S/137/61/000/010/047/056
A006/A101

AUTHORS: Babakov, A.A., Zotova, Ye.V.

TITLE: Corrosion of steels in production low-nitrose sulfuric acid

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 10, 1961, 49, abstract 10I340 ("Sb. tr. Tsentr. n.-i. in-t chernoy metallurgii", 1960, no. 17,322 - 326)

TEXT: The authors analyze the possibility of replacing Pb by steel in heat-exchange and cooling equipment when producing low-nitrose H_2SO_4. Cast chrome-nickel-molybdenum-copper (I) steel specimens with a different Cr, Ni and C content were deformed under industrial conditions in low nitrose H_2SO_4 (76% H_2SO_4 and 0.05% HNO_3) at 120 - 135°C. The effect of Cr (5 - 27%) and Ni (9 - 28%) was studied on low-carbon I-specimens containing Mo 3% and Cu 3%; and the effect of C (0.02 - 0.30%) on X19H28M3Д3 (Kh19N28M3D3) and X23H28M3Д3 (Kh23N28M3D3) steel. The specimens were quenched from 1,200°C prior to the tests. The magnitude of corrosion of low-carbon specimens I with 3% Mo and 3% Cu, depends on the Cr content to a higher degree than on the Ni content. With a higher Cr amount, increased from 5 to 19%, the corrosion rate drops noticeably.

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Corrosion of steels ...

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With a higher C content, the corrosion rate increases the more, the lower the Cr content. Least corrosion rate is offered by steel of the following composition (in %): Cr 19 - 23, Ni 23 - 28, Mo 3, Cu 3; the C content must be extremely low.

Ye. Layner

[Abstracter's note: Complete translation]

Card 2/2

MESHCHERINOVA, O.N., kand.tekhn.nauk; TRIFONOVA, T.N., inzh.; TORPANOVA, G.A., kand.tekhn.nauk; SMIRNOV, Ye.V., inzh.; BABAKOV, A.A., kand.tekhn.nauk; KARNVA, Ye.N., inzh.; ZHADAN, T.A., inzh.; TALOV, N.P., inzh.; TSYPKINA, Ye.D., kand.tekhn.nauk; DORONIN, V.M., inzh.; DAVYDOVA, L.N., inzh.; PRIDANTSEV, M.V., prof., doktor tekhn.nauk, red.; LIVSHITS, G.L., kand.tekhn.nauk, red.; BERLIN, Ye.N., red.izd-va; MIKHAYLOVA, V.V., tekhn.red.

[Steels with low nickel content; a handbook] Stali s ponizhennym soderzhaniem nikela; spravochnik. Pod red. M.V.Pridantseva i G.L.Livshitsa. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1961. 200 p. (MIRA 14:12)

1. Direktor instituta kachestvennykh staley TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii im. I.P.Bardina (for Pridantsev).
(Nickel steel)

89975

18.1151 1496 1045

S/133/61/000/003/014/014
A054/A033

AUTHORS: Babakov, A. A., Candidate of Technical Sciences;
Zhadan, T. A., Engineer

TITLE: The effect of austenite-forming elements on the properties of X28 (Kh28) grade steel.

PERIODICAL: Stal', no. 3, 1961, 276 - 279

TEXT: High-chrome (28.5 %) Kh28 grade steel (without titanium) shows a clearly defined, coarse-grained crystal structure in a cast condition, which results in a reduced ductility. High-chrome and titanium-containing ferrite type X17T, X25T (Kh17T, Kh25T) grade steels are also brittle in the welding zone (a_k is below 1 kgm/cm^2), due to the formation of a coarse structure during welding. In order to improve the ductility of these steels, tests were carried out with Kh28 type steel, adding small amounts of austenite-forming elements, (Ni, Mn, N_2) and studying its mechanical and corrosive properties under conditions simulating the temperature and holding times of welding. Smelting was carried out in a 30-kg high-frequency furnace, cleaned, 15-kg ingots were forged into rods and slabs,

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the latter were rolled into sheets 4 mm thick. Both processes took place at 1500 - 1100°C. The sheets were heat-treated at 900°C, water-cooled, then rolled to 2 mm thickness. The mechnical properties and tendency to intercrystalline corrosion were tested on specimens heated to 800 - 1000°C (welding) temperature, for two minutes per 1 mm thickness, as well as at 1100 - 1300°C, for 1 min per 1 mm thickness. A change in the mechanical properties and structure could only be observed with an increased nickel-content, when austenite develops at the border of grains, over the entire volume of the metal, increasing its strength and toughness. Upon studying the temperature effect, it was found that steels alloyed with 2 - 6 % nickel do not change in strength and ductility to any great extent, when the temperature was raised from 800 to 1200°C. The highest values for toughness in X28H6 (Kh28N6), X28H3A (Kh28N3A) and X28H4 (Kh28N4) type steels were observed after heating to 900 - 1000°C. Steels containing max.3% nickel had a toughness below 1 kgm/ cm^2 irrespective of the heating temperature. Upon incrasing the cooling rate (in water), the toughness of the Kh28N4 steel increased by about 10 kgm/ cm^2. Most probably during rapid cooling various intermatallic phases cannot separate from the solid solution, so that the grain borders remain clean and the intercrystalline adhesive forces increase. Increasing the holding time to more than 5 minutes did not

