A UNITED STATES DEPARTMENT OF COMMERCE PUBLICATION

NBS SPECIAL PUBLICATION 260-30

Standard Reference Materials.

STANDARD SAMPLES ISSUED IN THE USSR

(A translation from the Russian)

U.S.
DEPARTMENT
OF
COMMERCE
National
Bureau
of
Standards

UNITED STATES DEPARTMENT OF COMMERCE • Maurice H. Stans, *Secretary*
NATIONAL BUREAU OF STANDARDS • Lewis M. Branscomb, *Director*

Standard Reference Materials:

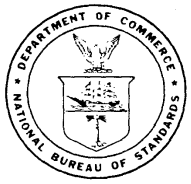
Standard Samples Issued in the USSR

R. S. Gorozhanina, A. Y. Freedman, and A. B. Shaievitch
All-Union Scientifie Research Institute of Metrology
Sverdlovsk Branch, All-Union Scientific Research Center
of the State Service for Standard Samples

Translated from the Russian by

M. C. Selby

Institute for Basic Standards
National Bureau of Standards
Boulder, Colorado 80302



National Bureau of Standards Special Publication 260-30

Nat. Bur. Stand. (U.S.), Spec. Publ. 260-30, 86 pages (June 1971)
CODEN: XNBSA

Issued June 1971

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
(Order by SD Catalog No. C13.10:260-30). Price $1.00
Stock Number 0303-0871

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

All-Union Scientific Research Institute
of Metrology
Sverdlovsk Branch
All-Union Scientific Research Center
of the State Service for Standard Samples

STANDARD SAMPLES
ISSUED IN THE USSR

Prepared by:
R. S. Gorozhanina, A. Y. Freedman, A. B. Shaievitch

Editor
Candid. Tech. Sciences A. B. Shaievitch

Published by the Committee of Standards, Measures and Measuring
Instruments of the Soviet of Ministers of the USSR, 1969

Standard
samples
issued
in the USSR

Editor

N. P. Shchukina

Artistic designer

N. A. Savenko

Technical Editor

N. P. Sizova

Proofreaders:

N. P. Shnyder
G. A. Gavrilkina

T-07116. Turned in to the print setter 16/XII, 1968
Approved for printing 29/IV, 1969
Format 70 X 108 1/16. Printing paper No. 1
5.25 l.l.

4.81 uch.-izd. l. Circulation 3000 copies.
Edition No. 2037/12. Without payment.
Publishing house of standards.
Moscow K-1 Stchusev Street, No. 4

Printing house "Moscovsikii pechatnik"
Moscow, Lialin lane, 6. Zak. 2028

CONTENTS

UDK 389:620.1:543.08

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 indispensible 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 of "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 uniority 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 prevelant 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.

Part 1

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 D^2 means a load in kg of 30 times the square of the diameter of the ball used in the hardness test, i.e., 30 D^2 = 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_z32÷16	+15
	▽6÷▽9	R_a2÷0.25	−20
Cast iron	▽10÷▽12	R_a0.125÷0.032	±20
	▽13	R_z0.08	

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	0.1 ÷ 0.3 W/m.degree ±	
	Dependence of the thermal conductivity coefficient on temperature within 20 to 80°C	$\lambda = 0.18 (1 + 3.3 10^{-4} t)$ W/m.degree	
	Dependence of the temperature-conduction coefficient upon temperature	$\alpha = 1.2 (1 - 1.7 . 10^{-3} t) . 10^{-7}$ m^2/sec	

Table 3 continued

Substance	Certified characteristic	Value of certified characteristic	Relative error, %
Corundum	Enthalpy Specific heat	0÷1500°C 0÷1500°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	
	General reflection coefficient 0.9	± (0.2 - 0.5)%

Table 4 continued

Type of SS	Certified characteristic	Relative error
SS of angle of rotation of the plane of polarization (quartz polarimetric plates)	Set 100^0S, 75^0S, 50^0S, 25^0S-clockwise, 25^0S-counterclockwise Set 100^0S, 80^0S, 60^0S, 40^0S-clockwise	$0.05 \div 0.005°S$

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 diamagnetic 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 magnetic-dielectrics, thin-sheet iron-nickel alloys	Ac 10 KHz 1 MHz	Initial permeability	1÷5
		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) polycrystal	—	Number of paramagnetic centers (intervals of values) $10^{13} \div 10^{16}$	—
Carbonized glucose	—	Number of paramagnetic centers (intervals of values) $10^{13} \div 10^{16}$	—

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, $tg\delta$, are certified (at 9400 MHz). The ranges of the dielectric constants, ϵ, and $tg\delta$ 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	$2.10^1 \div 2.10^5$ disintegrations/sec.	I II III	5 7 10
Natural uranium	Activity	$2 \div 2.10^2$ disintegrations/sec.	I II III	5 7 10
Uranium 234	Activity	$2 \div 2.10^2$ disintegrations/sec.	I II III	5 7 10
Sources of β Strontium-90 + + yttrium-90	Activity	$2.10^2 \div 2.10^7$ disintegrations/sec.	I II III	5 10 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	$2.10^2 \div 2.10^5$ disintegrations/sec.	I	5
			II	10
			III	15
Cobalt-60	Activity	$2.10^2 \div 2.10^5$ disintegrations/sec.	I	5
			II	10
			III	15
γ-sources				
Cobalt-60	Activity	$1.10^{-3} \div 5$ curie	I	$5 \div 7$ in the interval $10^{-6} \div 10^{-4}$ curie
				5 in the interval $10^{-4} \div 5$ curie
			II	$7 \div 10$ in the interval $10^{-6} \div 10^{-4}$ curie
				7 in the interval $10^{-4} \div 5$ curie
Cesium-137	Activity	$1.10^{-3} \div 5$ curie	I	$5 \div 7$ in the interval $10^{-6} \div 10^{-4}$ curie
				5 in the interval $10^{-4} \div 5$ curie
			II	$7 \div 10$ in the interval $10^{-6} \div 10^{-4}$ curie
				7 in the interval $10^{-4} \div 5$ curie
Radium-226	Activity	$1.10^{-3} \div 5$ curie	I	$5 \div 7$ in the interval $10^{-6} \div 10^{-4}$ curie
				5 in the interval $10^{-4} \div 5$ curie
			II	$7 \div 10$ in the interval $10^{-6} \div 10^{-4}$ curie
				7 in the interval $10^{-4} \div 5$ curie
Yttrium-88, cadmium-109, cobalt-57, cobalt-60, manganese-54, sodium-22, mercury-203, cerium-137, zinc-65	Activity of sample spectrometric sources radiation	$10^3 \div 10^5$ disintegrations sec.	—	5

Table 6 continued

Type SS	Certified characteristic	Value of certified characteristic	Class	Limiting error %
Non-emanating radium-226	Activity	$10^{-9} \div 5.10^{-7}$ 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	±(2÷3) ±(3÷5)
Sources of α				
Plutonium - 239	External radiation	$2.10^{2} \div 2.10^{5}$ disintegrations/sec.	I II III	3 5 7
Natural uranium	External radiation	$2.10^{1} \div 2.10^{5}$ disintegrations/sec.	I II III	3 5 7
Uranium-234	External radiation	$2.10^{1} \div 2.10^{5}$ disintegrations/sec.	I II III	3 5 7
Sources of β				
Strontium-90 + yttrium-90	External radiation	$2.10^{2} \div 2.10^{7}$ disintegrations/sec.	I II III	3 5 10
Thallium-204	External radiation	$2.10^{2} \div 2.10^{5}$ disintegrations/sec.	I II III	3 5 10
Cobalt-60	External radiation	$2.10^{2} \div 2.10^{5}$ disintegrations/sec.	I II III	3 5 10
Sources of γ				
Cobalt-60	Power of dose of exposure (at a distance of 1 meter)	$3.10^{-8} \div 1,5.10^{-3}$ (roentgen) r/sec.	I II	1,5÷3 4
Cesium-137	Same	$2.10^{-8} \div 4,5.10^{-4}$ (roentgen) r/sec.	I II	1,5÷3 4
Radium-226	Same	$2.10^{-8} \div 4.10^{-5}$ (roentgen) r/sec.	I II	1,5÷3 4
Cobalt-60	Same	$2.10^{-5} \div 1,3.10^{-5}$ (roentgen) r/sec.	III	5÷7
Cesium-137	Same	$2.10^{-8} \div 4.10^{-4}$ (roentgen) r/sec.	III	5÷7
Radium-226	Same	$10^{-6} \div 2.10^{-1}$ 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	Luminesence 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 NA(Tl)	Luminesence 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 ± 0.5/M
4	70 ± 0.5/M
5	91 ± 0.5/M
7	95 ± 0.5/M
8	99 ± 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 pharmaceutic and biochemical compounds and of a series of others.

PART II

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
	1 - 200 mg	I	±1
		II	±1.5
Sample solutions	10^{-8} - 10^{-5} mg/cm^3	I	±1.5
			±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 μg/g
3/66	Amazonite-microcline	Rubidium contents Contents of radiogenic strontium	About 0.8% About 4.0 μg/g
1/65	Felsitic quartzitic liparitic porphyry	Contents of potash Contents of radiogenic argon	4.013 ± 0.38% 79.27 ± 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	Manganese	Silicon	Phosphorus	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-l*	Foundry coke	KK	2.91	—	1.35	3.12	0.21	0.015	—	0.18	0.20	—	—
17-n	Foundry coke	IK-1											
62-V*	Foundry coke	IK-1	—	—	—	—	0.084	—	—	—	—	—	—
61-g*	Foundry coke	IK-1	—	—	-	—	—	0.098	—	—	—	—	—
221-a	Foundry chrom-nickel	CHNK3-2	—	—	0.54	3.19	0.37	0.021	—	—	—	2.27	0.93
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	—	0.12	—	—	—
101-V*	Superior quality	IIBK-3	4.08	—	0.83	0.27	0.020	0.013	—	—	—	—	—

