samples are made in the form of rolled bars.

Structural and instrumental alloyed steels. Table 29 lists SS's for the analysis of these types of steels. SS's are fabricated in the form of rolled bars.

Highly alloyed corrosion-resistant, heat-resistant, refractory, and special steels and alloys. Table 30 lists the SS's. SS's are fabricated in the form of rods from rolled or cast metal.

NONFERROUS METALS AND ALLOYS

Nonferrous metals. Table 31 lists SS's for the analysis of nonferrous metals.

Aluminum base alloys. Table 32 lists SS's for the analysis of aluminum base alloys.

Bronzes. Table 33 lists SS's for the analyzing various brands of bronze.

Brasses. Table 34 lists SS's for the analysis of various brands of brass.

Magnesium base alloys. Table 35 lists SS's for analyzing magnesium based alloys.

Titanium based alloys. Table 36 lists SS's for analyzing titanium based alloys.

All SS's of this group are fabricated in the form of rods from rolled or cast metal.

OTHER PRODUCTS OF PROCESSED METALLURGICAL RAW MATERIAL

Slag. Table 37 gives SS's of the 8th assembly for the analysis of basic open-hearth slags.

MINING ROCKS

Diabase, faceted diorite, miaskite, periodotite. Contents of oxides or rock formation elements, also of small and of rare elements are certified. The contents of each element (of the compound) in the standard samples of these rocks (diabase DIM-1, faceted diorite "Ryzhik" miaskite MIV-1, periodotite) corresponds to the natural rocks.

Table 26

Cast iron Number of SS	Number of series	Contents of elements, %					
		Manga- nese	Silicon	Chromium	Nickel	Potassium	Copper
Foundry 191-V* 192-V* 193-V* 194-V* 195-V*	19-V	1.49	4.83	—	—	—	—
		0.70	3.18	—	—	—	—
		0.39	1.62	—	—	—	—
		1.13	1.82	—	—	—	—
		0.51	0.96	—	—	—	—
Converter 181-V* 182-V* 183-V* 184-V*	18-V	0.29	0.10	—	—	—	—
		1.98	2.45	—	—	—	—
		1.01	1.09	—	—	—	—
		0.050	0.43	—	—	—	—
Converter	18-g						
Converter 781 782 783 784 785	78	0.36	0.17	—	—	—	—
		0.70	0.47	—	—	—	—
		0.99	0.66	—	—	—	—
		1.53	1.08	—	—	—	—
		2.65	1.60	—	—	—	—
Converter, treated with magnesium 261-b* 262-b* 263-b* 264-b*	26-b	1.24	0.53	—	—	0.0094	—
		0.74	2.75	—	—	0.06	—
		0.42	1.68	—	—	—	—
		0.70	1.13	—	—	0.015	—
		—	—	—	—	—	—
Chrome nickel 371-a* 372-a* 373-a* 374-a* 375-a*	37-a	0.40	0.95	0.99	0.29	—	(0.58)
		0.15	3.22	2.30	0.56	—	(0.41)
		0.48	1.80	0.16	1.35	—	(0.48)
		0.76	2.21	0.45	0.73	—	(0.14)
		1.46	1.43	0.08	0.28	—	(0.56)
Chrome nickel (LKh 2-3)	37-b	—	—	—	—	—	—

Table 27

Material Number of SS	Number of series	Brand of material	Contents of elements, %						
			Manga- nese	Silicon	Chromium	Carbon	Alumi- num	Iron	Phosphorus
Silicon manganese	25-a	Type of							
		SiMn 14-							
		SiMn 20	66.9	21.26	—	—	—	6.91	—
		251-a	73.27	16.66	—	—	—	6.77	—
		252-a	80.42	11.8	—	—	—	5.40	—
253-a	59.5	24.41	—	—	—	14.59	—		
254-a									

Table 27 continued

Material, Number of SS	Number of series	Brand of material	Contents of elements, %							
			Manga- nese	Silicon	Chromium	Carbon	Alumi- num	Iron	Phosphorus	
Ferro- manganese	55-a	—								
551-a*			71.32	1.50	—	6.02	—	(20.5)	0.35	
552 a*			67.43	3.11	—	5.61	—	(22.8)	0.63	
553-a*			81.31	0.88	—	6.36	—	(11.2)	0.34	
554-a*			89.26	0.32	—	6.56	—	(3.3)	0.17	
Ferromolyb- denum with the addition of non- ferrous metals	23	M01	—	—	—	—	—	—	—	—
Ferrosilicon	35	Type Si 45								
351			0.36	40.9	1.69	—	(3.27)	—	—	—
352			(0.22)	45.8	0.59	—	(0.63)	—	—	—
353			0.95	47.8	0.79	—	(0.41)	—	—	—
354			1.51	49.6	0.29	—	(1.41)	—	—	—
355			0.34	44.1	0.09	—	(1.22)	—	—	—
Ferrosilicon	56	Type Si 75								
561			0.97	71.4	0.38	—	2.27	—	—	—
562			0.69	70.4	1.27	—	0.39	—	—	—
563			1.10	74.5	0.81	—	1.23	—	—	—
564			0.30	71.1	0.13	—	0.51	—	—	—
565			(0.23)	74.5	1.67	—	(0.19)	—	—	—

Table 28

Steels, Number SS	Number of series	Contents of elements, %									
		Carbon	Silicon	Manga- nese	Sulfur	Phosphorus	Chromium	Nickel	Titanium	Aluminum	Copper
Low-carbon	101										
1041*		0.05	0.46	1.0	0.021	0.010	0.55	0.08	—	0.009	0.09
1042*		0.05	0.31	0.46	0.025	0.008	0.07	0.08	—	0.018	0.23
1013*		0.09	0.09	0.08	0.016	0.016	0.20	0.13	—	0.028	0.18
1044*		0.15	0.19	0.13	0.039	0.028	0.15	0.16	—	0.056	0.28
1045*		0.37	0.09	0.14	0.098	0.019	0.04	0.33	—	0.053	0.36
Medium and high-carbon	105										
1051*		0.31	0.47	0.76	0.011	0.012	0.82	0.06	—	0.035	0.06
1052*		0.42	0.37	0.43	0.017	0.003	0.13	0.33	—	0.013	0.14
1053*		0.60	0.17	0.28	0.035	0.023	0.16	0.07	—	0.023	0.20
1054*		0.72	0.10	0.39	0.048	0.032	0.22	0.13	—	0.045	0.18
1055*		1.01	0.09	0.17	0.091	0.061	0.14	0.31	—	0.087	0.39