change the toughness, as, evidently this time is sufficient for the concentration of the solid solution to attain an equilibrium. Repeated heating to high temperatures with subsequent cooling in air only reduced the toughness. The tendency of the steels to intercrystalline corrosion was tested on sheets after various heat treatments (ГОСТ = GOST 6032-51). The maximum resistance against intercrystalline corrosion was found in Kh28 grade steel, irrespective of heat treatment, when adding 4 - 6 % nickel. Kh28N3A nickel steel also showed sufficient resistance against intercrystalline corrosion and higher toughness. However, when adding 0.23 % N, gaseous blisters form in the ingot. The welding properties of Kh28N4 grade steel of the following chemical composition: C: 0.11 %; Mn: 0.28%; Si: 0.50%; Cr: 28.8 % Ni: 4.1%, were tested. After heat treatment at 900°C and water-cooling the following characteristics were recorded: σ_B, kg/sq mm 70.6; $\sigma_{0.2}$, kg/sq mm; δ_5, % 17.6; ψ, % 34.1; a_K, kgm/sq cm 10.5. Based on the tests it was found advisable to use electrodes made of the Х25Н13 (Kh25N13) austenite-ferrite type or Х27Н4А (Kh27N4A) and Х25НГБ (Kh25NGB) ferrite-austenite grade steel for the Kh25T, Kh28AN and Kh28N4 steels, with a special coating. Figure 6 shows that the toughness of 6 mm thick Kh28N4 steel sheet decreas-

89975

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ed to 4 kgm/cm^2 in the welding zone under repeated high temperatures, while it increased when moving away from the seam. Thus, the steel with 4 % nickel content proved to be fairly ductile (a_k about 4 - 6 kgm/cm^2). Therefore the Kh28N4 steel can be used as substitute for Kh23N12 and Kh23N18 austenite steels for products subjected to high temperatures, without considerable mechanical load, and for chemical equipment exposed to aggressive media. There are 6 figures, 2 tables and 2 Soviet references.

ASSOCIATION: TsNIIChM

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S/129/61/000/011/004/010
E071/E335

AUTHOR: Babakov, A.A., Candidate of Technical Sciences

TITLE: Replacement of nickel by manganese and nitrogen in stainless steels

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, no. 11, 1961, 25 - 29

TEXT: The influence of nitrogen on the properties of CrNi steels Kh18N6, Kh20N6, Kh22N6, Kh22N4, CrNiMn steels Kh18N4G8, Kh14N4G8, CrMn steels Kh18G8 and Kh14G8, Ti-containing steel Kh22N4 and of the steel Kh19N9 was investigated. The experimental steels were smelted in a 30-kg high-frequency furnace from a low-nitrogen ferrochromium (containing 0.7 - 1.2% nitrogen), technically-pure iron, steel 10, metallic manganese, nickel and ferrochromium 00 and 000. The chemical composition and structure of the steels are entered in Table 1. The steels were cast into an ingot with a hot top and into a cast-iron slab mould; the ingots were forged into 18 mm rods (starting material for test specimens) and slabs rolled into plates and strip. The mechanical properties were determined on

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Replacement of nickel ....

specimens hardened in water from 1 150 °C. The tendency to brittleness was investigated on tensile and impact specimens, hardened in water from 1 150 °C (soaking time 20 minutes) and then heated for 100 hours at 200, 300, 400, 500, 600, 700, 800 and 900 °C. After determining the amount of austenite on the impact specimens, mechanical tests were carried out. The experimental results obtained showed that nitrogen was an element promoting the formation of austenite in austenitic chromium-nickel stainless steels. It is necessary to obtain stable nitrides with a high dissociation temperature to retain nitrogen in steel. Chromium nitrides belong to this class. The positive influence of manganese was established; it increases the solubility of nitrogen in the steel. In 18-8 type steels, nitrogen can replace 2-3% of nickel. In respect of mechanical properties and tendency to brittleness, steels Kh18N6, Kh20N6, Kh22N6 and Kh18N4G8 with additions of nitrogen are equivalent to steel 1Kh18N10. Steels of the type Kh18N6 - Kh20N6 as well

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as Kh18N4G9 with additions of nitrogen can find application as non-magnetic or weakly magnetic high-strength materials, containing a lower amount of nickel. In order to reduce the tendency of the nitrogen-containing steels to intercrystalline corrosion, their carbon content should be lowered to a minimum. There are 2 figures, 2 tables and 2 references: 1 Soviet-bloc and 1 English - Ref. 2 - D.J. Garneg - "Blast Furnace and Steel Plant", v. 4, no. 12, 1955.

ASSOCIATION: TsNIIChM

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Replacement of nickel ....