Number of SS	Ferroalloy	Brand of ferroalloy	Contents of						
			Silicon	Manga-nese	Carbon	Chrome	Tungsten	Molyb-denum	Vana-dium
269-a*	Ferroboron	—	2.40	—	0.26	—	—	—	—
254	Ferroboron	БжР2							
77-V	Ferrovanadium	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	Ferroniobium	НБ1	11.18	—	0.06	—	—	—	—
301	Ferroniobium as an ingredient of non-ferrous metals								
36-V	Ferrosilicon	Си 75	76.2	0.13	0.07	0.09	—	—	—
37-a*	Ferrosilicon	Си 45	44.27	0.35	0.046	—	—	—	—
38-V	Ferrosilicon	Си 10	9.38	1.22	1.74	—	—	—	—
222-a	Ferrotitanium	Ти 2	4.18	—	0.05	—	—	—	—
306	Ferrochromium	Хр000	—	—	0.04	—	—	—	—
200-b*	Ferrochromium	Хр1	1.58	—	1.06	63.8	—	—	—
243	Ferrochromium	Хр6	0.27	—	7.06	69.0	—	—	—
308*	Ferrochromium	Хрн1	0.80	—	0.023	65.94	—	—	—
175	Calcium-silicon	Касн1	60.53	—	—	—	—	—	—
176-a*	Manganese-silicon	Смн20	21.10	68.8	0.64	—	—	—	—
285	Manganese-silicon	Смн17	—	—	—	—	—	—	—
210	Chromium-silicon	Сихр 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
—	—	—	—	0.031	0.28	0.38	—	—	—	—	6.88	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	0.098	0.027	—	—	—	—	—	—	—	—	0.003
—	—	—	0.037	0.08	—	0.09	—	—	—	—	—	—	0.01
—	—	—	0.02	0.007	3.9	0.04	—	—	—	—	—	—	—
—	—	—	0.263	0.001	—	—	4.59	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	0.39	0.014	—	—	—	—	—	—	—	—	—
—	—	—	0.047	0.066	—	0.61	—	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	0.001	—	—	—	—	—	—	—	—	—
—	—	—	0.011	0.078	—	—	—	—	—	—	—	—	—
—	—	8.3	0.029	0.029	0.10	—	—	—	—	—	—	—	—
—	30.10	—	0.039	0.050	1.57	—	2.25	—	—	—	—	—	—
—	—	—	0.058	—	—	—	—	—	—	—	—	—	—
—	—	—	0.213	—	—	—	—	—	—	—	—	—	—
—	—	—	0.031	0.001	0.97	—	16.35	—	—	—	—	—	—
1.62	—	—	0.082	0.005	5.70	—	—	—	—	31.4	—	—	—

Table 12

Number of SS	Steel	Brand of steel	Contents of elements, %										
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chrome	Nickel	Aluminium	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	—	—	—	—	—	—	—	—	—	—	0.013	—
207-a*	Open hearth for nitrogen	—	—	—	—	—	—	—	—	—	—	0.006	—
207-b	Open hearth for nitrogen	Steel 10											
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	Chrome	Nickel	Aluminum	Copper	Nitrogen	Arsenic
20-г*	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-т	Open hearth for carbon and other elements		0.33	0.29	0.60	0.044	0.013	0.16	0.10	—	0.18	—	—
7-р*	SS for phosphorus		—	—	—	—	0.028	—	—	—	—	—	—
7-s	SS for phosphorus	Steel 20											
9-т	SS for phosphorus	—	—	—	—	—	0.061	—	—	—	—	—	—

Table 13

Number of SS	Steel	Brand of steel	Contents of elements, %										
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chrome	Nickel	Vanadium	Aluminum	Copper	Arsenic
5-р*	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-е	Low-carbon	A											
312	Electrotechnical	Э22	0.093	2.89	0.37	0.016	0.032	0.10	—	—	—	—	—
155-У	Transformer	—	0.10	4.18	0.13	0.004	0.016	0.11	—	—	0.057	0.18	—
284-а*	Transformer	—	0.044	3.13	0.075	0.003	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)	35ГС	0.345	0.72	1.01	0.016	0.048	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	20Х	—	—	—	—	—	0.96	0.10
33-c*	Chrome	ШХ15	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	38ХВФЮА	0.38	0.23	0.25	0.005	0.012	1.66	0.11
223-a	Chrome-tungsten-vanadium-aluminum	38ХВФЮА	—	—	—	—	—	—	—
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-j	Nickel-molybdenum-chrome	35ХН3МА	—	—	—	—	—	—	—

Table 14 continued

Number of SS	Steel	Brand of steel	Contents of elements, %						
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chrome	Nickel
258-a	Chrome-silicon-manganese	ШХ15СГ	1.03	0.47	1.07	0.007	0.012	1.47	0.09
157-v*	Chrome-silicon-nickel-copper	15ХСНД (НЛ-2)	0.18	0.62	0.48	0.024	0.026	0.78	0.43
32-e	Chrome-manganese	50ХГ	0.51	—	0.98	—	—	1.11	—
215-a*	Chrome-manganese-silicon	15ХГСА	0.20	0.71	0.97	0.013	0.014	0.73	0.10
109-g*	Chrome-manganese-silicon	30ХГСА	0.36	1.22	0.97	0.008	0.021	0.90	0.20
119-g*	Chrome-manganese-silicon	35ХГСА	0.34	1.27	1.03	0.020	0.020	1.35	0.14
131-v*	Chrome-manganese-molybdenum	38ХГМ (40ХГМ)	0.40	0.20	0.99	0.010	0.023	1.01	0.17
127-g*	Chrome-manganese-titanium	16ХГТА (ЭИ274)	0.16	0.38	1.15	0.010	0.021	1.62	0.11
246-a*	Chrome-manganese-nickel-titanium-boron	20ХГНТРА	0.17	0.28	0.99	0.020	0.029	0.59	0.47
245-a	Chrome-molybdenum	30ХМ	0.30	0.27	0.56	0,009	0.018	0.99	0.18
86-d*	Chrome-molybdenum-aluminum	38ХМЮА	0.39	0.27	0,44	0.004	0.018	1.48	0.19
310	Chrome-molybdenum-vanadium	Р2М	0,27	0.33	0.58	0.015	0.021	1.44	0.22
256-a	Chrome-nickel	45ХН	0.47	0,26	0.66	0,024	0.018	0.51	1.05
30-j	Chrome-nickel-vanadium	20ХН4ФА	0.22	0,29	0.36	0,010	0.015	0.93	3.86
104-g	Chrome-nickel-tungsten	18Х2Н4ВА (18ХНВА)	0.16	0.30	0.42	0,010	0.016	1.51	4.21
31-j*	Chrome-nickel-molybdenum	33ХН3МА	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	35ГС	—	—	—	—	—	—	0.08	—	—
252-a*	Manganese	45Г2	—	—	—	—	—	—	—	—	—
240-a*	Manganese-silicon-copper	10Г2СД (МК)	—	—	—	0.02	—	—	0.07	—	—
224-a*	Molybdenum	30МА	—	0.50	—	—	—	—	—	—	—
209-b	Nickel	13Н2А	—	—	—	—	—	—	0.17	—	—
208-a*	Nickel	21Н5А	—	—	—	—	—	—	0.14	—	—
21-e	Chrome	20Х	—	—	—	—	—	—	—	—	—
33-c*	Chrome	ШХ15	—	—	—	—	—	—	0.12	—	—
225-a	Chrome	38ХА	—	—	—	—	—	—	0.19	—	—
151-b*	Chrome with boron	15ХРА	—	—	—	—	—	—	0.11	—	0.004
124-g*	Chrome-vanadium	50ХФА	—	—	0.17	—	—	—	0.16	—	—
223	Chrome-tungsten-vanadium-aluminum	38ХВФЮА	0.32	—	0.18	—	0.49	—	—	—	—
223-a	Chrome-tungsten-vanadium-aluminum	38ХВФЮА	—	—	—	—	—	—	—	—	—
28-j*	Chrome-nickel	12ХН3А	—	—	—	—	—	—	0.17	—	—
28-i	Chrome-nickel	12ХН3А									
29-e	Chrome-nickel	12Х2Н4А	—	—	—	—	—	—	0.12	—	—
31-i	Chrome-nickel-molybdenum	35ХН3МА									

Table 14 continued

Number of SS	Steel	Brand of steel	Contents of elements, %								
			Tungsten	Molybdenum	Vanadium	Titanium	Aluminum	Nickel	Copper	Cobalt	Boron
258-a	Chrome-silicon-manganese	ШХ15СГ	—	—	—	—	—	—	0.14	—	—
157-V*	Chrome-silicon-nickel-copper	15ХСНД (НЛ-2)	—	—	—	—	—	—	0.32	—	—
32-e	Chrome manganese	50ХГ	—	—	—	—	—	—	0.12	—	—
215-a*	Chrome-manganese-silicon	15ХГСА	—	—	—	—	—	—	0.13	—	—
109-g*	Chrome-manganese-silicon	30ХГСА	—	—	—	—	—	—	0.20	—	—
119-g*	Chrome-manganese-silicon	35ХГСА	—	—	—	—	—	—	—	—	—
131-V*	Chrome-manganese-molybdenum	38ХГМ (40ХГМ)	—	0.23	—	—	—	—	0.20	—	—
127-g*	Chrome-manganese-titanium	16ХГТА (ЭИ274)	—	—	—	0.10	—	—	—	—	—
246-a*	Chrome-manganese-nickel-titanium-boron	20ХГНТРА	—	—	—	0.038	—	—	—	—	0.005
245-a	Chrome-molybdenum	30ХМ	—	0.21	—	—	—	—	0.19	—	—
86-d*	Chrome-molybdenum-aluminum	38ХМЮА	—	0.22	—	—	0.92	—	—	—	—
310	Chrome-molybdenum-vanadium	Р2М	—	1.03	0.25	—	—	—	0.13	—	—
256-a	Chrome-nickel	45ХН	—	—	—	—	—	—	0.18	—	—
30-j	Chrome-nickel-vanadium	20ХН4ФА	—	—	0.22	—	—	—	0.15	—	—
104-g	Chrome-nickel-tungsten	18Х2Н4ВА (1Х2НВА)	0.90	—	—	—	—	—	0.17	—	—
31-j*	Chrome-nickel-molybdenum	33ХН3МА	—	0.27	—	—	—	—	0.19	—	—