Table 29

Steels, Number of SS	Number of series	Brand of steel	Contents of elements, %													
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten	Molyb- denum	Vanadium	Alumini- um	Copper	Cobalt			
Tungsten-cobalt- vanadium	73	Type R 18K5F2	(0.85)	0.65	0.20	2.64	0.70	22.72	0.19	1.19	—	—	—	—	—	3.85
731			(0.89)	0.53	0.32	3.41	0.49	20.00	0.28	1.64	—	—	—	—	—	4.80
732			(0.87)	0.37	0.49	4.18	0.26	17.31	0.47	2.23	—	—	—	—	—	5.73
733			(0.94)	0.26	0.73	4.86	0.15	13.74	0.70	2.99	—	—	—	—	—	6.76
734			—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tungsten-cobalt- vanadium	73-a	R 18K5F2	(0.33)	0.68	0.26	0.14	0.07	—	0.77	0.73	—	—	—	—	—	0.08
Low-alloyed	32	—	(0.36)	0.28	0.12	0.21	0.16	—	0.38	0.47	—	—	—	—	—	0.16
321			(0.30)	0.03	0.38	0.44	0.37	—	0.16	0.14	—	—	—	—	—	0.31
322			(0.44)	0.13	1.00	1.26	0.70	—	0.08	0.11	—	—	—	—	—	0.58
323			—	—	—	—	—	—	—	—	—	—	—	—	—	—
324			—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chrome	14-V	—	(0.35)	0.21	0.20	18.58	0.21	—	—	—	—	—	—	—	—	—
141-V*			(0.34)	0.29	0.37	15.87	0.36	—	—	—	—	—	—	—	—	—
142-V*			(0.35)	0.55	0.53	12.32	0.51	—	—	—	—	—	—	—	—	—
143-V*			(0.38)	0.92	0.90	9.97	0.87	—	—	—	—	—	—	—	—	—
144-V*			—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chrome-silicon	22-a	—	(0.45)	0.80	0.25	1.56	0.84	—	—	—	—	—	—	—	—	—
221-a			(0.48)	1.39	0.46	0.83	0.41	—	—	—	—	—	—	—	—	—
222-a			(0.49)	1.95	0.89	0.39	0.19	—	—	—	—	—	—	—	—	—
223-a			(0.65)	2.36	1.56	0.25	0.11	—	—	—	—	—	—	—	—	—
224-a			—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 29 continued

Steels, Number of SS	Number of series	Brand of steel	Contents of elements, %														
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten	Molyb- denum	Vanadium	Aluminum	Copper	Cobalt				
Chromium-manganese	21-a	—	(0.48)	0.064	0.26	1.73	0.81	—	—	—	—	—	—	—	—	—	—
211 a			(0.46)	0.47	0.45	0.82	0.60	—	—	—	—	—	—	—	—	—	—
212-a			(0.46)	0.23	0.82	0.43	0.43	—	—	—	—	—	—	—	—	—	—
213-a			(0.47)	0.66	2.11	0.29	0.18	—	—	—	—	—	—	—	—	—	—
214-a																	
Chromium-molybdenum	36	Type Kh12M	(1.60)	0.68	0.14	8.86	0.64	—	—	—	—	—	—	—	—	—	—
361			(1.57)	0.11	0.22	10.95	0.43	—	—	—	—	—	—	—	—	—	—
362			(1.51)	0.24	0.42	12.95	0.19	—	—	—	—	—	—	—	—	—	—
363			(1.56)	0.12	0.66	15.18	0.11	—	—	—	—	—	—	—	—	—	—
364																	
Chromium-molybdenum	36-a	Type Rh12M	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chromium-molybdenum	92	Type OKhMF8	(0.05)	0.03	0.70	1.61	0.22	—	—	—	—	—	—	—	—	—	—
Chromium-molybdenum			(0.05)	0.11	0.63	1.72	0.30	—	—	—	—	—	—	—	—	—	—
921*			(0.06)	0.24	0.43	1.24	0.54	—	—	—	—	—	—	—	—	—	—
922*			(0.05)	0.48	0.25	0.92	0.74	—	—	—	—	—	—	—	—	—	—
923*																	
924*																	
Chromium-nickel	34	Type 40KhN	(0.37)	0.15	1.03	0.32	1.53	—	—	—	—	—	—	—	—	—	—
341			(0.39)	0.21	0.68	0.52	1.27	—	—	—	—	—	—	—	—	—	—
342			(0.40)	0.34	0.52	0.77	0.97	—	—	—	—	—	—	—	—	—	—
343			(0.44)	0.60	0.29	1.08	0.77	—	—	—	—	—	—	—	—	—	—
344																	

Table 29 continued

Steels, Number of SS	Number of series	Brand of steel	Contents of elements, %										
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten	Molyb- denum	Vanadium	Alumi- num	Copper	Cobalt
Chrome-nickel- molybdenum-vanadium	29-b	Type 45KhNMF A	(0.44)	1.85	0.12	0.13	1.32	—	0.70	0.11	—	0.18	—
			(0.45)	0.46	0.19	0.32	0.86	—	0.41	0.27	—	0.20	—
			(0.44)	0.92	0.04	0.76	0.39	—	0.26	0.43	—	0.30	—
			(0.43)	0.20	1.26	1.76	0.25	—	0.13	0.76	—	0.53	—
Chrome-nickel- molybdenum-and tungsten-vanadium	28-b	Type 38KhN3MFA and 30Kh2NVFA	(0.33)	0.26	1.80	0.18	4.74	0.37	0.75	0.11	—	0.16	—
			(0.41)	0.44	0.40	0.33	2.93	1.23	0.47	0.25	—	0.24	—
			(0.30)	0.81	0.83	0.75	1.72	2.66	0.30	0.41	—	0.37	—
			(0.38)	1.25	0.20	1.92	0.99	0.74	0.11	0.75	—	0.55	—
Chrome-nickel- molybdenum-and tungsten-vanadium	28-b	Type 38KhN3MFA	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—
Chrome-molyb- denum-aluminum	10-b	Type 38KhMYuA	(0.35)	0.66	0.12	1.87	0.15	—	0.12	—	0.31	0.51	—
			(0.39)	0.47	0.26	1.65	0.32	—	0.25	—	0.56	0.37	—
			(0.39)	0.31	0.46	1.39	0.47	—	0.49	—	0.81	0.22	—
			(0.35)	0.18	0.83	1.17	0.68	—	0.72	—	1.24	0.19	—