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Table 1:

Type of steel Марка стали	Химический состав в %, Chemical Composition (%)							Structure Структура
	C	Cr	Ni	Mn	Si	Ti	N	
X18H9A (Kh18N9A)	0,14	16,19	8,06	0,47	0,38	—	0,21	γ
X18H9T (Kh18N9T)	0,13	17,7	9,32	0,58	0,54	0,63	—	γ
X22H4 (Kh22N4)	0,16	22,15	5,10	0,56	0,38	—	—	α + γ
X22H4A (Kh22N4A)	0,12	22,03	4,68	0,90	0,54	—	0,22	γ + α
X18H6A (Kh18N6A)	0,15	16,94	6,40	0,58	0,37	—	0,18	γ
X20H6A (Kh20N6A)	0,09	20,08	6,28	0,48	0,36	—	0,23	γ
X22H6A (Kh22N6A)	0,08	21,88	6,29	0,60	0,49	—	0,23	γ
X22H4AT (Kh22N4AT)	0,09	22,31	4,30	0,36	0,47	0,13	0,08	α + γ
X22H4AT (Kh22N4AT) (repeat)	0,12	20,91	4,60	1,0	0,56	1,16	0,19	α
X14H4Г8A (ЭИ100 / Kh14N4G8A)	0,11	13,63	4,0	8,52	0,76	—	0,16	γ
X14Г8A (Kh14G8A)	0,11	13,55	0,12	8,65	0,76	—	0,16	γ
X18H4Г8A (Kh18N4G8A)	0,10	18,28	4,03	8,53	1,0	—	0,21	γ
X18Г8A (Kh18G8A)	0,10	18,10	0,12	8,46	1,0	—	0,20	γ + α

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S/133/61/000/011/006/010
A054/A127

AUTHORS: Babakov, A. A., Candidate of Technical Sciences, Ladyzhinskiy, B. S., Engineer

TITLE: Corrosion resistance of electric-welded 1X18H9T (1Kh18N9T) steel tubes

PERIODICAL: Stal', no. 11, 1961, 1026 - 1029

TEXT: Tests were carried out to study the corrosion resistance of stainless steel tubes 10 - 76 mm in diameter; with a wall thickness of 1 - 2 mm produced at the Moscow trubnyy zavod (Moscow Tube Plant) by continuous argon-arc welding at a rate of 1.5 - 2.0 m/min. The tests in which E. Ye. Tsypina, Engineer, I. T. Ivanova, Engineer, L. P. Basova, Laboratory Assistant, T. S. Sadykova, Laboratory Assistant, L. N. Belogurova, Laboratory Assistant and V. I. Shashina, Laboratory Assistant participated, were aimed at investigating the resistance of the welding seam to corrosion in general and to intergranular corrosion compared with the base metal. The test tubes (16 x 2 and 25 x 2 mm in size) contained 0.11% C, 0.93% Si, 0.89% Mn, 18.9% Cr, 9.1% N, 0.68% Ti and 0.10% C, 1.08% Si, 1.32% Mn, 18.6% Cr, 9.7% N and 0.50% Ti respectively. The heat treatment of the 1Kh18N9T

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steel was carried out under the following conditions: a) heating alternatively to 1,050, 1,100 and 1,200°C, holding for 2, 6 and 20 minutes at each temperature; quenching in water; b) heating alternatively to 850 and 900°C with 60 and 120 minutes holding, to 950°C with 30 and 60 minutes holding; air-cooling (stabilizing anneal); c) water-hardening of the specimens at 1,050°C with subsequent stabilizing anneal at 850 - 870°C (double heat treatment). Part of the tubes was subjected to a provoking tempering (heating to 650°C, holding time 120 minutes, air-cooling) in the as delivered condition, while part of the tubes was subjected to provoking tempering after the heat treatment as mentioned above. The test tubes were boiled in aggressive media according to the following scheme: in 10-% solution of formic acid for 96 hours; in 10-% solution of acetic acid for 144 hours; in 55-% solution of nitric acid for 144 hours; in a solution of vitriol (110 g) and sulfuric acid (55 ml) in 1 liter of water (A-method, ГОСТ 6032-58 [GOST 6032-58]) for 48 hours; in a solution of vitriol (160 g) and 100 ml sulfuric acid in 1 liter of water containing copper chips for 24 hours. It was found that the tubes (16 x 2 mm) in the as delivered condition without additional heat treatment were sufficiently corrosion-resistant to formic acid, acetic acid and nitric acid. Additional heat treatment in the form of stabilizing annealing and

Corrosion resistance of...

steel was carried out under the following conditions: a) heating alternatively to 1,050, 1,100 and 1,200°C, holding for 2, 6 and 20 minutes at each temperature; quenching in water; b) heating alternatively to 850 and 900°C with 60 and 120 minutes holding, to 950°C with 30 and 60 minutes holding; air-cooling (stabilizing anneal); c) water-hardening of the specimens at 1,050°C with subsequent stabilizing anneal at 850 - 870°C (double heat treatment). Part of the tubes was subjected to a provoking tempering (heating to 650°C, holding time 120 minutes, air-cooling) in the as delivered condition, while part of the tubes was subjected to provoking tempering after the heat treatment as mentioned above. The test tubes were boiled in aggressive media according to the following scheme: in 10-% solution of formic acid for 96 hours; in 10-% solution of acetic acid for 144 hours; in 55-% solution of nitric acid for 144 hours; in a solution of vitriol (110 g) and sulfuric acid (55 ml) in 1 liter of water (A-method, ГОСТ 6032-58 [GOST 6032-58]) for 48 hours; in a solution of vitriol (160 g) and 100 ml sulfuric acid in 1 liter of water containing copper chips for 24 hours. It was found that the tubes (16 x 2 mm) in the as delivered condition without additional heat treatment were sufficiently corrosion-resistant to formic acid, acetic acid and nitric acid. Additional heat treatment in the form of stabilizing annealing and