Table 15

Number of SS	Steel	Brand of steel	Contents of elements, %															
			Carbon	Silicon	Manganese	Sulphur	Phosphorus	Chrome	Nickel	Tungsten	Molybdium	Vanadium	Titanium	Aluminum	Niobium	Copper	Cobalt
107-a*	Vanadium	Ф	1.03	0.20	0.31	0.013	0.012	0.18	0.17	—	—	0.30	—	—	—	—	—
122-g	Tungsten	Р9															
26-e*	Tungsten	Р18	0.79	0.37	0.22	0.009	0.026	4.13	0.15	17.78	0.34	1.23	—	—	—	—	—
251-b*	Tungsten-cobalt	Р9К5 (ЭИ705)	0.97	0.27	0.29	0.009	0.029	4.10	0.17	9.47	0.28	2.25	—	—	—	—	5.21
18-l*	Carbon steel	У8А	0.78	—	—	—	—	—	—	—	—	—	—	—	—	—	—
293-a	Carbon steel	У8А															
14-m	Carbon steel	У10А	1.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—
102-g*	Carbon steel	У12А	1.16	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27-g	Chrome steel	7Х3(Э7Х3)	0.65	0.24	0.33	0.010	0.018	3.34	—	—	—	—	—	—	—	—	—
247-a*	Chrome-vanadium	Х12Ф1	1.32	0.33	0.39	0.011	0.017	11.63	0.33	—	—	0.76	—	—	—	—	—
129-b	Chrome-tungsten	4Х8В2 (ЭИ160)	0.42	0.24	0.24	0.006	0.023	8.02	0.15	2.80	—	—	—	—	—	—	—
257	Chrome-tungsten	ХВ5	1.39	0.16	0.115	0.007	0.011	0.60	0.08	4.93	—	0.18	—	—	—	—	—
122-V	Chrome-tungsten-vanadium	Р9(ЭИ262)	0.90	0.26	0.39	0.003	0.021	4.17	0.22	8.77	0.28	2.17	—	—	—	—	—
135	Chrome-tungsten-vanadium	3Х2В8Ф (3Х2В8)	0.33	0.24	0.30	0.006	0.021	2.49	0.18	7.77	—	0.29	—	—	—	—	—
259-a	Chrome-tungsten-vanadium	9Х5ВФ (Х5ВФ)	0.11	0.64	0.18	0.009	0.015	5.60	0.10	0.58	—	0.55	—	—	—	0.11	—
146-a	Chrome-tungsten-silicon	5ХВ2С (5ХВС)	0.48	0.74	0.33	0.009	0.025	1.02	0.15	2.30	—	—	—	—	—	—	—
145-b	Chrome-tungsten-manganese	ХВГ	1.01	0.20	0.93	0.008	0.019	1.03	0.20	1.39	—	—	—	—	—	—	—
53-d*	Chrome-molybdium	Х12М	1.42	0.20	0.35	0.007	0.024	10.90	0.21	—	0.50	0.25	—	—	—	0.14	—
53-e	Chrome-molybdium	Х12М															
303	Chrome-nickel-tungsten	5ХНВ															
326	Chrome-nickel-molybdenum	5ХНМ	0.57	0.22	0.68	0.012	0.020	0.73	1.48	—	0.21	—	—	—	—	0.16	—
248-a*	Chrome-nickel-titanium	5ХНТ	0.53	0.23	0.625	0.013	0.016	1.09	1.50	—	—	—	0.14	—	—	—	—

Table 16

Number of SS	Steel	Brand of steel	Contents of elements, %						
			Carbon	Silicon	Manganese	Sulfur	Phosphorus	Chrome	Nickel
34-c*	Chrome steel	2X13(ЭЖ-2)	0.19	0.31	0.38	0.003	0.022	13.56	0.26
34-j	Chrome steel	2X13							
108-b*	Chrome silicon	4X9C2 (X9C2)	0.51	2.47	0.49	0.018	0.019	8.89	—
237	Chrome-silicon-molybdenum	4X10C2M (X10C2M, ЭИ107)	0.38	2.27	0.40	0.004	0.021	9.42	0.18
134-V*	Chrome-nickel	X23H13 (ЭИ319)	0.15	0.75	1.26	0.008	0.022	23.01	13.08
111-b	Chrome-nickel-tungsten-molybdenum	4X14H14B2M (ЭИ69)	0.47	0.44	0.48	0.003	0.021	13.66	13.79
249-a*	Chrome-nickel-tungsten-vanadium-boron	13X14H BФРА (ЭИ736)	0.15	0.33	0.57	0.012	0.025	14.31	3.27
280	Chrome-nickel-tungsten-molybdenum-vanadium	1X12H2BMФ (ЭИ961)	0.127	0.50	0.20	0.010	0.029	11.05	1.65
307	Chrome-nickel-tungsten-molybdenum-niobium-boron	X16H16B2 MБР (ЭИ184, ЭИ713)	0.087	0.32	0.38	0.010	0.027	16.19	15.98
158-b*	Chrome-nickel-cobalt-tungsten-molybdenum-niobium	ЭИ434	0.37	0.87	0.90	0.015	0.012	12.51	11.97
133-b	Chrome-nickel-silicon-tungsten-molybdenum	X14H14CB2M (ЭИ240)	0.50	3.30	0.36	0.006	0.022	13.72	14.16
125-b	Chrome-nickel-silicon	3X13H7C2 (X13H7C2, ЭИ72)	0.29	2.58	0.43	0.010	0.024	12.00	6.83
128-b	Chrome-nickel-manganese	2X13H4Г9 (X13H4Г9, ЭИ100)	0.19	0.55	8.78	0.014	0.029	13.54	4.25
159-b*	Chrome-nickel-molybdenum with nitrogen	X16H25AM (ЭИ395)	0.10	0.71	1.45	0.012	0.015	16.21	25.08

Table 16 continued

Number of SS	Steel	Brand of steel	Contents of elements, %									
			Tungsten	Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Copper	Cobalt	Boron	Nitrogen
34-e*	Chrome steel	2X13 (ЭЖ-2)	—	—	—	—	—	—	—	—	—	—
34-j	Chrome steel	2X13	—	—	—	—	—	—	—	—	—	—
108-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 (ЭИ69)	2.36	0.315	—	—	—	—	—	—	—	—
249-a*	Chrome-nickel-tungsten-vanadium-boron	13X14H BФРА (ЭИ736)	1.95	—	0.25	0.027	—	—	—	—	0.005	—
280	Chrome-nickel-tungsten-molybdenum-vanadium	1X12H2BMФ (ЭИ961)	1.67	0.44	0.26	—	—	—	—	—	—	—
307	Chrome-nickel-tungsten-molybdenum-niobium-boron	X16H16B2 MБР (ЭИ184, ЭИ713)	2.65	0.60	—	—	—	0.80	—	—	0.004	—
158-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	20Х3МВФ (ЭИ415)	0.19	0.32	0.39	0.009	0.017	2.71	0.18
170-b*	Chrome-nickel-manganese	Св. Х20Н10Г6 (ЭИ478)	0.10	0.45	6.46	0.015	0.028	18.72	9.68
314*	Chrome-nickel-manganese	0Х20Н10Г6 (ЭП109)	0.03	0.38	5.93	0,007	0,015	21.30	10.45
260	Chrome-nickel-manganese-vanadium-molybdenum-silicon	4Х15Н7Ф2МС (ЭИ388)	0.45	0.69	6.67	0.007	0.032	15.24	6.80
231-a	Chrome-nickel-manganese-molybdenum-vanadium-niobium	4Х12Н8Г8 МФБ (ЭИ481)	0.37	0.56	9.42	0.004	0.026	12.18	8.41
316	Chrome-nickel-molybdenum-copper-titanium	0Х23Н28М3 Д3Т (ЭИ943)	0.05	0.64	0.42	0.005	0.020	23.78	27.62
164-9*	Chrome-nickel-molybdenum-titanium	Х17Н13М3Т (Х18Н12М3Т, ЭИ432)	0.11	0.78	1.43	0.010	0.033	17.29	12.77
160-b*	Chrome-nickel-niobium	0Х18Н12Б (Х18Н11Б, ЭИ402)	0.09	0.61	1.08	0.003	0.020	18.49	13.07
52-j	Chrome-nickel-titanium	Х18Н9Т (1Х18Н9Т, ЭЯ1Т	0.10	0.50	1.20	0.005	0.026	17.80	9.01
315*	Chrome-nickel-titanium-boron	Х12Н20Т3Р (ЭИ696)	0.05	0.44	0.48	0.007	0.019	10.88	19.43
315a	Chrome-nickel-titanium-boron	Х12Н20Т3Р (ЭИ696)							
279	Chrome-titanium	Х17Т (ЭИ636)	0.055	0.56	0.43	0.010	0.021	18.30	0.34
218-a	Chrome-titanium-vanadium	Х18ТФ (ЭИ635)	0.048	0.51	0.44	0.008	0.022	18.03	0.25

Table 16 continued

Number of SS	Steel	Brand of steel	Contents of elements, %									
			Tungsten	Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Copper	Cobalt	Boron	Nitrogen
236	Chrome-molybdenum-tungsten-vanadium	20Х3МВФ (ЭИ415)	—	0.43	0.71	—	—	—	—	—	—	—
170-b*	Chrome-nickel-manganese	Св. Х20Н10Г6 (ЭИ478)	—	—	—	—	—	—	—	—	—	—
314*	Chrome-nickel-manganese	0Х20Н10Г6 (ЭП109)	—	—	—	—	—	—	0.10	—	—	—
260	Chrome-nickel-manganese-vanadium-molybdenum-silicon	4Х15Н7Ф2МС (ЭИ388)	—	0.99	1.85	—	—	—	—	—	—	—
231-a	Chrome-nickel-manganese-molybdenum-vanadium-niobium	4Х12Н8Г8 МФБ (ЭИ481)	—	1.15	1.39	0.06	—	0.37	—	—	—	—
316	Chrome-nickel-molybdenum-copper-titanium	0Х23Н28М3 Д3Т (ЭИ943)	—	2.77	—	0.71	—	—	2.90	—	—	—
164-g*	Chrome-nickel-molybdenum-titanium	Х17Н13М3Т (Х18Н12М3Т, ЭИ432)	—	3.50	—	0.34	—	—	0.22	—	—	—
160-b*	Chrome-nickel-niobium	0Х18Н12Б (Х18Н11Б, ЭИ402)	—	—	—	—	—	0.99	—	—	—	—
52- j	Chrome-nickel-titanium	Х18Н9Т (1Х18Н9Т, ЭЯ1Т)	—	—	—	0.51	—	—	0.15	—	—	—
315*	Chrome-nickel-titanium-boron	Х12Н20Т3Р (ЭИ696)	—	—	—	2.93	0.23	—	0.25	—	0.008	—
315a	Chrome-nickel-titanium-boron	Х12Н20Т3Р (ЭИ696)										
279	Chrome-titanium	Х17Т (ЭИ636)	—	0.36	0.37	0.73	—	—	—	—	—	—
218-a	Chrome-titanium-vanadium	Х18ТФ (ЭИ635)	—	0.35	0.34	0.69	—	—	—	—	—	—