Table 29 continued

Steels, Number of SS	Number of series	Brand of steel	Table of contents, %														
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten	Molyb- denum	Vanadium	Alumi- num	Copper	Cobalt				
Steel with boron	20	--	(0.37)	0.18	1.24	1.34	0.20	--	--	--	--	--	--	--	--	--	--
201			(0.37)	0.43	0.80	1.07	0.38	--	--	--	--	--	--	--	--	--	--
202			(0.34)	0.47	0.41	0.82	0.90	--	--	--	--	--	--	--	--	--	--
203			(0.35)	0.58	0.29	0.56	2.12	--	--	--	--	--	--	--	--	--	--
204			(0.34)	1.10	0.25	0.51	0.22	--	--	--	--	--	--	--	--	--	--
205																	
Tungsten	67-a	Type R9	(0.86)	0.66	0.21	3.10	0.225	11.86	0.15	1.08	--	--	--	--	--	--	--
671-a*			(0.93)	0.37	0.30	3.96	0.26	9.43	0.33	1.44	--	--	--	--	--	--	--
672-a*			(0.88)	0.29	0.37	4.50	0.47	7.81	0.41	2.04	--	--	--	--	--	--	--
673-a*			(0.84)	0.27	0.58	6.24	0.59	6.31	0.68	2.79	--	--	--	--	--	--	--
674-a*																	
Tungsten	66-a	Type R18	(0.78)	0.66	0.19	3.39	0.19	21.94	0.20	0.79	--	--	--	--	--	--	--
661-a*			(0.80)	0.52	0.31	4.02	0.30	18.50	0.31	0.97	--	--	--	--	--	--	--
662-a*			(0.75)	0.15	(0.37)	4.71	(0.49)	15.79	(0.38)	(1.23)	--	--	--	--	--	--	--
663-a*			(0.72)	0.19	0.58	6.33	0.58	13.7	0.71	1.64	--	--	--	--	--	--	--
664-a*																	

Table 30

Material, Number SS	Number of series	Brand of material	Contents of elements, %					
			Carbon	Silicon	Manganese	Chromium	Nickel	Tungsten
Steels	91	Type EI 438	(0.14)	0.17	1.35	—	0.68	—
911*			(0.18)	0.29	0.80	0.19	0.52	—
912*			(0.16)	0.69	0.57	0.21	0.30	—
913*			(0.18)	1.11	0.37	0.41	—	—
914*								
Steels	94	Type EI 606	(0.06)	2.06	0.31	13.88	13.6	—
941*			(0.05)	1.74	0.53	16.93	10.4	—
942*			(0.05)	1.46	0.77	20.17	8.35	—
943*			(0.05)	1.11	1.09	23.25	6.30	—
944*								
Chrome-aluminum steels	80	Type OKh27Yu5A	(0.02)	0.74	0.66	25.88	0.79	—
801*			(0.02)	0.39	0.56	26.33	0.63	—
802*			(0.02)	0.55	0.34	26.53	0.35	—
803*			(0.02)	0.19	0.11	25.95	0.19	—
804*								
Chrome-silicon- molybdenum steels	54	Type 4Kh10SM (EI 107)	(0.40)	2.74	0.90	7.99	0.85	—
541			(0.42)	2.26	0.52	9.05	0.57	—
542			(0.42)	1.87	0.30	10.05	0.25	—
543			(0.41)	1.60	0.14	10.91	0.13	—
544								
Chrome-molybdenum -vanadium-niobium- nickel steels	93	Type 2Kh11MFBN (EI 291)	(0.10)	1.81	0.20	7.87	1.30	—
931*			(0.11)	0.86	0.40	9.83	0.57	—
932*			(0.12)	0.26	0.82	11.80	0.31	—
933*			(0.12)	0.18	1.26	15.45	0.20	—
934*								

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %					
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten
Chrome-nickel- aluminum steels	64	Type Kh15N9Yu (Kh25N9Yu, EI 904, SN-2)	(0.07)	1.05	1.02	19.45	4.96	—
			(0.06)	0.56	0.57	16.35	6.38	—
			(0.06)	0.42	0.39	14.39	7.71	—
			(0.06)	0.21	0.13	11.44	10.34	—
Chrome-nickel- tungsten-molybdenum -vanadium steels	57	Type 1Kh12N2VMF (EI 961)	(0.07)	0.82	0.13	13.97	1.06	1.10
			(0.07)	0.68	0.37	12.45	1.46	1.54
			(0.06)	0.38	0.52	9.64	1.91	1.89
			(0.07)	0.14	0.86	8.89	2.61	2.37
Chrome-nickel- tungsten-niobium- boron steels	42-a	Type 1Kh14N18V2BR (EI 695R) and 1Kh14N18V2BR1 (EI 726)	(0.09)	0.33	0.70	10.56	22.60	2.98
			(0.10)	0.43	0.94	12.62	19.86	2.67
			(0.11)	0.57	1.51	14.31	17.73	2.04
			(0.10)	0.79	2.29	17.36	15.54	1.68
Chrome-nickel- manganese steels	49-a	Type 2Kh13N4G9 (Kh13N4G9, EI100) OKH17N5G9	(0.05)	0.85	4.53	21.01	2.38	—
			(0.08)	0.61	6.65	16.96	3.42	—
			(0.06)	0.25	8.68	12.72	5.04	—
			(0.06)	0.24	12.55	9.59	6.61	—