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quenching, without subsequent provoking tempering improved their corrosion resistance in nitric acid. The best results as to general corrosion resistance were obtained for tubes after hardening at 1,050 - 1,200°C. Provoking tempering (at 650°C) decreased the corrosion resistance of tubes in nitric acid not only for specimens in the as delivered condition, but also for those which had undergone additional heat treatment. Therefore the additional heat treatment of the tubes in the critical temperature range during operation is not necessary. However, stabilizing annealing of specimens subjected to provoking tempering prior to the tests had a positive effect on the corrosion resistance. The resistance to intergranular corrosion was studied by metallographic methods. Stabilizing anneal increased the resistance to intergranular corrosion. When operating in nitric acid of average concentration and high temperature, it was found advisable to use stainless steels with a lower carbon content and a more stable solid solution. The problem, whether additional heat treatment should be applied or not has to be decided under consideration of the composition of aggressive media involved in the production, the processes to which the tubes are subjected in the following stages at the plants producing chemical equipment and the operation conditions of the tubes in aggressive media. There are 7 figures.

ASSOCIATION: TsNIIChM and Moscow trubnyy zavod (Moscow Tube Plant)

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SOROKO, L.N., inzh.; FILONOV, V.A., inzh.; KSENZUK, F.A., inzh.; TSIRLIN, B.M., inzh.; PAVLISHCHEV, V.B., inzh. Prinimali uchastiye: BAHAKOV, A.A.; BOROVSKIY, V.V.; YASHCHENKO, B.V.; LAZUTIN, A.G.; ZAVERYUKHA, A.Kh.; FRANTSENYUK, I.V.; ORLOVA, T.K.

Experimental rolling of stainless steel slabs on a 1200 mill with coilers in the furnace. Stal' 21 no.12:1092-1096 D '61. (MIRA 14:12)

1. Zavod "Zaporozhstal'" (for Soroko, Filonov, Ksenzuk, TSirlin, Pavlishchev).

(Rolling mills—Equipment and supplies)
(Steel, Stainless)

S/129/62/000/002/014/014
E073/E335

AUTHOR: Babakov, A.A., Candidate of Technical Sciences

TITLE: Some results of the International Symposium on Stainless Steels

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov no. 2, 1962 56 - 57

TEXT: This symposium was held in Prague September 11 - 19 1961 and there were 75 participants from 11 countries. 20 main papers were read. The conference was subdivided into five sections, the first one dealing with physical and metallurgical problems of chromium stainless steels and complex alloys. The second dealt with the manufacture and properties of chromium stainless steels Х13 (Kh13), Х17 (Kh17) and Х17Т (Kh17T), The third section dealt with the properties of austenitic and ferritic-austenitic steels, particularly with utilizing nitrogen as the alloying element, which is suitable jointly with manganese as a substitute for nickel. The fourth section dealt with special high nickel-content steels with Cr, Mo and Cu

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Some results of ....

particularly for operation in sulphuric acid. The fifth section dealt with metallurgical and technological features of manufacturing stainless steels and alloys. A new electroslag method of manufacturing stainless steel was dealt with in detail. The introductory paper was read by Professor Dr. Pluhař, Corresponding Member of the Czechoslovak Academy of Sciences. His paper was devoted to the development of stainless steels and alloys, particularly for the chemical and power generation industries of Czechoslovakia.
L. Colombier (France) read a paper on four groups of stainless steels.
H. Ziter (Austria) reported on some compositions and properties of steels which are resistant to sulphuric acid.
V. Cihal, J. Jezek and R. Pospíšil (Czechoslovakia) reported on the properties of austenitic steels containing additions of Nb and Ti.
E. Löbl and B. Potůček (Czechoslovakia) dealt with the various properties of steels with low Ni contents and additions of Mn and N and possibly also Cu or Mo.

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Some results of ....

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M. Viklický (Czechoslovakia) dealt with the properties of chromium steels of the ferritic class and two-phase stainless ferritic-austenitic class steel, their resistance to corrosion and the possibility of their industrial application.
J. Rabald (East Germany) dealt with the properties of the steels type Х18Н12М3Т (Kh18N12M3T) and Х25Н4М2 (Kh25N4M2), which are resistant to acetic acid and steel Х20Н29М2Д3 (Kh20N29M2D3) which has a high resistance to sulphuric acid.
Sakari Kheyskan (Finland) read a paper on the properties of stainless chromium steels and the influence of various tempering conditions on the composition of the rejected carbide phases.
Z. Planckenstein (Austria) read a paper on the problem of developing stainless austenitic steels in which nickel is partly substituted by manganese and nitrogen (0.45 - 0.55% N).
E. Bradbury et al (Great Britain) dealt with the problem of gas corrosion of metal at elevated temperatures.
In a second paper, Bradbury and T. Evans dealt with the study of stress corrosion of steels.