Table 17

Number of SS	Alloy	Brand of alloy	Contents of elements, %							
			Carbon	Silicon	Manganese	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	45Н	0.021	0.23	0.72	0.006	0,005	0.033	45.98	—
244-b	Nickel	45Н								
276	Nickel	ЭИ99								
286	Nickel	ХН 60МВТЮ (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 (ЭП233)	0.02	0.19	0.86	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	—	48.4	—	—
324*	Aluminum-nickel-copper-cobalt-titanium	ЮНДК24Т	—	4.0	7.5	—	2.5	32.5	—	—	—	—
318*	Cobalt-chrome-nickel-molybdenum	40КХНМ (К40НХМ, ЭИ995)	7.08	—	—	—	—	39.55	—	—	—	—
244-a	Nickel	45Н	—	—	—	—	0.10	—	—	—	—	—
244-b	Nickel	45Н										
276	Nickel	ЭИ99										
286	Nickel	ХН 60МВТЮ (ЭИ487)										
261-a	Nickel-cobalt	29НК (Н29К18)	—	—	—	—	—	18.25	—	—	—	—
320*	Nickel-cobalt-copper	32НКД (Н30К4Д, ЭИ630А)	—	—	—	—	0.69	3.70	—	—	—	—
273	Nickel-molybdenum	ЭИ461										
319*	Nickel-molybdenum-copper	74НМД (ЭП233)	3.82	—	—	—	8.00	—	—	—	—	—

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	80НХС	0.03	1.31	0,96	0.008	0.006	2.96	—	—
321-a	Nickel-chrome-silicon	80ХНС	—	—	—	—	—	—	—	—
123-b	Chrome-aluminum	0Х27Ю5А (взамен 1Х25Ю5, 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	ХН70МВТЮБ (ЭИ598)	0.06	0.58	0.28	0.003	0.006	17.15	—	2.84
139-V*	Chrome-nickel	Х15Н60 (ХН60)	0.13	0.88	0.87	0.007	0.015	16.03	54.55	—
325*	Chrome-nickel-tungsten-titanium	1Х15Н24В4Т (Х15Н24В4Т, ЭП164)	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	ХН77ТЮР (ЭИ437Б)	0.05	0.37	0.24	0.006	0,007	21,02	—	—
167-b	Chrome-on a nickel base	Х20Н80Т3 (ЭИ437)	0.046	0,38	0,27	0.005	0.007	20,56	—	—
167-V	Chrome-on a nickel base	Х20Н80Т3 (ЭИ437)	—	—	—	—	—	—	—	—

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	80ХНС	—	—	—	—	—	—	—	—	—	—
321-a	Nickel-chrome-silicon	80НХС										
123-b	Chrome-aluminum	0Х27Ю5А (взамен 1Х25Ю5, ЭИ340)	—	0.023	5.24	—	—	—	—	—	Zirconium 0.18	—
232-a	Chrome-molybdenum-tungsten-titanium-aluminum-niobium on a nickel base	ХН70МВТЮБ (ЭИ598)	4.82	2.16	1.45	1.13	0.03	—	0.003	1.38	—	—
139-V*	Chrome-nickel	Х15Н60 (ХН60)	—	—	0.017	—	—	—	—	—	—	—
325*	Chrome-nickel-tungsten-titanium	1Х15Н24В4Т (Х15Н24В4Т, ЭП164)	—	1.7	—	—	—	—	No more than 0.2	—	No more than 0.025	—
317*	Chrome-titanium-aluminum-boron on a nickel base	ХН77ТЮР (ЭИ437Б)	—	2.70	0.85	—	0.03	—	0.01	0.44	0.01	0.0005
167-b	Chrome-titanium on a nickel base	Х20Н80Т3 (ЭИ437)	—	2.78	0.85	—	0.029	—	0.008	1.52	—	—
167-V	Chrome-titanium on a nickel base	Х20Н80Т3 (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	—	—	—	0.11	—	—	—
177-b	Cadmium	Кд0	0.0028	0.027	—	0.0008	—	—	—	—	—	—	—
212-a*	Silicon crystal	Кр0	—	—	—	0.43	—	—	—	—	—	—	—
266	Metallic manganese	Mp1	—	—	—	1.47	—	—	—	0.88	—	—	97.2
266-a	Metallic manganese		—	—	—	—	—	—	—	—	—	—	—
71-d	Electrolytic copper	M1	99.96	0.001	0.0008	0.0016	0.0001	0.0004	0.0009	—	0.0001	0.0002	—
173-b*	Converted copper	МК-1	99.58	—	—	—	0.0002	0.016	0.11	—	—	—	—
172-V*	Metallic nickel	Н1	0.015	0.0004	0.0004	0.019	—	0.00004	—	0.0011	—	0.0005	—
91-V*	Metallic nickel	Н4	0.55	—	—	1.02	—	—	97.6	0.03	—	—	—
238-a	Metallic nickel	НП3	—	—	—	—	—	—	—	—	—	—	—
304	Metallic niobium	—	—	—	—	0.060	—	—	—	0.002	—	—	—
99-b*	Metallic tin	01	0.0015	0.033	0.0012	0.0036	0.004	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	—	—	—	0.007	—
187-V*	Antimony	Су0	0.004	0.033	No more than 0.0002	0.015	No more than 0.0003	—	0.003	—	No more than 0.005	0.013	No more than 0.06
302	Metallic titanium	—	—	—	—	0.11	—	—	—	0.016	—	—	—
291	Metallic chrome	Х0	0.010	—	—	0.61	0.0003	0.0003	—	0.26	0.0018	—	—
73-V*	Metallic zinc	Ц0	0.0011	0.010	—	0.0018	—	—	—	—	—	—	—
73-g	Metallic zinc	Ц0	—	—	—	—	—	—	—	—	—	—	—

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	—	—	—	—	—	—	—	—	0.003	—	—	—	—
177-b	Cadmium	Кд0	—	—	—	—	—	—	—	—	—	—	—	—	—
212-a*	Silicon crystal	Кр0	0.25	—	—	—	—	—	—	—	—	—	0.39	—	—
266	Metallic manganese	Мр1	—	0.058	—	—	—	—	—	—	—	0.09	—	—	—
266-a	Metallic manganese		—	—	—	—	—	—	—	—	—	—	—	—	—
71-d	Electrolytic copper	М1	—	0.0002	0.0017	—	—	0.00004	—	—	—	—	—	—	—
173-b*	Converted copper	МК-1	—	—	—	—	—	—	—	—	—	—	—	—	—
172-V*	Metallic nickel	Н1	—	—	—	—	0.072	—	—	—	—	—	—	—	—
91-V*	Metallic nickel	Н4	—	—	0.023	—	0.60	—	—	—	—	0.04	—	—	—
238-a	Metallic nickel	НП3	—	—	—	—	—	—	—	—	—	—	—	—	—
304	Metallic niobium	—	—	—	—	0.002	—	—	0.24	0.092	0.009	0.05	—	—	—
99-b*	Metallic tin	01	0.002	—	0.0004	—	—	—	—	—	—	—	—	—	—
99-V	Metallic tin	01	—	—	—	—	—	—	—	—	—	—	—	—	—
214-a	Metallic tin	02	Less than 0.001	—	Less than 0.001	—	—	—	—	—	—	—	—	—	—
187-V*	Antimony	Су0	—	—	0.009	—	0.001	—	—	—	—	—	—	Not more than 0.002	—
302	Metallic titanium	—	—	—	—	—	—	—	—	0.028	—	0.027	—	—	—
291	Metallic chrome	Х0	0.49	0.003	0.016	—	—	Not detected	—	—	—	0.020	—	—	98.4
73-V*	Metallic zinc	Ц0	—	—	—	—	—	0.0026	—	—	—	—	—	—	—
73-g	Metallic zinc	Ц0	—	—	—	—	—	—	—	—	—	—	—	—	—

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	—
	Bronze:										
68-d	aluminum-iron-manganese	БрАЖМц 10—3—1.5	85.83	—	0.04	2.91	—	0.0006	—	0.037	0.002
234*	aluminum-iron	БрАЖ 9—4	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	—	Менее 0.1	Less than 0.001	—	0.30	Less than 0.1	—
192-b	silicon-nickel	Бр КН1-3	95.48	0.002	0.053	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	БрОЦС6-6-3	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	—	—	—	—	—
	Brass:										
143-V	—	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	ЛО 90—1	89.4	0.006	9.9	0.018	Traces	Traces	—	—	0.52
	HARD ALLOYS			Residue of hydrochlorination			Free of carbon				
220	Carbide tungsten	—	—	0.12		0.049	0.03			—	—
219	Carbide titanium	—	—	—		0.28	0.54			0.008	—