Table 30 continued

Material Number of SS	Number of series	Brand of material	Contents of elements, %					
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten
Chromium-nickel- molybdenum steels	65	Type Kh17N5M3 (EI 925, SN-3)	(0.07)	0.98	0.18	21.37	3.46	—
			(0.06)	0.74	0.32	19.18	4.19	—
			(0.08)	0.38	0.54	15.8	5.34	—
			(0.07)	0.14	0.98	12.35	6.75	—
Chromium-nickel- titanium steels	58	Type 1Kh21N5T (EI 811)	(0.09)	1.02	1.05	24.38	3.71	—
			(0.12)	0.62	0.58	22.08	4.94	—
			(0.13)	0.38	0.36	19.49	6.25	—
			(0.11)	0.21	0.16	17.46	7.69	—
			(0.02)	0.37	0.35	8.28	24.60	—
Chromium-nickel- titanium-boron steels	31	Type Kh12N20T3R (EI 696)	(0.02)	0.53	0.50	9.75	21.52	—
			(0.03)	0.78	0.72	11.81	19.36	—
			(0.02)	1.15	1.02	14.06	16.65	—
			(0.03)	0.73	0.19	0.18	22.83	—
Nickel-cobalt- alloys	71	Type 29NK (N29K18)	(0.02)	0.53	0.34	0.56	26.37	—
			(0.02)	0.36	0.54	0.54	30.10	—
			(0.03)	0.20	0.75	0.73	34.0	—
			(0.03)	0.20	0.75	0.73	34.0	—

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %					
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten
Nickel-chrome-titanium -aluminum alloys	96	Type 42NKhtYu (N41Kht)	(0.04)	1.15	1.12	3.69	(41.57)	—
			(0.03)	0.67	0.70	4.78	(41.63)	—
			(0.03)	0.37	0.43	5.96	(41.62)	—
			(0.03)	0.21	0.32	7.06	(41.73)	—
Alloys	51		(0.13)	5.81	0.34	20.77	9.37	—
			(0.12)	4.46	0.50	18.53	10.92	—
			(0.15)	3.52	0.87	16.73	12.71	—
			(0.14)	2.64	1.52	15.05	15.07	—
Chrome-nickel- manganese-molybdenum- vanadium-niobium steels	46	Type 4Kh12N8G8MFB (EI 481)	(0.34)	0.91	5.71	16.39	5.64	—
			(0.35)	0.56	7.35	14.13	7.21	—
			(0.34)	0.31	9.68	11.79	9.93	—
			(0.38)	0.25	11.56	9.00	12.19	—
Chrome-nickel-molyb- denum-niobium-titanium- aluminum-boron steels	81	Type 1Kh16N36MBTYuR (EI 150)	—	0.20	1.00	21.46	(36.4)	—
			—	0.33	0.59	16.91	(36.4)	—
			—	0.59	0.33	14.00	(36.1)	—
			—	1.04	0.16	11.73	(36.5)	—

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, in %					
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten
Chromium-nickel-molyb- denum-titanium steels	45-b	Type Kh17N13M2T (Kh18N12M2T, EI 448) Kh17N13M3T (Kh18N12M3T, EI 432)	—	—	—	—	—	—
			(0.08)	0.25	2.07	22.81	—	—
			(0.05)	0.48	1.56	19.92	9.08	—
			(0.06)	0.64	1.27	17.61	11.02	—
Chromium-nickel- niobium steels	27	Type OKh18N12B (Kh18N11B, EI 402)	(0.04)	1.36	0.40	23.30	6.68	—
			(0.03)	0.89	0.69	20.35	8.67	—
			(0.03)	0.58	1.23	17.16	11.67	—
			(0.03)	0.36	2.23	14.29	14.40	—
Chromium-nickel- titanium steels	9-9	Type Kh18N9T (1Kh18N9T, EYa1T)	(0.08)	1.35	0.35	22.92	6.73	—
			(0.07)	0.54	0.72	20.73	8.77	—
			(0.05)	0.67	1.22	17.33	11.52	—
			(0.05)	0.26	2.30	14.36	14.58	—
Precision alloys	95	Type N33Yu1	(0.03)	0.11	0.16	—	(32.75)	—
			(0.02)	0.22	0.36	0.04	(32.50)	—
			(0.03)	0.54	0.52	0.09	(32.77)	—
			(0.03)	0.86	0.75	0.24	(32.75)	—

Table 30 continued

Material, Number SS	Number of series	Brand of material	Contents of elements, %						
			Carbon	Silicon	Manga- nese	Chromium	Nickel	Tungsten	
Precision alloys	38	Type N-36	—	—	—	—	—	—	—
Precision alloys	107	Type 31NRh3 G	—	—	—	—	—	—	—
Precision alloys	88	Type 40KNKhMVTYu	—	—	—	—	—	—	—
Chrom-molybdenum- niobium-titanium- aluminum alloys	40-a	Type KhN75MBTYu (EI 602)	(0.02)	1.08	0.15	20.20	—	—	—
401-a			(0.03)	0.85	0.25	20.20	—	—	—
402-a			(0.02)	0.56	0.41	20.02	—	—	—
403-a			(0.03)	0.43	0.57	20.03	—	—	—
404-a									
Chrom-nickel- tungsten-titanium alloys	50	Type Kh38VT (EI 703);	(0.09)	0.34	0.24	25.40	—	—	1.70
501			(0.10)	0.41	0.36	22.81	—	—	2.34
502			(0.08)	0.76	0.59	20.04	—	—	2.91
503			(0.09)	1.02	0.90	17.00	—	—	3.72
504									
Chrom-nickel- tungsten-titanium- aluminum alloys	39-a	Type KhN35VTYu (EI 787)	(0.02)	0.23	0.23	10.33	37.80	1.18	
391-a*			(0.02)	0.37	0.38	12.30	32.60	2.04	
392-a*			(0.02)	0.49	0.53	14.70	30.00	3.30	
393-a*			(0.03)	0.79	0.86	17.70	23.43	3.93	
394-a*									