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Some results of .....

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Pivovar (Poland) read a paper on the welding of type X18H4AG8 (Kh18N4AG8) steel.
Two Soviet participants read the papers: "Soviet steels with reduced Ni content" (M.V. Pridantsev); "Electroslag smelting a new and effective method of improving the quality of stainless high-temperature steels" (B.I. Medovar); "On the manufacture of stainless steel type 1Kh18N9T" (N.V.Keys I.A. Lubenets, D.G. Zhukov); "On the corrosion stability of stainless steels with a reduced Ni content" (V.N. Dyatlova).

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S/133/62/000/005/007/008
A054/A127

12 1130

AUTHORS: Babakov, A.A., Candidate of Technical Sciences, and Kareva, Ye.N., Engineer

TITLE: At the Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii im. I.P. Bardina (Central Scientific Research Institut of Ferrous Metallurgy im. I.P. Bardin)

PERIODICAL: Stal', no. 5, 1962, 460

TEXT: New stainless steels of the austenitic and ferritic-austenitic grade containing a reduced amount of nickel have been developed. These steels are substitutes for the 1 X 18 H 10 (1Kh18N10), 2 X 18 H 10 (2Kh18N10), 1 X 18 H 10T (1Kh18N10T) and X18 H 12M 2T (Kh18N12M2T) grades. One group of the new grades is produced by alloying high-chrome ferritic steel with austenite-forming elements to obtain good technological properties of the steel in hot and cold plastic deformation, weldability and corrosion resistance. These grades have a basic ferritic structure with a 5-20% content of γ-phase, which eliminates low ductility in the zone of the welding seam. The other group of new steels belong to the austenitic grade (with a 5-20% content of the α-phase). In these steels

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At the Tsentral'nyy.....

nickel is replaced by manganese (in some cases by manganese and nitrogen). Some of the new grades which were subjected to tests on an industrial scale, have the following characteristics:

	σ_s (kg/mm^2)	σ_s (kg/mm^2)	δ (%)	a_k (kgm/cm^2)
OX 21 H5T (EP53) OKh21N5T (EP53) (ferritic-austenitic)	65	40	25	6
OX21H6M2T (EP54) OKh21N6M2T (EP54) (ferritic-austenitic) with 1.8-2.5% Mo	70	40	25	6
X14G14N (EP212) Kh14G14N (EP212) austenitic	75	30	45	15
X14G14N3T (EI711) Kh14G14N3T (EI711) austenitic	75	30	45	15

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At the Tsentral'nyy.....

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	σ_B (kg/mm^2)	σ_S (kg/mm^2)	δ (%)	a_k (kgm/cm^2)
Kh17AG14 (EP213) austenitic	70	45	50	15
OKh17N5AG9 (EP55) austenitic, 0.5-0.3% Nb	75	40	35	15

The Kh14G14N and Kh14G14N3T grades are suitable for machines working under low temperature conditions, the OKh21N5T grade for chemical apparatus (low and medium concentration nitric acid production), while the OKh21N6M2T and OKh21N5T grades are used for equipment in the production of fatty acids. The Kh17AG14 and Kh14G14N grades are replacing the 1Kh18N9 and 2Kh18N9 grades. The tests on an industrial scale were carried out at the "Elektrostal'" Plant, "Serp i molot" Plant and "Krasnyy Oktyabr'" Plant. The welding conditions for the new grades have been developed, too.

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41147
S/133/62/000/011/004/005
A054/A127

18 1130

AUTHORS: Pridantsev, M.V., Doctor of Technical Sciences, Professor, Babakov, A.A., Candidate of Technical Sciences

TITLE: Stainless steels with reduced nickel content

PERIODICAL: Stal', no. 11, 1962, 1035 - 1039

TEXT: High-chrome, low-nickel stainless ferritic steels [X 17 (Kh17), X 28 (Kh28)] are used in some cases to replace high-nickel steel grades, In some aggressive media this is possible, but on the whole their use is limited, because they are inclined to intercrystalline corrosion; when suddenly cooled from temperatures above 900°C, they have a tendency to general corrosion and at high temperatures (during welding, for instance) their grains tend to grow which reduces their notch toughness. To eliminate these drawbacks of low-nickel steels, TsNIIChM established new grades, partly of the ferritic-austenitic and partly of the austenitic type. The aim was to compose alloys with a low nickel content, having just the right amount of the γ-phase, at which the ductility of the steel does not decrease during the hot processes and which at the same time increases notch toughness. As additional austenite-forming elements manganese and nitrogen

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A054/A127

Stainless steels with .....

were used in the tests. The new ferritic-austenitic grades have the following composition and mechanical characteristics:

Table 2:

Сталь (1)	Химический состав, % (2)						Механические свойства*) (3)			
	C ≤	Mn ≤	Si ≤	Cr	Ni	Ti	σ_B kg/mm²	σ_t kg/mm²	δ %	a_k kgm/cm²
0Х21Н3Т (ЭП214) (4)	0,08	0,80	0,80	20,5—22,5	3—3,5	0,3—0,5	50	30	20	2
0Х21Н5Т (ЭП53) (5)	0,08	0,80	0,80	20,0—22,0	4,8—5,8	0,3—0,5	65	35	25	6
1Х21Н5Т (ЭИ811) (6)	0,09—0,14	0,80	0,80	20,0—22,0	4,8—5,8	0,35—0,7**	70	40	20	6
0Х21Н6М2Т (ЭП54) (7)	0,08	0,80	0,80	20,0—22,0	5,5—6,5	0,3—0,5**	70	40	20	6
Х28Н4 (8)	0,15	0,80	1,00	26—29	3,5—4,5	0,2	46	—	18	5

(9) *) Механические свойства термически обработанных после ковки образцов: закалка с 950—1000° с охлаждением на воздухе. **) На расчет δ (C — 0,03) %, но не более 0,7%.
**) Кроме того, 1,8—2,5% Mo.

Legend: 1 - Steel; 2 - Chemical composition, %; 3 - Mechanical properties; 4 - [0Kh21N3T(EP214)]; 5 - [0Kh21N5T(EP53)]; 6 - [1Kh21N5T(EI811)];

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Stainless steels with.....

7 - [0Kh21N6M2T(Ep54)]; 8 - (Kh28N4);
9 - Remarks: 1-the minimum values are guaranteed after hardening from 950 - 1000°C and air cooling; 2- Calculating 5 (C-0.02%) but not more than 0.7%. 3- Moreover: 1.8 - 2.5% Mo.

The use of the new grades saves 50 - 60 kg nickel per ton of steel. The economy is even greater, as they have a higher strength and therefore less steel is required for making machines, constructions. Their heat expansion coefficient is lower than that of austenitic grades and consequently lower stresses arise in the welding seams. Moreover, they tend to crack less under stresses and no intercrystalline corrosion develops in them. Their higher chrome content makes the new ferritic-austenitic grades just as resistant to aggressive media as the steels containing nickel, to some substances they even display a higher resistance. The 1 X 18 H 9 T (1Kh18N9T) grade can best be replaced by the 0Kh21N5T grade, while the 1 X 18 H 12 M 2 T (1Kh18N12M2T) grade by the 0Kh21N6M2T grade. However, the new ferritic-austenitic grades tend to become brittle, which means that they cannot be exposed to temperatures above 350°C. As their grains tend to grow when heated to high temperatures, rolling, forging, hardening them must be carried out at corresponding lower temperatures, than those applied to the conventional grades.

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Stainless steels with.....

Overheating increases the amount of the ferritic phase, upon heating to 850 - - 1050°C a reversed [illegible] transformation takes place in the new steel grades. TsNIIChM also established a number of new austenitic type grades, in which manganese and nitrogen are used to replace part of the nickel, as austenite forming element. In two grades [X 14Г 14 H (Kh14G14N) and X 14Г 14H 3T (Kh14G14N3T)] only manganese is used besides nickel for this purpose. To these two grades not more than 12 - 14% chrome can be added in order to make the formation of the austenitic phase possible. The composition of the new austenitic grades and their mechanical characteristics are given in Table 5:

Legend:
1 - Steels; 2 - Chemical composition, %; 3 - Other elements; 4 - Mechanical properties; 5 - 1Kh18N9T (given for comparison); 6 - [Kh17N4AG9(EI878)]; 7 - (Kh18N5G9AB; 8 - [Kh22N5AG9(EP20)]; 9 - [Kh17AG14(EP213)]; 10 - - [Kh17N5G9AB(EP55)]; 11 - [OKh20N4AG10(NN3)]; 12 - [OKh20N5G12AB(NN3B)]; 13 - [Kh14G14N(EP212)]; 14 - [Kh14G14N3T(EI711)];
15 - Remarks: 1- calculating 5(C-0.02), where C-the carbon content, in %, but not more than 0.8%; 2- calculating a tenfold content of carbon, but not more than 0.8%; idem, but with an upper threshold of 0.95%; 4- calculating 5(C-0.02), but not more than 0.6%.

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S/133/62/000/011/004/005
A054/A127

Stainless steels with.....
Table 5

Сталь (1)	Химический состав, % (2)						Другие элементы (3)	Механические свойства (4)		
	C ≤	Cr	Ni	Mn	Si	N_2		σ_B кг/мм²	σ_s кг/мм²	δ %
1Х16Н9Т	0,12	17—20	9—11	1—2	0,8	—	Ti*1	60	25	40
Х17Н4АГ9 (ЭИ878)	0,12	16—18	3,5—4,5	8—10	0,8	0,18—0,25	—	70	40	40
Х18Н5Г9АБ	0,8	18—20	4,5—5,5	8,0—10,0	0,8	0,25—0,30	Nb*3	80	45	35
Х22Н5АГ9 (ЭП20)	0,09	21—23	4,5—5,5	8—10	0,8	0,35—0,45		90	45	40
Х17АГ14 (ЭП213)	0,15	16—18	0,6	13,5—15,5	0,8	0,30—0,40		75	40	45
Х17Н5Г9АБ (ЭП55)	0,08	16—18	4,5—5,5	8—10	0,6	0,18—0,25	Nb*3	80	40	40
0Х20Н4АГ10 (ННЗ)	0,08	17,5—20,5	4—5	10—12,5	0,8	0,4—0,5	Nb*3	85	50	35
0Х20Н5Г12АБ (ННЗБ)	0,08	18—20	4,5—5,5	11,5—13,5	≤0,8	0,4—0,5	Nb*3	85	50	35
Х14Г14Н (ЭП212)	0,12	13—15	1—2	13—15	≤0,8	—	Ti*4	70	30	45
Х14Г14Н3Т (ЭИ711)	0,10	13—15	2,5—3,5	13—15	≤0,8	—		70	30	45