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	ЦАМ 9—1.5	—	Less than 0.001	8.63	—	—	0.0026	0.03	—	—	—	—	—
268-a	Aluminum-magnesium antifriction on zinc base	ЦАМ 9—1.5	—	—	—	—	—	—	—	—	—	—	—	—
69-g*	Duraluminum	Д1	—	—	—	—	—	—	—	—	—	—	—	—
	Bronze:													
68-d	aluminum-iron-manganese	БрАЖМц 10—3—1.5	0.0006	0.62	9.54	0.002	—	—	—	—	—	—	—	—
234*	aluminum-iron	БрАЖ 9—4	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-V*	tin-zinc-lead	Бр ОЦС6—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	Titamium	Carbon	Calcium	Chromium
193-b*	Chrome	БрХ	—	—	—	Maximum 0.02	Maximum 0.01	—	—	—	—	—	—	—
	Brass:													
143-V	—	Л62	—	—	2.80	0.03	—	—	—	—	—	—	—	—
191-a	aluminum-nickel	ЛАН 59—3—2	—	—	—	0.001	—	—	—	—	—	—	—	—
65-g	iron-manganese	ЛЖМЦ 59—1—1	—	0.72	0.28	—	—	—	—	—	—	—	—	—
66-g	lead	ЛС 59—1	—	—	—	0.0005	—	—	—	—	—	—	—	—
113-V	Silumin	Сил 0	—	0.007	—	—	—	—	—	—	0.015	—	0.031	—
113-g	Silumin	Сил 0	—	—	—	—	—	—	—	—	—	—	—	—
217*	Tombac tin	ЛО 90—1	—	—	—	0.005	—	—	—	—	—	—	—	—
	HARD ALLOYS													
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
	SLAGS														
79-V*	Blast-furnace	30.7	7.8	0.64	—	0.24	45.6	—	6.06	7.49	—	—	3.11	—	—
267	Blast-furnace	36.90	15.53	0.25	—	0.86	37.66	—	6.73	1.08	—	—	0.58	—	—
267-a	Blast-furnace														
311	Converter vanadium	—	—	—	—	—	—	13.80	—	—	—	0.069	—	—	—
262	Convertor (smelting in oxygen)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
80-V*	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	—	—
203-b	Open hearth	—	—	—	—	—	—	—	—	—	—	—	0.17	—	—
204-a*	Open hearth	—	—	—	—	—	—	—	—	—	—	—	0.280	—	—
205-a*	Open hearth	—	—	—	—	—	—	—	—	—	—	—	0.39	—	—
47	Copper smelting	35.60	—	30.56	—	—	5.32	—	—	—	—	—	—	0,24	—
	RESIDUES														
185	Copper flotation	—	—	—	—	—	—	—	—	—	—	—	—	0.24	—
186	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	Manganous 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	Notdetermined	—	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	—	—	97.9	—	0.10	—	—	—	—	—	—	—
290*	Vanadium pentoxide	—	—	—	—	—	—	—	—	—	—	—	—
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	—	—	—	—	0.42	—	—	—	—
241-a*	Flux	0.048	0.025	—	—	—	0.13	—	—	—	—	—
255*	Flux	Not determined	Not determined	—	—	—	—	—	—	—	—	—
				0.6	—	—	—	—	—	0.43	—	—
	CONCENTRATES											
112-a	Manganese	0.163	0.[illegible]8	—	—	—	—	—	—	—	—	—
130-a	Manganese	0.217	0.058	—	—	—	—	—	—	—	—	—
250	Copper	—	—	—	—	—	—	—	—	—	—	—
297	Nickel	—	—	—	—	6.05	—	—	1.88	—	—	38.85
281	Niobium	0.058	0.16	—	—	—	0.09	—	—	—	—	—
275*	Chromic Oxide	—	0.040	—	0.0007	—	0.06	—	—	0.0003	0.0001	—
290*	Vanadium pentoxide	0.051	—	86.1	—	—	—	—	—	—	—	—
138	Tin	—	—	—	—	—	—	—	—	48.8	—	—
148	Tin	—	—	—	—	—	—	—	—	41.5	—	—
154-a	Titanium	0.12	0.039	0.12	—	—	—	—	—	—	—	—
90	Chrome	—	0.005	—	—	—	0.09	—	—	—	—	—
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	Sulfur	Vanadium pentoxide	Arsenic
288	Beryllium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
190-a*	Bauxite	3.74	54.5	—	—	—	22.69	2.22	2.02	—	—	—	—	Pentoxide of phosphor 0.49	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	0.158
3-V	Iron	19.19	1.30	—	54.70	0.70	—	—	0.04	0.04	—	0.04	—	0.030	0.010	—	—
4-V*	Iron	14.37	4.22	—	46.83	20.33	—	0.34	5.78	5.13	—	0.57	—	0.174	0.024	0.13	—
25-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	—	41.0	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	—	—

Table 22 continued

Number of SS	Ore	Contents of elements and of their components, %															Roasting losses, %
		Nickel oxide	Nickel	Cobalt	Barium oxide	Carbon dioxide	Zinc	Tin	Lead	Copper	Sodium oxide	Niobium pentoxide	Zirconium dioxide	Selenium	Tellurium	Beryllium oxide	
288	Beryllium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.26	—
190-a*	Bauxite	—	—	—	—	2.05	—	—	—	—	—	—	—	—	—	—	13.84
198-a	Alumina	—	—	—	—	—	—	—	—	—	0.42	—	—	—	—	—	—
1-V	Iron	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2-g*	Iron	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3-V	Iron	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4-V*	Iron	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25-V*	Iron	0.08	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
195-a*	Iron	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
194-b*	Iron	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
294	Cobalt	—	—	7.5	—	—	—	—	—	—	—	—	—	—	—	—	—
44-b	Manganese	—	0.034	0.005	0.26	—	—	—	—	—	—	—	—	—	—	—	—
183	Copper	—	—	—	—	—	—	—	—	0.91	—	—	—	—	—	—	—
184	Copper	—	—	—	—	—	—	—	—	0.94	—	—	—	—	—	—	—
277	Niobium	—	—	—	—	—	—	—	—	—	—	0.11	0.10	—	—	—	—
136	Tin	—	—	—	—	—	—	0.43	—	—	—	—	—	—	—	—	—
140	Tin-zinc	—	—	—	—	—	1.18	—	13.92	—	—	—	—	—	—	—	—
287	Selenium-tellurium	—	—	—	—	—	—	—	—	—	—	—	—	0.005	0.010	—	—
216-a*	Siderite	—	—	—	—	37.8	—	—	—	—	—	—	—	—	—	—	—
132-a*	Chromite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
166-b	Chromite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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, %													Firing losses, %
		Silicon dioxide	Aluminum oxide	Chromic oxide	Ferric oxide	Titanium dioxide	Calcium oxide	Sum of oxides of alkali metals	Maganesium oxide	Manganous oxide	Phosphorus	Sulfur	Potassium oxide	Fluorine	
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	—	0.64	39.11	0.0960	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 Disodium hydrogen phosphate, 0.025 m	6.86	609.9±0,6
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 Metallury 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 phosphor. 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, %					
		Manganese	Silicon	Chromium	Nickel	Potassium	Copper
Foundry	19-V						
191-V*		1.49	4.83	—	—	—	—
192-V*		0.70	3.18	—	—	—	—
193-V*		0.39	1.62	—	—	—	—
194-V*		1.13	1.82	—	—	—	—
195-V*		0.51	0.96	—	—	—	—
Converter	18-V						
181-V*		0,29	0,10	—	—	—	—
182-V*		1.98	2,45	—	—	—	—
183-V*		1,01	1.09	—	—	—	—
184-V*		0,050	0,43	—	—	—	—
Converter	18-g						
Converter	78						
781		0,36	0,17	—	—	—	—
782		0.70	0,47	—	—	—	—
783		0.99	0,66	—	—	—	—
784		1,53	1,08	—	—	—	—
785		2,65	1,60	—	—	—	—
Converter, treated with magnesium	26-b						
261-b*		1,24	0.53	—	—	0,0094	—
262-b*		0,74	2,75	—	—	0,06	—
263-b*		0.42	1,68	—	—	—	—
264-b*		0.70	1,13	—	—	0,015	—
Chrome nickel	37-a						
371-a*		0,40	0,95	0,99	0,29	—	(0,58)
372-a*		0,15	3,22	2,30	0,56	—	(0,41)
373-a*		0,48	1,80	0,16	1,35	—	(0,48)
374-a*		0,76	2,21	0,45	0,73	—	(0,14)
375-a*		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, %						
			Manganese	Silicon	Chromium	Carbon	Aluminum	Iron	Phosphorus
Silicon manganese	25-a	Type of SiMn 14-SiMn 20							
251-a			66.9	21.26	—	—	—	6.91	—
252-a			73.27	16,66	—	—	—	6.77	—
253-a			80,42	11.8	—	—	—	5.40	—
254-a			59,5	24,41	—	—	—	14.59	—

Table 27 continued

Material, Number of SS	Number of series	Brand of material	Contents of elements, %						
			Manganese	Silicon	Chromium	Carbon	Aluminum	Iron	Phosphorus
Ferromanganese	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
Ferromolybdenum with the addition of nonferrous 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	Manganese	Sulfur	Phosphorus	Chromium	Nickel	Titanium	Aluminum	Copper
Low-carbon	104										
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
1043*		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	0.049	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	Manganese	Chromium	Nickel	Tungsten	Molybdenum	Vanadium	Aluminum	Copper	Cobalt
Tungsten-cobalt-vanadium	73	Type R18K5F2											
731			(0.85)	0.65	0.20	2.64	0.70	22.72	0.19	1.19	—	—	3.85
732			(0.89)	0.53	0.32	3.41	0.49	20.00	0.28	1.64	—	—	4.80
733			(0.87)	0.37	0.49	4.18	0.26	17.31	0.47	2.23	—	—	5.73
734			(0.94)	0.26	0.73	4.86	0.15	13.74	0.70	2.99	—	—	6.76
Tungsten-cobalt-vanadium	73-a	R18K5F2	—	—	—	—	—	—	—	—	—	—	—
Low-alloyed	32	—											
321			(0.33)	0.68	0.26	0.14	0.07	—	0.77	0.73	—	0.08	—
322			(0.36)	0.28	0.12	0.21	0.16	—	0.38	0.47	—	0.16	—
323			(0.30)	0.03	0.38	0.44	0.37	—	0.16	0.14	—	0.31	—
324			(0.44)	0.13	1.00	1.26	0.70	—	0.08	0.11	—	0.58	—
Chrome	14-V	—											
141-V*			(0.35)	0.21	0.20	18.58	0.21	—	—	—	—	—	—
142-V*			(0.34)	0.39	0.37	15.87	0.36	—	—	—	—	—	—
143-V*			(0.35)	0.55	0.53	12.32	0.51	—	—	—	—	—	—
144-V*			(0.38)	0.92	0.90	9.97	0.87	—	—	—	—	—	—
Chrome-silicon	22-a	—											
221-a			(0.45)	0.80	0.25	1.56	0.84	—	—	—	—	—	—
222-a			(0.49)	1.39	0.46	0.83	0.41	—	—	—	—	—	—
223-a			(0.49)	1.95	0.89	0.39	0.19	—	—	—	—	—	—
224-a			(0.65)	2.36	1.56	0.25	0.11	—	—	—	—	—	—

Table 29 continued

Steels, Number of SS	Number of series	Brand of steel	Contents of elements, %										
			Carbon	Silicon	Manganese	Chromium	Nickel	Tungsten	Molybdenum	Vanadium	Aluminum	Copper	Cobalt
Chrome-manganese	21-a	—											
211 a			(0.48)	0.064	0.26	1.73	0.81	—	—	—	—	—	—
212-a			(0.46)	0.47	0.45	0.82	0.60	—	—	—	—	—	—
213-a			(0.46)	0.23	0.82	0.43	0.43	—	—	—	—	—	—
214-a			(0.47)	0.66	2.11	0.29	0.18	—	—	—	—	—	—
Chrome-molybdenum	36	Type Kh12M											
361			(1.60)	0.68	0.14	8.86	0.64	—	0.90	0.66	—	—	—
362			(1.57)	0.41	0.22	10.95	0.43	—	0.59	0.49	—	—	—
363			(1.51)	0.24	0.42	12.95	0.19	—	0.38	0.31	—	—	—
364			(1.56)	0.12	0.66	15.18	0.11	—	0.20	0.14	—	—	—
Chrome-molybdenum	36-a	Type Rh12M	—	—	—	—	—	—	—	—	—	—	—
Chrome-molybdenum -vanadium-niobium	92	Type OKhMFB											
921*			(0.05)	0.03	0.70	1.61	0.22	—	0.48	0.46	—	0.17	Niobium 0.03
922*			(0.05)	0.11	0.63	1.72	0.30	—	0.70	0.29	—	0.14	0.17
923*			(0.06)	0.24	0.43	1.24	0.54	—	0.92	0.19	—	0.34	0.24
924*			(0.05)	0.48	0.25	0.92	0.74	—	1.26	0.10	—	0.47	0.37
Chrome-nickel	34	Type 40KhN											
341			(0.37)	0.15	1.03	0.32	1.53	—	—	—	—	—	—
342			(0.39)	0.21	0.68	0.52	1.27	—	—	—	—	—	—
343			(0.40)	0.34	0.52	0.77	0.97	—	—	—	—	—	—
344			(0.44)	0.60	0.29	1.08	0.77	—	—	—	—	—	—