Table 30 continued

Material, Number of SS	Number of series	Brand of material	Contents of elements, %												
			Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron					
Chromium-nickel- aluminum-steels	64	Type Kh15N9Yu (Kh25N9Yu, EI 904, SN-2)	—	—	—	0.35	—	—	—	—	—	—	—	—	
			—	—	—	0.61	—	—	—	—	—	—	—	—	
			—	—	—	0.89	—	—	—	—	—	—	—	—	—
			—	—	—	1.45	—	—	—	—	—	—	—	—	—
Chromium-nickel- tungsten-molybdenum- vanadium steels	57	Type 1Kh12N2VMF (EI 961)	—	—	—	—	—	—	—	—	—	—	—	—	
			0.22	0.126	—	—	—	—	—	—	—	—	—	—	
			0.36	0.27	—	—	—	—	—	—	—	—	—	—	—
			0.46	0.44	—	—	—	—	—	—	—	—	—	—	—
			0.64	0.65	—	—	—	—	—	—	—	—	—	—	—
Chromium-nickel- tungsten-niobium- boron steels	42-a	Type 1Kh14N18V2BR (EI 695R) and 1Kh14N18V2BR I (EI 726)	—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	1.46	—	—	—	—	—	—	—	
			—	—	—	—	1.14	—	—	—	—	—	—	—	
			—	—	—	—	0.88	—	—	—	—	—	—	—	
Chromium-nickel- manganese steels	49-a	Type 2Kh13N4G9 (Kh13N4G9, EI 100) OKh17N5G9	—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %												
			Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron					
Chromium-nickel-molybdenum steels	65	Type K17N5M3 (EI 925, SN-3)	2.29	—	—	—	—	—	—	—	—	—	—	—	
			2.83	—	—	—	—	—	—	—	—	—	—	—	
			3.52	—	—	—	—	—	—	—	—	—	—	—	—
			4.64	—	—	—	—	—	—	—	—	—	—	—	—
Chromium-nickel-titanium steels	58	Type 1Kh21N5T (EI 811)	—	—	(0.06)	—	—	—	—	—	—	—	—	—	
			—	—	(0.10)	—	—	—	—	—	—	—	—	—	
			—	—	(0.17)	—	—	—	—	—	—	—	—	—	—
			—	—	(0.50)	—	—	—	—	—	—	—	—	—	—
Chromium-nickel-titanium-boron steels	31	Type Kh12N20T3R (EI 696)	—	—	3.25	0.28	—	—	—	—	—	—	—	0.005	
			—	—	2.54	0.39	—	—	—	—	—	—	—	0.010	
			—	—	2.16	0.68	—	—	—	—	—	—	—	0.015	
			—	—	1.14	0.66	—	—	—	—	—	—	—	0.027	
Nickel-cobalt-alloys	71	Type 29NK(N29K18)	—	—	0.42	0.10	—	—	—	24.2	0.50	—	—	—	
			—	—	0.34	0.23	—	—	—	20.2	0.34	—	—	—	
			—	—	0.29	0.41	—	—	—	17.4	0.23	—	—	—	
			—	—	0.20	0.62	—	—	—	14.4	0.13	—	—	—	

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %									
			Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron		
Nickel-chrome-titanium-aluminum alloys	96	Type 42NKhtYu (N41Kht)	—	—	4.16	0.32	—	—	—	—	—	—
			—	—	3.95	0.43	—	—	—	—	—	—
			—	—	2.47	0.68	—	—	—	—	—	—
			—	—	1.98	1.17	—	—	—	—	—	—
			—	—	0.06	(0.05)	—	—	—	—	—	—
Alloys	51	—	—	—	0.08	0.064	—	—	—	—	—	—
			—	—	0.28	0.15	—	—	—	—	—	—
			—	—	0.93	0.39	—	—	—	—	—	—
			—	—	—	—	—	—	—	—	—	—
Chrome-nickel-manganese-molybdenum-vanadium-niobium steels	46	Type 4Kh12N8G8MFB (E1481)	1.81	1.85	0.085	—	0.08	—	—	—	—	—
			1.46	1.54	0.09	—	0.31	—	—	—	—	—
			1.10	1.20	0.12	—	0.45	—	—	—	—	—
			0.70	0.79	0.21	—	0.68	—	—	—	—	—
			—	—	—	—	—	—	—	—	—	—
Chrome-nickel-molybdenum-niobium-titanium-aluminum-boron steels	81	Type 1Kh16N36MBTYuR (E1150)	1.78	—	0.42	0.51	0.68	—	—	—	—	—
			2.34	—	0.48	0.76	0.90	—	—	—	—	—
			3.04	—	1.11	1.15	1.29	—	—	—	—	—
			3.46	—	—	1.44	1.65	—	—	—	—	—

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %												
			Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron					
Chromium-nickel-molybdenum-titanium steels	45-b	Type K17N13M2T (Kh18N12M2T, E1448) Kh17N13M3T (Kh18N12M3T, E1432)	1.57	—	0.1	—	—	—	—	—	—	—	—	—	
			2.25	—	0.18	—	—	—	—	—	—	—	—	—	
			3.22	—	0.41	—	—	—	—	—	—	—	—	—	—
			4.33	—	0.94	—	—	—	—	—	—	—	—	—	—
Chromium-nickel-niobium steels	27	Type OKh18N12B (Kh18N11B, E1402)	—	—	—	—	—	—	1.48	0.26	—	—	—	—	
			—	—	—	—	—	—	0.98	0.36	—	—	—	—	
			—	—	—	—	—	—	0.50	0.46	—	—	—	—	
			—	—	—	—	—	—	0.28	0.58	—	—	—	—	
Chromium-nickel-titanium steels	9-g	Type Kh18N9T (1Kh18N9T, EYalT)	—	—	(1.03)	—	—	—	—	0.12	—	—	—	—	
			—	—	(0.18)	—	—	—	—	0.23	—	—	—	—	
			—	—	(0.09)	—	—	—	—	0.40	—	—	—	—	
			—	—	(0.09)	—	—	—	—	0.51	—	—	—	—	
Precision alloys	95	Type N33Yu1	—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %							
			Molyb- denum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron
Precision alloys	38	Type N-36	1.53	—	0.85	0.17	0.60	0.12	—	4.09
	107	Type 31NKb3G	1.90	—	0.65	0.32	0.80	0.16	—	2.52
	88	Type 40KNKhMVTYu	2.28	—	0.49	0.50	1.10	0.25	—	1.50
	40-a	Type KhM75MBTYu (EI 602)	2.34	—	0.33	0.86	1.56	0.38	—	0.96
Chrome-nickel- tungsten-titanium alloys	50	Type KnM38VT (EI 703)	—	—	1.07	0.64	0.78	—	—	—
	501	—	—	—	0.71	(1.19)	—	—	—	—
	502	—	—	0.53	(0.034)	1.38	—	—	—	—
	503	—	—	—	—	—	—	—	—	—
	504	—	—	—	0.51	1.81	—	—	—	—
Chrome-nickel- tungsten-titanium alloys	39-a	Type KhM35VTYu (EI 787)	—	—	2.07	2.65	—	—	0.005	—
	391-a*	—	—	—	1.39	—	—	—	0.010	—
	392-a*	—	—	2.90	0.67	—	—	—	0.020	—
	393-a*	—	—	3.05	0.29	—	—	—	0.03	—