*1 Из расчета 5 (C — 0,02), где C — содержание углерода, %, но не более 0,8%. *2 Из расчета десятикратного содержания углерода, но не более 0,8%. *3 То же, но с верхним пределом 0,95%. *4 Из расчета 5 (C — 0,02), но не более 0,8%.

The strength properties of these grades are better than those of conventional

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Stainless steels with.....

chrome-nickel alloys. The solid solution is considerably strengthened by the adsorption of nitrogen and manganese atoms. The addition of niobium (which forms stable compounds in the presence of nitrogen) increases the resistance to intercrystalline corrosion. In this case, however, part of nickel is bonded to nitrogen and this decreases its autenite forming effect. There are 9 figures and 5 tables.

Card 6/6

BABAKOV, A.A.; ZOTOVA, Ye.V.

Tendency toward intercrystallite corrosion in Kh18N28M3D3 and Kh23N28M3D3 steels. Sbor.trud.TSNIICHM no.27:85-92 '62. (MIRA 15:8)

(Chromium-nickel steel--Corrosion)

PRIDANTSEV, M.V., doktor tekhn.nauk, prof.; BABAKOV, A.A., kand.tekhn. nauk

Stainless steel with a lower nickel content. Stal' 22 no.11:1035-1039 N '62. (MIRA 15:11)
(Steel, Stainless--Analysis) (Nickel--Analysis)

S/776/62/000/027/002/004

AUTHORS: Babakov, A. A., Zotova, Ye. V.

TITLE: The effect of Silicon, Copper, Vanadium, Tungsten, and Niobium on the corrosion resistance of Ferronickel alloys in sulfuric acid.

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov. no.27. Moscow, 1962. Spetsial'nyye stali i splavy. pp. 47-73.

TEXT: The paper describes a laboratory test series intended to find corrosion-resistant steels and alloys for the manufacture of chemical equipment that is suitable for operation in contact with sulfuric acid. The direct objective of the tests was an investigation of the influence of the Ni on the corrosion rate of Fe-Ni alloys (with low C content) in sulfuric acid having a concentration of 5, 10, and 20%, and - upon determining an optimal composition for the Fe-Ni alloys - to study the effect on the optimal alloy of such elements as Si, Cu, B, V, and W, both severally and jointly. The paper describes the methodology of the investigation, comprising corrosion tests on flat, heat-treated, 25x50x2.5(3.0)-mm specimens with a ground and, in some instances, etched surface, an investigation of the corrosion of the Fe-Ni alloys with Ni contents of 5, 10, 15, etc., %, which showed a sharp decrease in corrosion rate

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up to 25-30% Ni, but not with higher Ni contents. The investigation of the test steels is further broken down into: (A) An investigation of Fe-Ni steels with Si and Cu addition, including an investigation of their microstructure and corrosion stability; (B) an investigation of theFe-Ni alloys with additions of V, W, and Nb, and a number of types of Cr-Ni Steels, including an investigation of the microstructures of said steels. It was found that: (1) The introduction into a low-alloy steel of 25-30% Ni, corresponding to appx. 2/8 mol, increases the corrosion resistance of a Fe-Ni alloy against sulfuric-acid solutions sharply; (2) the additional alloying of Fe-Ni alloys of the H30 (N30) type ($\leq$ 5% Si and 2-4% Cu) affords a further increase in corrosion resistance and renders such alloys corrosion-resistant at temperature not to exceed 80°C; (3) alloying of N30-type Fe-Ni alloys or Cr-Ni alloys of the H30X20 (N30Kh20) type with additions of V, W, or B up to 15% of each does not produce a favorable effect on the sulfuric-acid corrosion resistance, but on the contrary renders all steels investigated distinctly unstable; and (4) greatest corrosion resistance, under analogous circumstances, is exhibited by steels X18H28M3Д3 (Kh18N28M3D3) or X23H28M3Д3 (Kh23N28M3D3). A lower Ni content or absence of Cu additions reduces the corrosion resistance. High-Cr steel X17 (Kh17) through X27 (Kh27) or Cr-Ni steels of the types investigated exhibit a low corrosion resistance. There are 34 figures and 7 tables; no references.

S/776/62/000/027/003/004

AUTHORS: Babakov, A.A., Zotova, Ye.V., Zhadan, T.A.

TITLE: A search for steels that are corrosion-resistant in extractive phosphoric acid.

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov. no. 27. Moscow, 1962. Spetsial'nyye stali i splavy. pp. 74-84.