Table 29 continued

Steels, Number of SS	Number of series	Brand of steel	Contents of elements, %										
			Carbon	Silicon	Manganese	Chromium	Nickel	Tungsten	Molybdenum	Vanadium	Aluminum	Copper	Cobalt
Chrome-nickel-molybdenum-vanadium	29-b	Type 45KhNMFA											
291-b*			(0.44)	1.85	0.12	0.13	1.32	—	0.70	0.11	—	0.18	—
292-b*			(0.45)	0.46	0.19	0.32	0.86	—	0.41	0.27	—	0.20	—
293-b*			(0.44)	0.92	0.64	0.76	0.39	—	0.26	0.43	—	0.30	—
294-b*			(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											
281-a			(0.33)	0.26	1.80	0.18	4.74	0.37	0.75	0.11	—	0.16	—
282-a			(0.41)	0.44	0.40	0.33	2.93	1.23	0.47	0.25	—	0.24	—
283-a			(0.30)	0.81	0.83	0.75	1.72	2.66	0.30	0.44	—	0.37	—
284-a			(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-molybdenum-aluminum	10-b	Type 38KhMYuA											
101-b			(0.35)	0.66	0.12	1.87	0.15	—	0.12	—	0.31	0.51	—
102-b			(0.39)	0.47	0.26	1.65	0.32	—	0.25	—	0.36	0.37	—
103-b			(0.39)	0.31	0.46	1.39	0.47	—	0.49	—	0.81	0.22	—
104-b			(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	Manganese	Chromium	Nickel	Tungsten	Molybdenum	Vanadium	Aluminum	Copper	Cobalt
Steel with boron	20	—											
201			(0.37)	0.18	1.24	1.34	0.20	—	—	—	—	—	—
202			(0.37)	0.43	0.80	1.07	0.38	—	—	—	—	—	—
203			(0.34)	0.47	0.41	0.82	0.90	—	—	—	—	—	—
204			(0.35)	0.58	0.29	0.56	2.12	—	—	—	—	—	—
205			(0.34)	1.10	0.25	0.51	0.22	—	—	—	—	—	—
Tungsten	67-a	Type R9											
671-a*			(0.86)	0.66	0.21	3.10	0.225	11.86	0.15	1.08	—	—	—
672-a*			(0.93)	0.37	0.30	3.96	0.26	9.43	0.33	1.44	—	—	—
673-a*			(0.88)	0.29	0.37	4.50	0.47	7.81	0.41	2.04	—	—	—
674-a*			(0.84)	0.27	0.58	6.24	0.59	6.31	0.68	2.79	—	—	—
Tungsten	66-a	Type R18											
661-a*			(0.78)	0.66	0.19	3.39	0.19	21.94	0.20	0.79	—	—	—
662-a*			(0.80)	0.52	0.31	4.02	0.30	18.50	0.31	0.97	—	—	—
663-a*			(0.75)	0.15	(0.37)	4.71	(0.49)	15.79	(0.38)	(1.23)	—	—	—
664-a*			(0.72)	0.19	0.58	6.33	0.58	13.7	0.71	1.64	—	—	—

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

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %					
			Carbon	Silicon	Manganese	Chromium	Nickel	Tungsten
Chrome-nickel-aluminum steels	64	Type Kh15N9Yu (Kh25N9Yu, EI 904, SN-2)						
641			(0.07)	1.05	1.02	19.45	4.96	—
642			(0.06)	0.56	0.57	16.35	6.38	—
643			(0.06)	0.42	0.39	14.39	7.71	—
644			(0.06)	0.21	0.13	11.44	10.34	—
Chrome-nickel-tungsten-molybdenum-vanadium steels	57	Type 1Kh12N2VMF (EI 961)						
571			(0.07)	0.82	0.13	13.97	1.06	1.10
572			(0.07)	0.68	0.37	12.45	1.46	1.54
573			(0.06)	0.38	0.52	9.64	1.91	1.89
574			(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)						
421-a			(0.09)	0.33	0.70	10.56	22.60	2.98
422-a			(0.10)	0.43	0.94	12.62	19.86	2.67
423-a			(0.11)	0.57	1.51	14.31	17.73	2.04
424-a			(0.10)	0.79	2.29	17.36	15.54	1.68
Chrome-nickel-manganese steels	49-a	Type 2Kh13N4G9 (Kh13N4G9, EI 100) OKH17N5G9						
491-a			(0.05)	0.85	4.53	21.01	2.38	—
492-a			(0.08)	0.61	6.65	16.96	3.42	—
493-a			(0.06)	0.25	8.68	12.72	5.04	—
494-a			(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	Manganese	Chromium	Nickel	Tungsten
Chrome-nickel-molybdenum steels	65	Type Kh17N5M3 (EI 925, SN-3)						
651			(0.07)	0.98	0.18	21.37	3.46	—
652			(0.06)	0.74	0.32	19.18	4.19	—
653			(0.08)	0.38	0.54	15.8	5.34	—
654			(0.07)	0.14	0.98	12.35	6.75	—
Chrome-nickel-titanium steels	58	Type 1Kh21N5T (EI 811)						
581			(0.09)	1.02	1.05	24.38	3.71	—
582			(0.12)	0.62	0.58	22.08	4.94	—
583			(0.13)	0.38	0.36	19.49	6.25	—
584			(0.11)	0.21	0.16	17.46	7.69	—
Chrome-nickel-titanium-boron steels	31	Type Kh12N20T3R (EI 696)						
311			(0.02)	0.37	0.35	8.28	24.60	—
312			(0.02)	0.53	0.50	9.75	21.52	—
313			(0.03)	0.78	0.72	11.81	19.36	—
314			(0.02)	1.15	1.02	14.06	16.65	—
Nickel-cobalt-alloys	71	Type 29NK (N29K18)						
711			(0.03)	0.73	0.19	0.18	22.83	—
712			(0.02)	0.53	0.34	0.56	26.37	—
713			(0.02)	0.36	0.54	0.54	30.10	—
714			(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	Manganese	Chromium	Nickel	Tungsten
Nickel-chrome-titanium-aluminum alloys	96	Type 42NKhTYu (N41KhT)						
961*			(0.04)	1.15	1.12	3.69	(41.57)	—
962*			(0.03)	0.67	0.70	4.78	(41.63)	—
963*			(0.03)	0.37	0.43	5.95	(41.62)	—
964*			(0.03)	0.21	0.32	7.06	(41.73)	—
Alloys	51							
511			(0.13)	5.81	0.34	20.77	9.37	—
512			(0.12)	4.46	0.50	18.53	10.92	—
513			(0.15)	3.52	0.87	16.73	12.71	—
514			(0.14)	2.64	1.52	15.05	15.07	—
Chrome-nickel-manganese-molybdenum-vanadium-niobium steels	46	Type 4Kh12N8G8MFB (EI 481)						
461			(0.34)	0.91	5.71	16.39	5.64	—
462			(0.35)	0.56	7.35	14.13	7.21	—
463			(0.34)	0.31	9.68	11.79	9.93	—
464			(0.38)	0.25	11.56	9.00	12.19	—
Chrome-nickel-molybdenum-niobium-titanium-aluminum-boron steels	81	Type 1Kh16N36MBTYuR (EI 150)						
811			—	0.20	1.00	21.46	(36.4)	—
812			—	0.33	0.59	16.91	(36.4)	—
813			—	0.59	0.33	14.00	(36.1)	—
814			—	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	Manganese	Chromium	Nickel	Tungsten
Chrome-nickel-molybdenum-titanium steels	45-b	Type Kh17N13M2T (Kh18N12M2T, EI 448) Kh17N13M3T (Kh18N12M3T, EI 432)	—	—	—	—	—	—
451-b			(0.08)	0.25	2.07	22.81	9.08	—
452-b			(0.05)	0.48	1.56	19.92	11.02	—
453-b			(0.05)	0.64	1.27	17.61	12.76	—
454-b			(0.06)	1.00	0.91	15.17	14.45	
Chrome-nickel-niobium steels	27	Type OKh18N12B (Kh18N11B, EI 402)						—
271			(0.04)	1.36	0.40	23.30	6.68	—
272			(0.04)	0.89	0.69	20.35	8.67	—
273			(0.03)	0.58	1.23	17.16	11.67	—
274			(0.03)	0.36	2.23	14.29	14.40	—
Chrome-nickel-titanium steels	9-g	Type Kh18N9T (1Kh18N9T, EYa1T)						
91-g*			(0.08)	1.35	0.35	22.92	6.73	—
92-g*			(0.07)	0.54	0.72	20.73	8.77	—
93-g*			(0.05)	0.67	1.22	17.33	11.52	—
94-g*			(0.05)	0.26	2.30	14.36	14.58	—
Precision alloys	95	Type N33Yu1						
951*			(0.03)	0.11	0.16	—	(32.75)	—
952*			(0.02)	0.22	0.36	0.04	(32.50)	—
953*			(0.03)	0.54	0.52	0.09	(32.77)	—
954*			(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	Manganese	Chromium	Nickel	Tungsten
Precision alloys	38	Type N-36	—	—	—	—	—	—
Precision alloys	107	Type 31NRh3G	—	—	—	—	—	—
Precision alloys	88	Type 40KNKhMVTYu	—	—	—	—	—	—
Chrome-molybdenum-niobium-titanium-aluminum alloys	40-a	Type KhN75MBTYu (EI 602)						
401-a			(0.02)	1.08	0.15	20.20	—	—
402-a			(0.03)	0.85	0.25	20.20	—	—
403-a			(0.02)	0.56	0.41	20.02	—	—
404-a			(0.03)	0.43	0.57	20.03	—	—
Chrome-nickel-tungsten-titanium alloys	50	Type Kh38VT (EI703)						
501			(0.09)	0.34	0.24	25.40	—	1.70
502			(0.10)	0.41	0.36	22.81	—	2.34
503			(0.08)	0.76	0.59	20.04	—	2.91
504			(0.09)	1.02	0.90	17.00	—	3.72
Chrome-nickel-tungsten-titanium-aluminum alloys	39-a	Type KhN35VTYu (EI 787)						
391-a*			(0.02)	0.23	0.23	10.33	37.80	1.18
392-a*			(0.02)	0.37	0.38	12.30	32.60	2.04
393-a*			(0.02)	0.49	0.53	14.70	30.00	3.30
394-a*			(0.03)	0.79	0.86	17.70	23.43	3.93