Table 31

Material, Number of SS	Number of series	Brand of material	Contents of elements, %																		
			Manga- nese	Silicon	Chromium	Copper	Aluminum	Iron	Zinc	Lead	Tin										
High-purity aluminum	11	AV0, AV00, AV000, AV0000	—	0.00060 0.00098 0.0029 0.0060 0.013 0.044	—	0.00022 0.00051 0.0012 0.0030 0.0060 0.012	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Industrial-purity aluminum	12	A85, A8, A7, A6, A5, A0, A & AE	0.0040 — 0.0070 — 0.018 0.013	0.054 0.097 0.205 0.40 0.73 1.14	—	0.0031 0.0046 0.0057 0.010 0.020 0.043	—	—	—	0.052 0.098 0.20 0.43 0.67 1.03	—	—	—	—	—	—	—	—	—	—	
Industrial-purity aluminum	13	—	0.0005 0.0021 0.0065 0.0070	— — — —	0.0013 0.0042 0.0073 0.011	—	—	—	—	—	—	—	—	—	0.006 0.030 0.050 0.110	—	—	—	—	—	—
Cobalt	—	—	0.0003 0.0005 0.001 0.0025 0.005	0.0005 0.0025 0.005 0.01 0.02	—	0.0005 0.001 0.002 0.004 0.01	0.0007 0.0012 0.002 0.0032 0.0052	0.0023 0.0035 0.0085 0.021 0.05	0.0008 0.0013 0.002 0.005 0.01	0.0003 0.00035 0.001 0.002 0.005	0.0003 0.00035 0.001 0.002 0.005	0.0019 0.0003 0.0005 0.001 0.002	0.00019 0.0003 0.0005 0.001 0.002								

Table 31 continued

Material, Number of SS	Number of series of material	Brand of material	Contents of elements, %																	
			Mang- nese	Silicon	Chromium	Copper	Aluminum	Iron	Zinc	Lead	Tin									
Nickel	—	—																		
1			0.0003	0.0005	—	0.0003	0.0013	0.0003	0.0019	0.0009	0.0001									
2			0.0010	0.0007	—	0.0010	0.0019	0.0006	0.0012	0.0011	0.0003									
3			0.002	0.002	—	0.0012	0.0043	0.0006	0.0012	0.0025	0.0003									
4			0.0045	0.005	—	0.0034	0.010	0.0032	0.010	0.003	0.003									
5			0.013	0.020	—	0.010	0.023	0.010	0.023	0.010	0.010									
6			0.080	0.060	—	0.022	0.030	0.022	0.030	0.020	0.032									
7			0.040	0.30	—	0.057	0.033	0.0056	0.33	0.050	0.003									
8			0.016	0.10	—	0.20	0.11	0.0026	0.11	0.0025	0.001									
Metallic chromium	74-a	—																		
741-a*			—	0.11	—	0.009	0.12	—	—	—	—									
742-a*			—	0.30	—	0.012	(0.11)	—	—	—	—									
743-a*			—	0.20	—	(0.011)	0.31	—	—	—	—									
744-a*			—	0.28	—	0.017	0.67	—	—	—	—									
745-a*			—	0.62	—	0.096	0.91	—	—	—	—									
Metallic chromium	75	Type Kh0-K2																		
751			—	—	—	—	—	—	—	—	—									
752			—	—	—	—	—	—	—	—	—									
Metallic zinc	70-a	Type TsV, TsO, Ts1, Ts2																		
701-a*			—	—	—	0.0010	0.033	—	—	0.0050	0.029									
702-a*			—	—	—	0.0021	0.051	—	—	0.0019	0.0002									
703-a*			—	—	—	0.0043	0.11	—	—	—	—									
704-a*			—	—	—	0.008	0.20	—	—	—	—									

Table 31 continued

Material, Number of SS	Number of series	Brand of material	Contents of elements, %																	
			Bismuth	Antimony	Arsenic	Cadmium	Titanium	Manganese	Vanadium	Cobalt	Nickel									
High-purity aluminum	11	AV0, AV00, AV000, AV0000																		
Industrial-purity aluminum	12	A85, A8, A7, A6, A5, A0, A and AE																		
21									0.0020											
22									0.0039											
23									0.0084											
24									0.028											
25																				
26																				
Industrial-purity aluminum	13	—																		
27																				
28																				
29																				
30																				
Cobalt	—	—																		
1																				
2																				
3																				
4																				
5																				

Table 31 continued

Material, Number of SS	Number of series	Brand of material	Contents of elements, %									
			Bismuth	Antimony	Arsenic	Cadmium	Titanium	Manganese	Vanadium	Cobalt	Nickel	
Nickel	—	—	0.00009 0.00023 0.001 0.003 0.010 0.032 0.003 0.001	0.0001 0.0003 0.001 0.003 0.010 0.032 0.003 0.001	0.0005 0.0011 0.0022 0.0025 0.011 0.030 0.006 0.0022	— 0.0003 0.0008 0.0024 0.010 0.030 0.0024 0.0009	— — — — — — — —	0.0003 0.0006 0.0012 0.0033 0.010 0.030 0.027 0.20 0.070	— — — — — — — — —	0.0005 0.0016 0.004 0.010 0.030 0.10 0.30 0.50	— — — — — — — — —	
Metallic chromium	74-a	—	—	—	—	—	—	—	—	—	—	—
741-a*			—	—	—	—	—	—	—	—	—	—
742-a*			—	—	—	—	—	—	—	—	—	—
743-a*			—	—	—	—	—	—	—	—	—	—
744-a*			—	—	—	—	—	—	—	—	—	—
745-a*			—	—	—	—	—	—	—	—	—	—
Metallic chromium	75	Type Kh0-Kh2	0.010 0.0002	0.035 0.00032	0.033 0.0007	—	—	—	—	—	—	—
751			—	—	—	—	—	—	—	—	—	—
752			—	—	—	—	—	—	—	—	—	—
Metallic zinc	70-a	Type TsV, TsO Ts1, Ts2	—	—	—	0.0011 0.0021 0.010 0.027	—	—	0.020 0.014 0.053 0.09	—	—	—
701-a*			—	—	—	—	—	—	—	—	—	—
702-a*			—	—	—	—	—	—	—	—	—	—
703-a*			—	—	—	—	—	—	—	—	—	—
704-a*			—	—	—	—	—	—	—	—	—	—

Table 32

SS Number of Alloys	Number of series	Brand of alloy	Contents of elements, %														
			Silicon	Iron	Manganese	Titanium	Copper	Zinc	Calcium	Nickel	Magnesium	Chromium	Beryllium	Zirconium			
1	10	Type of raw silumin	6.55	0.54	0.63	0.22	0.22	0.26	0.24	—	—	—	—	—	—	—	—
2			9.12	0.93	0.19	0.13	0.14	0.16	0.02	—	—	—	—	—	—	—	—
3			10.95	0.30	0.078	0.066	0.07	0.076	0.11	—	—	—	—	—	—	—	—
4			13.0	0.16	0.032	0.023	0.026	0.023	0.06	—	—	—	—	—	—	—	—
791	69	Type D-20 Type AV	0.11	0.52	0.48	(0.012)	0.009	0.018	—	0.12	1.46	0.058	—	—	—	—	—
792	79		0.26	0.28	0.30	0.020	0.028	0.04	—	0.06	1.18	0.13	—	—	—	—	—
793			0.70	0.11	0.10	0.039	0.16	0.10	—	0.035	0.79	0.22	—	—	—	—	—
794			0.99	0.12	0.004	0.066	0.40	0.22	—	0.002	0.43	0.36	—	—	—	—	—
795			1.48	0.055	0.010	0.090	0.71	0.28	—	0.006	0.28	0.49	—	—	—	—	—
831	83	Type AK-4	1.25	0.69	0.046	0.056	1.71	0.51	—	1.64	2.00	—	—	—	—	—	—
832			0.92	0.92	0.14	0.080	2.05	0.31	—	1.42	1.68	—	—	—	—	—	—
833			0.50	1.22	0.26	(0.027)	2.39	0.14	—	1.06	1.46	—	—	—	—	—	—
834			0.21	1.50	0.40	0.18	2.66	0.086	—	0.80	1.09	—	—	—	—	—	—
841	84	Type V-95	0.10	0.68	0.90	—	2.42	4.24	—	—	1.28	0.35	—	—	—	—	—
842			0.70	0.11	0.31	—	1.70	(3.38)	—	—	2.65	0.055	—	—	—	—	—
843			0.28	0.27	0.53	—	2.00	5.45	—	—	2.21	0.10	—	—	—	—	—
844			0.38	0.37	0.65	—	1.50	7.35	—	—	2.23	0.25	—	—	—	—	—
845			0.60	0.55	0.14	—	1.13	6.36	—	—	1.83	0.37	—	—	—	—	—

Table 32 continued

SS Number of Alloys	Number of Series	Brand of Alloy	Contents of elements, %												
			Silicon	Iron	Manganese	Titanium	Copper	Zinc	Calcium	Nickel	Magnesium	Chromium	Beryllium	Zirconium	
851	85	Type of duralumin	0.98	0.42	0.68	0.048	2.09	0.36	—	0.15	1.04	0.14	—	—	
852			0.31	0.36	0.60	0.066	2.88	0.20	0.20	0.078	—	—	—	—	
853			0.069	0.75	0.35	0.082	4.34	(0.06)	(0.13)	0.64	0.072	—	—	—	—
854			0.59	0.51	0.77	0.032	4.79	(0.017)	(0.12)	1.45	(0.051)	—	—	—	—
855			1.30	0.19	1.10	0.066	5.12	0.26	0.03	0.34	0.018	—	—	—	—
856			1.18	0.29	0.27	0.17	1.64	0.81	0.05	2.58	(0.015)	—	—	—	—
857			0.16	0.51	1.02	0.092	3.80	0.68	0.038	2.01	0.32	—	—	—	—
861	86	Type AL-27 AL-27-1, AL-23 AL-23-1	0.34	0.34	0.17	—	0.21	0.15	—	—	5.01	—	0.16	—	
862			0.23	0.21	0.15	—	0.15	0.11	0.15	0.11	9.35	—	0.100	—	
863			0.16	0.14	0.22	0.12	0.098	0.089	11.42	—	—	—	—	0.043	0.096
864			0.10	0.071	0.125	0.072	0.050	0.019	—	—	—	12.66	—	0.032	0.066
865			0.054	0.038	0.068	0.046	0.037	0.036	—	—	—	6.68	—	0.015	0.034
866			0.047	0.030	0.089	0.025	0.021	0.021	—	—	—	8.43	—	0.009	0.020
867			0.23	(0.004)	(0.004)	0.16	(0.003)	—	—	—	—	9.84	—	0.021	0.19
1061*	86-a	Type AL-27 Type AK-5 Type AD-31 Type AL-11	4.85	0.80	0.31	—	0.24	13.0	—	—	0.53	—	—	—	
1062*			6.4	1.7	0.36	—	0.34	8.7	—	—	0.36	—	—	—	
1063*			7.9	1.2	0.80	—	0.50	6.6	—	—	0.32	—	—	—	
1064*			9.2	0.50	0.60	—	0.79	6.2	—	—	0.11	—	—	—	