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %							
			Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron
Steels	91	Type EI439							Cerium	Zirconium
911*			—	—	0.09	0.93	—	—	0.015	0.12
912*			—	—	0.19	0.76	—	—	0.067	0.10
913*			—	—	0.39	0.52	—	—	0.018	0.18
914*			—	—	0.49	0.22	—	—	0.010	0.03
Steels	94	Type EI606								
941*			—	2.61	—	—	—	—	0.52	—
942*			—	2.19	—	—	—	—	0.53	—
943*			—	1.87	—	—	—	—	0.17	—
944*			—	1.58	—	—	—	—	0.14	—
Chrome-aluminum steels	80	Type OKh27Yu5A								
801*			—	—	—	4.0	—	—	—	—
802*			—	—	—	4.75	—	—	—	—
803*			—	—	—	5.71	—	—	—	—
804*			—	—	—	7.09	—	—	—	—
Chrome-silicon-molybdenum steels	54	Type 4Kh10S2M(EI107)								
541			1.00	—	—	—	—	—	—	—
542			0.78	—	—	—	—	—	—	—
543			0.49	—	—	—	—	—	—	—
544			0.24	—	—	—	—	—	—	—
Chrome-molybdenum-vanadium-niobium-nickel steels	93	Type 2Kh11MFBN (FI291)								
931*			2.11	0.63	—	—	0.90	—	—	0.001
932*			1.21	0.34	—	—	0.39	—	—	0.002
933*			0.65	0.17	—	—	0.22	—	—	0.003
934*			0.35	0.09	—	—	0.11	—	—	0.005

Table 30 continued

Material, Number of SS	Number of series	Brand of material	Contents of elements, %							
			Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron
Chrome-nickel-aluminum-steels	64	Type Kh15N9Yu (Kh25N9Yu, EI 904, SN-2)								
641			—	—	—	0.35	—	—	—	—
642			—	—	—	0.61	—	—	—	—
643			—	—	—	0.89	—	—	—	—
644			—	—	—	1.45	—	—	—	—
Chrome-nickel-tungsten-molybdenum-vanadium steels	57	Type 1Kh12N2VMF (EI 961)								
571			0.22	0.126	—	—	—	—	—	—
572			0.36	0.27	—	—	—	—	—	—
573			0.46	0.44	—	—	—	—	—	—
574			0.64	0.65	—	—	—	—	—	—
Chrome-nickel-tungsten-niobium-boron steels	42-a	Type 1Kh14N18V2BR (EI 695R) and 1Kh14N18V2BR I (EI 726)								
421-a			—	—	—	—	1.46	—	—	(0.002)
422-a			—	—	—	—	1.14	—	—	(0.004)
423-a			—	—	—	—	0.88	—	—	(0.010)
424-a			—	—	—	—	0.60	—	—	(0.029)
Chrome-nickel-manganese steels	49-a	Type 2Kh13N4G9 (Kh13N4G9, EI 100) OKh17N5G9								
491-a			—	—	—	—	—	—	—	—
492-a			—	—	—	—	—	—	—	—
493-a			—	—	—	—	—	—	—	—
494-a			—	—	—	—	—	—	—	—

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %							
			Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron
Chrome-nickel-molybdenum steels	65	Type K17N5M3 (EI 925, SN-3)								
651			2.29	—	—	—	—	—	—	—
652			2.83	—	—	—	—	—	—	—
653			3.52	—	—	—	—	—	—	—
654			4.64	—	—	—	—	—	—	—
Chrome-nickel-titanium steels	58	Type 1Kh21N5T (EI 811)								
581			—	—	(0.06)	—	—	—	—	—
582			—	—	(0.10)	—	—	—	—	—
583			—	—	(0.17)	—	—	—	—	—
584			—	—	(0.50)	—	—	—	—	—
Chrome-nickel-titanium-boron steels	31	Type Kh12N20T3R (EI 696)								
311			—	—	3.25	0.28	—	—	—	0.005
312			—	—	2.54	0.39	—	—	—	0.010
313			—	—	2.16	0.68	—	—	—	0.015
314			—	—	1.14	0.66	—	—	—	0.027
Nickel-cobalt-alloys	71	Type 29NK(N29K18)								
711			—	—	0.42	0.10	—	24.2	0.50	—
712			—	—	0.34	0.23	—	20.2	0.34	—
713			—	—	0.29	0.41	—	17.4	0.23	—
714			—	—	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)								
961*			—	—	4.16	0.32	—	—	—	—
962*			—	—	3.95	0.43	—	—	—	—
963*			—	—	2.47	0.68	—	—	—	—
964*			—	—	1.98	1.17	—	—	—	—
Alloys	51	—								
511			—	—	0.06	(0.05)	—	—	—	—
512			—	—	0.08	0.064	—	—	—	—
513			—	—	0.28	0.15	—	—	—	—
514			—	—	0.93	0.39	—	—	—	—
Chrome-nickel-manganese-molybdenum-vanadium-niobium steels	46	Type 4Kh12N8G8MFB (EI481)								
461			1.81	1.85	0.085	—	0.08	—	—	—
462			1.46	1.54	0.09	—	0.31	—	—	—
463			1.10	1.20	0.12	—	0.45	—	—	—
464			0.70	0.79	0.21	—	0.68	—	—	—
Chrome-nickel-molybdenum-niobium-titanium-aluminum-boron steels	81	Type 1Kh16N36M8TYuR (EI150)								
811			1.78	—	0.42	0.51	0.68	—	—	—
812			2.34	—	0.48	0.76	0.90	—	—	—
813			3.04	—	0.59	1.15	1.29	—	—	—
814			3.46	—	1.11	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
Chrome-nickel-molybdenum-titanium steels	45-b	Type KI7N13M2T (Kh18N12M2T, EI 448) Kh17N13M3T (Kh18N12M3T, EI 432)								
451-b			1.57	—	0.1	—	—	—	—	—
452-b			2.25	—	0.18	—	—	—	—	—
453-b			3.22	—	0.41	—	—	—	—	—
454-b			4.33	—	0.94	—	—	—	—	—
Chrome-nickel-niobium steels	27	Type OKh18N12B (Kh18N11B, EI 402)								
271			—	—	—	—	1.48	0.26	—	—
272			—	—	—	—	0.98	0.36	—	—
273			—	—	—	—	0.50	0.46	—	—
274			—	—	—	—	0.28	0.58	—	—
Chrome-nickel-titanium steels	9-g	Type Kh18N9T (1Kh18N9T, EYa1T)								
91-g*			—	—	(1.03)	—	—	0.12	—	—
92-g*			—	—	(0.18)	—	—	0.23	—	—
93-g*			—	—	(0.09)	—	—	0.40	—	—
94-g*			—	—	(0.09)	—	—	0.51	—	—
Precision alloys	95	Type N33Yu1								
951*			—	—	—	2.24	—	—	—	—
952*			—	—	—	1.63	—	—	—	—
953*			—	—	—	1.19	—	—	—	—
954*			—	—	—	0.82	—	—	—	—

Table 30 continued

Material Number SS	Number of series	Brand of material	Contents of elements, %							
			Molybdenum	Vanadium	Titanium	Aluminum	Niobium	Cobalt	Copper	Boron
Precision alloys	38	Type N-36								
Precision alloys	107	Type 31NKh3G								
Precision alloys	88	Type 40KNKhMVTYu								
Chrome-molybdenum-niobium-titanium-aluminum alloys	40-a	Type KhN75MBTYu (EI 602)								
401-a			1.53	—	0.85	0.17	0.60	0.12	—	4.09
402-a			1.90	—	0.65	0.32	0.80	0.16	—	2.52
403-a			2.28	—	0.49	0.50	1.10	0.25	—	1.50
404-a			2.84	—	0.33	0.86	1.56	0.38	—	0.96
Chrome-nickel-tungsten-titanium alloys	50	Type KhN38VT (EI 703)								
501			—	—	1.07	0.64	0.78	—	—	—
502			—	—	0.71	0.16	(1.19)	—	—	—
503			—	—	0.53	(0.034)	1.38	—	—	—
504			—	—	0.51	0.06	1.81	—	—	—
Chrome-nickel-tungsten-titanium alloys	39-a	Type KhN35VTYu (EI 787)								
391-a*			—	—	2.07	2.65	—	—	0.005	—
392-a*			—	—	2.57	1.39	—	—	0.010	—
393-a*			—	—	2.90	0.67	—	—	0.020	—
394-a*			—	—	3.05	0.29	—	—	0.03	—

Table 31

Material, Number of SS	Number of series	Brand of material	Contents of elements, %								
			Manganese	Silicon	Chromium	Copper	Aluminum	Iron	Zinc	Lead	Tin
High-purity aluminum	11	AV0, AV00, AV000, AV0000									
1			—	0.00060	—	0.00022	—	0.00033	—	—	—
2			—	0.00098	—	0.00051	—	0.00060	—	—	—
3			—	0.0029	—	0.0012	—	0.0019	—	—	—
4			—	0.0060	—	0.0030	—	0.0057	—	—	—
5			—	0.013	—	0.0060	—	0.014	—	—	—
6			—	0.044	—	0.012	—	0.043	—	—	—
Industrial-purity aluminum	12	A85, A8, A7, A6, A5, A0, A & AE									
21			0.0040	0.054	—	0.0031	—	0.052	—	—	—
22			—	0.097	—	0.0046	—	0.098	—	—	—
23			0.0070	0.205	—	0.0057	—	0.20	—	—	—
24			—	0.40	—	0.010	—	0.43	—	—	—
25			0.018	0.73	—	0.020	—	0.67	—	—	—
26			0.013	1.14	—	0.043	—	1.03	—	—	—
Industrial-purity aluminum	13										
27			0.0005	—	0.0013	—	—	—	0.006	—	—
28			0.0021	—	0.0042	—	—	—	0.030	—	—
29			0.0065	—	0.0073	—	—	—	0.050	—	—
30			0.0070	—	0.011	—	—	—	0.110	—	—
Cobalt	—	—									
1			0.0003	0.0005	—	0.0005	0.0007	0.0023	0.0008	0.0003	0.00018
2			0.0005	0.0025	—	0.001	0.0012	0.0035	0.0013	0.00055	0.0003
3			0.001	0.005	—	0.002	0.002	0.0085	0.002	0.001	0.0005
4			0.0025	0.01	—	0.004	0.0032	0.021	0.005	0.002	0.001
5			0.005	0.02	—	0.01	0.0052	0.05	0.01	0.005	0.002