Table 33

Bronze, Number SS	Number of series	Brand of bronze	Contents of elements, %												
			Aluminum	Iron	Zinc	Tin	Silicon	Nickel	Lead	Antimony	Manganese	Beryllium			
Aluminum-iron manganese	99	Type BRAZhmP 10-3-1.5	7.5	4.5	0.20	0.02	0.02	0.01	—	—	—	—	—	—	
			9.0	3.4	0.30	0.05	0.05	0.20	—	—	—	—	—	—	
			11.0	2.5	0.50	0.10	0.10	0.30	0.003	—	—	—	—	—	—
			12.5	1.5	0.80	0.15	0.15	0.50	0.005	—	—	—	—	—	—
Beryllium	97	Type BrB2	0.05	0.05	—	—	—	—	—	—	—	—	—	—	
			0.10	0.10	—	—	—	0.10	—	—	—	—	—	—	
			0.15	0.15	—	—	—	0.20	—	—	—	—	—	—	—
			0.20	0.25	—	—	—	0.40	—	—	—	—	—	—	—
Iron-aluminum	15	Type BRAZh9-4	8.7	4.7	1.51	—	—	—	—	—	—	—	—	—	
			9.57	2.25	0.39	—	—	0.062	—	—	—	—	—	—	
			10.07	2.16	0.03	—	—	0.10	—	—	—	—	—	—	—
			12.04	1.65	0.19	—	—	0.3	—	—	—	—	—	—	—
Silicon-manganese	98	Type BrKMts 3-1	—	0.11	0.27	0.10	—	—	—	—	—	—	—	—	
			—	0.26	0.43	0.20	3.94	0.15	—	—	—	—	—	—	
			—	0.35	0.6	0.25	3.70	0.19	—	—	—	—	—	—	
			—	0.6	0.94	0.31	3.23	0.25	—	—	—	—	—	—	
Tin-zinc	100	Type BrOtZ 4-3	—	0.07	4.5	3.0	—	—	—	—	—	—	—	—	
			—	0.09	4.05	3.5	—	—	—	—	—	—	—	—	
			—	0.04	3.35	4.2	—	—	—	—	—	—	—	—	
			—	0.02	2.75	4.65	—	—	—	—	—	—	—	—	
Beryllium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	
			—	—	—	—	—	—	—	—	—	—	—	—	

Table 34

Brass, Number of SS	Number of series	Brand of Brass	Contents of elements, %										
			Aluminum	Iron	Tin	Silicon	Nickel	Lead	Antimony	Bismuth	Manganese		
Brass	90	Type L 62	—	0.25	—	—	0.10	0.15	0.002	0.005	—	—	—
901*			—	0.15	—	—	0.18	0.08	0.0035	0.0027	—	—	—
902*			—	0.09	—	—	0.32	0.04	0.006	0.0014	—	—	—
903*			—	0.05	—	—	0.60	0.02	0.01	0.0007	—	—	—
904*			—										
Iron-manganese	89	Type LZhMTs 59-1-1	0.5	0.4	0.9	—	—	0.3	0.004	—	0.4	—	—
891*			0.27	0.63	0.56	—	—	0.2	0.006	—	0.53	—	—
892*			0.14	0.94	0.33	—	—	0.14	0.01	—	0.75	—	—
893*			0.06	1.4	0.2	—	—	0.1	0.015	—	1.0	—	—
894*													
Lead	82	Type LS-59-1	0.073	0.16	0.43	0.059	0.88	1.82	0.019	(0.0003)	—	—	—
821			0.32	0.20	0.30	0.19	—	1.42	0.016	(0.0003)	—	—	—
822			0.15	0.29	0.22	0.30	0.68	1.08	0.010	(0.0005)	—	—	—
823			0.54	0.43	0.12	0.58	0.49	0.73	(0.005)	(0.0004)	—	—	—
824			0.24	1.06	0.38	(0.10)	0.17	2.13	0.0011	(0.0002)	—	—	—
825													

Table 35

Magnesium, Number of SS	Number of series	Brand of magnesium	Contents of elements, %										
			Aluminum	Iron	Zinc	Silicon	Nickel	Manganese	Copper	Beryllium			
Magnesium		Type MA2, MA2-1											
601	60		5.52	—	0.22	0.05	—	0.10	0.12	—			
602			4.50	—	0.64	0.11	—	0.32	0.08	—			
603			3.55	—	1.24	0.20	—	0.55	0.054	—			
604			2.57	—	1.74	0.28	—	0.80	0.010	—			
Magnesium with beryllium	48	—											
481			4.3	0.034	0.25	0.10	(M. 0.001)	0.08	0.017	(0.0002)			
482			6.3	0.022	0.78	0.16	(M. 0.001)	0.18	0.084	(0.0010)			
483			7.4	0.021	0.45	0.21	(M. 0.001)	0.38	0.13	(0.0005)			
484			9.5	0.029	1.20	0.27	(M. 0.001)	(0.62)	0.20	(0.0009)			

Table 36

SS Number of alloy	Number of series	Brand of alloy	Contents of elements, %					
			Alumi- num	Iron	Silicon	Manga- nese	Oxygen	Hydrogen
521*	52	Type VT-6	—	—	—	—	0.10	—
522*			—	—	—	—	0.20	—
523*			—	—	—	—	0.30	—
524*			—	—	—	—	0.60	—
525*			—	—	—	—	0.80	—
611*	61	Type OT-4	5.5	0.05	0.02	0.40	—	—
612*			3.9	0.12	0.06	0.66	—	—
613*			2.5	0.36	0.08	1.30	—	—
614*			1.4	0.60	0.12	2.10	—	—
621	62	Type VT1-1	—	0.080	(0.010)	—	—	—
622			—	0.029	0.026	—	—	—
623			—	0.16	0.064	—	—	—
624			—	0.30	0.11	—	—	—
722-a*	—	Type VT-14	—	—	—	—	—	0.010
723-a*			—	—	—	—	—	0.016
724-a*			—	—	—	—	—	0.026
725-a*			—	—	—	—	—	0.007

Table 37

Number of SS of slag	Contents of elements and of their compounds, %						
	General iron in conversion to iron oxide	Calcium oxide	Magnesium oxide	Silicon dioxide	Manganous oxide	Aluminum oxide	Phosphorus pentoxide
81	26.21	22.9	6.59	25.36	16.08	2.15	(0.86)
82	11.49	43.2	9.71	19.27	9.36	6.03	(0.83)
83	17.12	47.8	6.43	8.64	5.07	7.64	(5.80)
84	18.00	47.6	9.77	(8.4)	3.17	6.37	(2.50)
85	34.54	19.52	4.16	(21.0)	17.20	(1.48)	(1.49)
86	27.31	30.0	7.46	22.0	10.25	2.02	(1.11)
87	12.31	53.4	8.62	17.40	4.14	2.8	(0.73)

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