Table 31 continued

Material, Number of SS	Number of series	Brand of material	Contents of elements, %								
			Manganese	Silicon	Chromium	Copper	Aluminum	Iron	Zinc	Lead	Tin
Nickel	—	—									
1			0.0003	0.0005	—	0.0003	0,0003	0,0013	0.0003	0,00009	0,0001
2			0.0010	0.0007	—	0.0010	0,0006	0,0019	0.0011	0,00025	0.0003
3			0.002	0,002	—	0.0012	0.0012	0.0043	0.0012	0.001	0.001
4			0.0045	0,005	—	0.0034	0,0032	0.010	0.0032	0,003	0.003
5			0.013	0,020	—	0.010	0,010	0.023	0.010	0,010	0.010
6			0,080	0.060	—	0.022	0.030	0.064	0.020	0,032	0.032
7			0.040	0.30	—	0.057	0.0056	0.33	0.050	0,003	0,003
8			0.016	0.10	—	0.20	0.0026	0.11	0.0025	0,001	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 KhO-K2									
751			—	—	—	—	—	—	0,0050	0,029	0,035
752			—	—	—	—	—	—	0,0019	0,0002	0,0018
Metallic zinc	70-a	Type TsV, TsO, Ts1, Ts2									
701-a*			—	—	—	0,0010	0.033	0,0015	—	0,005	0,0007
702-a*			—	—	—	0.0021	0,051	0.0056	—	0,007	0.0036
703-a*			—	—	—	0,0043	0.11	0.016	—	0,016	0.0030
704-a*			—	—	—	0.008	0.20	0.043	—	0.051	0.0057

Table 31 continued

Material, Number of SS	Number of series	Brand of material	Contents of elements, %								
			Bismuth	Antimony	Arsenic	Cadminum	Titanium	Manganese	Vanadium	Cobalt	Nickel
High-purity aluminum	11	AV0, AV00, AV000, AV0000									
1			—	—	—	—	—	—	—	—	—
2			—	—	—	—	—	—	—	—	—
3			—	—	—	—	—	—	—	—	—
4			—	—	—	—	—	—	—	—	—
5			—	—	—	—	—	—	—	—	—
6			—	—	—	—	—	—	—	—	—
Industrial-purity aluminum	12	A85, A8, A7, A6, A5, A0, AandAE									
21			—	—	—	—	—	0.043	—	—	—
22			—	—	—	—	0.0020	0.013	—	—	—
23			—	—	—	—	0.0039	0.016	—	—	—
24			—	—	—	—	0.0084	—	—	—	—
25			—	—	—	—	0.028	—	—	—	—
26			—	—	—	—	—	0.022	—	—	—
Industrial-purity aluminum	13	—									
27			—	—	—	—	0.0005	—	0.0011	—	—
28			—	—	—	—	0.0029	—	0.0030	—	—
29			—	—	—	—	0.0057	—	0.0064	—	—
30			—	—	—	—	0.0095	—	0.011	—	—
Cobalt	—	—									
1			0.0001	0.0003	0.0005	0.00018	—	0.0007	—	—	0.0021
2			0.00018	0.0006	0.001	0.0003	—	0.0012	—	—	0.0033
3			0.0003	0.0011	0.0025	0.0005	—	0.0026	—	—	0.0056
4			0.0006	0.0026	0.005	0.001	—	0.0052	—	—	0.011
5			0.001	0.005	0.01	0.002	—	0.01	—	—	0.021

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	—	—									
1			0.00009	0.0001	0.0005	—	—	0.0003	—	0.0005	—
2			0.00023	0.0003	0.0011	0.0003	—	0.0006	—	0.0016	—
3			0.001	0.001	0.0022	0.0008	—	0.0012	—	0.004	—
4			0.003	0.003	0.005	0.0024	—	0.0033	—	0.010	—
5			0.010	0.010	0.011	0.010	—	0.010	—	0.030	—
6			0.032	0.032	0.030	0.030	—	0.027	—	0.10	—
7			0.003	0.003	0.005	0.0024	—	0.20	—	0.30	—
8			0.001	0.001	0.0022	0.0009	—	0.070	—	0.50	—
Metallic chromium	74-a	—									
741-a*			—	—	—	—	—	—	—	—	—
742-a*			—	—	—	—	—	—	—	—	—
743-a*			—	—	—	—	—	—	—	—	—
744-a*			—	—	—	—	—	—	—	—	—
745-a*			—	—	—	—	—	—	—	—	—
Metallic chromium	75	Type KhO-Kh2									
751			0.010	0.035	0.033	—	—	—	—	—	—
752			0.0002	0.00032	0.0007	—	—	—	—	—	—
Metallic zinc	70-a	Type TsV, TsO Ts1, Ts2									
701-a*			—	—	—	0.0011	—	0.020	—	—	—
702-a*			—	—	—	0.0021	—	0.044	—	—	—
703-a*			—	—	—	0.010	—	0.053	—	—	—
704-a*			—	—	—	0.027	—	0.09	—	—	—

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
	10	Type of raw silumin												
1			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	—	—	—	—	—
	69	Type D-20												
	79	Type AV												
791			0.11	0,52	0,48	(0.012)	0,009	0.018	—	0.12	1.46	0.058	—	—
792			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	—	—
	83	Type AK-4												
831			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	—	—	—
	84	Type V-95												
841			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)	—	—	2,85	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
	85	Type of duralumin												
851			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	2.40	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	—	—
	86	Type AL-27 AL-27-1, AL-23 AL-23-1												
861			0.34	0.34	0.17	—	0.21	0.15	—	—	5.04	—	0.16	—
862			0,23	0.21	0.15	—	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	0.049	—	—	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
	86-a 102 103 106	Type AL-27 Type AK-5 Type AD-31 Type AL-11												
1061*			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	Maganese	Beryllium
Aluminum-iron manganese	99	Type BRAZhMp 10-3-1.5										
991*			7.5	4.5	0.20	0.02	0.02	0.20	0.01	—	2.5	—
992*			9.0	3.4	0.30	0.05	0.05	0.30	0.02	—	2.0	—
993*			11.0	2.5	0.50	0.10	0.10	0.50	0.03	—	1.2	—
994*			12.5	1.5	0.80	0.15	0.15	0.80	0.05	—	0.8	—
Beryllium	97	Type BrB2										
971*			0.05	0.05	—	—	0.05	0.10	—	—	—	2.7
972*			0.10	0.10		—	0.10	0.20	0.003	—	—	2.2
973*			0.15	0.15		—	0.15	0.40	0.005	—	—	1.9
974*			0.20	0.25	—	—	0.25	0.80	0.008	—	—	1.5
Iron-aluminum	15	Type BrAZh9-4										
151*			8.7	4.7	1.51	—	—	0.062	—	—	0.76	—
152*			9.57	2.25	0.39	—	—	0.10	—	—	0.091	—
153*			10.07	2.16	0.03	—	—	0.3	—	—	0.014	—
154*			12.04	1.65	0.19	—	—	0.6	—	—	0.045	—
Silicon-manganese	98	Type BrKMts 3-1										
981*			—	0.11	0.27	0.10	3.94	0.15	—	—	1.03	—
982*			—	0.26	0.43	0.20	3.70	0.19	—	—	1.2	—
983*			—	0.35	0.6	0.25	3.23	0.25	—	—	1.4	—
984*			—	0.6	0.94	0.31	2.6	0.41	—	—	1.6	—
Tin-zinc	100	Type BrOtz 4-3										
1001*			—	0.07	4.5	3.0	—	—	—	0.0008	—	—
1002*			—	0.09	4.05	3.5	—	—	—	0.0015	—	—
1003*			—	0.04	3.35	4.2	—	—	—	0.0021	—	—
1004*			—	0.02	2.75	4.65	—	—	—	0.0037	—	—

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 L62									
901*			—	0.25	—	—	0.10	0.15	0.002	0.005	—
902*			—	0.15	—	—	0.18	0.08	0.0035	0.0027	—
903*			—	0.09	—	—	0.32	0.04	0.006	0.0014	—
904*			—	0.05	—	—	0.60	0.02	0.01	0.0007	—
Iron-manganese	89	Type L2hMTs 59-1-1									
891*			0.5	0.4	0.9	—	—	0.3	0.004	—	0.4
892*			0.27	0.63	0.56	—	—	0.2	0.006	—	0.53
893*			0.14	0.94	0.33	—	—	0.14	0.01	—	0.75
894*			0.06	1.4	0.2	—	—	0.1	0.015	—	1.0
Lead	82	Type LS-59-1									
821			0.073	0.16	0.43	0.059	0.88	1.82	0.019	(0.0003)	—
822			0.32	0.20	0.30	0.19	—	1.42	0.016	(0.0003)	—
823			0.15	0.29	0.22	0.30	0.68	1.08	0.010	(0.0005)	—
824			0.54	0.43	0.12	0.58	0.49	0.73	(0.005)	(0.0004)	—
825			0.24	1.06	0.38	(0.10)	0.17	2.13	0.0011	(0.0002)	—

Table 35

Magnesium, Number of SS	Number of series	Brand of magnesium	Contents of elements, %							
			Aluminum	Iron	Zinc	Silicon	Nickel	Manganese	Copper	Beryllium
Magnesium	60	Type MA2, MA2-1								
601			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	0.040	—
Magnesium with beryllium	48	—								
481			4.3	0.034	0.25	0.10	(м. 0.001)	0.08	0.017	(0.0002)
482			6.3	0.022	0.78	0.16	(м. 0.001)	0.18	0.084	(0.0010)
483			7.4	0.021	0.45	0.21	(м. 0.001)	0.38	0.13	(0.0005)
484			9.5	0.029	1.20	0.27	(м. 0.001)	(0.62)	0.20	(0.0009)

Table 36

SS Number of alloy	Number of series	Brand of alloy	Contents of elements, %					
			Aluminum	Iron	Silicon	Manganese	Oxygen	Hydrogen
	52	Type VT-6						
521*			—	—	—	—	0.10	—
522*			—	—	—	—	0.20	—
523*			—	—	—	—	0.30	—
524*			—	—	—	—	0.60	—
525*			—	—	—	—	0.80	—
	61	Type OT-4						
611*			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	—	—
	62	Type VT1-1						
621			—	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)