TEXT: The paper reports the results of an experimental investigation of steels that would be suitable for the making of double superphosphate from mineral fluorapatite (asparagus-stone), in which the reaction vessels must resist the aggressiveness of the sulfuric acid used to produce phosphoric acid containing 10-25% P_2O_5, hydrofluosilicic acid with a fluor concentration of 0.6-1.4%, and various compounds (SO_3, Fe_2O_3, Al_2O_3). Various deformable and nondeformable alloys on a Fe base, containing Cr, Ni, Mo, Cu, Si, and other elements in two- and multi-component systems, were tested. The compositions of the steels are tabulated in detail. Tests were performed in (1) phosphoric acid containing 32% P_2O_5, 1.8% F, and 2.5% SO_3, at 90°C; and (2) in phosphoric acid containing 55% P_2O_5, 0.8% F, and 4.5% SO_3, at 105-110°, both in the liquid and the vapor phase; the total dura-

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tion of the test was 100 hrs. The structure and the mechanical properties of the deformable steels are summarized in a full-page table; the structure and hardness of the cast non-deformable steels is shown in another full-page table. The results of the corrosion tests of the Fe-Ni alloys, summarized in yet another full-page table, show the favorable effect of the Ni on the corrosion resistance of the steel in phosphoric acid, more especially in the vapor phase thereof. Fe-Ni alloys are essentially little corrosion-resistant and nonresistant materials. The tabulated results of the corrosion-resistance tests of various deformable steels in phosphoric acid show that the corrosion resistance of Cr steels increases with increasing Cr content, whereas Ni-Si steels are not sufficiently corrosion-resistant. The highest corrosion resistance is exhibited by Cr-Ni steels, especially with Mo additions, and by Cr-Ni-Mo-Cu steels. Sormite steels appeared to be unstable. In summary, it is recommended that industrial production tests be made with austenitic steels of the types X18H12M2T [Kh18N12M2T] (ЭИ448 [EI448]), X23H28M2T [Kh23N28M2T] (ЭИ228 [EI228]), and X23H28M3Д3T [Kh23N28M3D3T] (ЭИ629 [EI629]) in equipment that is used in the production of double superphosphate and requires corrosion resistance of the steel and alloys in extractive phosphoric acid, both weak and evaporated. Production tests of the various steels were performed on a number of equipment parts and subassemblies in the experimental factory of the Moscow Scientific Research Institute of Fertilizers, Insecticides, and Fungicides imeni Ya. V.

A search for steels that are corrosion-resistant.... S/776/62/000/027/003/004

Samoylov. Cross-sections of mixer paddles and of distribution disks of a drum-type vacuum filter tested are shown in full-page-size figures. The results of the corrosion tests show the low corrosion resistance of Cr and Cr-Ni steels and the improved corrosion resistance of steels more highly alloyed with Cr, Ni, and Mo. The beneficial effects of heat treatment on welded parts after welding are noted. It is concluded that in the making of welded equipment it is important that steels with a low C content (not more than 0.06% and Ti additions (0.5-0.8%) be employed; such steels, of the types OX23H28M2T [OKh23N28M2T] and OX23H28M3Д3T [OKh23N28M3D3T] (ЭИ943 [EI943]), which exhibit good resistance to general and intercrystalline corrosion, are highly corrosion-resistant against the action of extractive phosphoric acid containing F compounds. There are 3 figures and 9 tables; no references.

Card 3/3

KAKHOVSKIY, N.I.; YUSHCHENKO, K.A.; YUSHKEVICH, Z.V.; BABAKOV, A.A.; KAREVA, Ye.N.; SHARONOVA, T.N.

Electric arc welding of corrosion-resistant ferrite-austenite steels of the type 21-3 and 21-5. Avtom. svar. 16 no.12:49-57 D '63. (MIRA 17:1)

1. Institut elektrosvarki imeni Patona AN UkrSSR (for Kakhovskiy, Yushchenko, Yushkevich). 2. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii (for Babakov, Kareva). 3. Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut azotnoy promyshlennosti i produktov organicheskogo sinteza (for Sharonova).

ACCESSION NR: AR4027946 S/0137/64/000/002/I071/I071

SOURCE: RZh. Metallurgiya, Abs. 2I419

AUTHOR: Babakov, A. A.; Gulyayev, A. P.; Zhadan, T. A.; Tufanov, D. G.

TITLE: Effect of carbon on the properties of Kh16N15M3B stainless steel

CITED SOURCE: Sb. tr. Tsentr. n.-i. in-t chernoy metallurgii, vy*p. 35, 1963, 63-66

TOPIC TAGS: carbon, stainless steel corrosion, intercrystalline corrosion

TRANSLATION: A study was made of the effect of C content (0.04-0.2%) at a constant ratio Nb:C ($\geq$ 10) on the mechanical properties and tendency toward intercrystalline corrosion (TIC) of Kh16N15M3B steel. In the hardened state, an increase in the C content causes a rise in σ_b and σ_s and a drop in δ, ψ, and a_k at 20 and 350°. This is due to an increase in the amount of carbides present in the steel (which was quenched from 1050°). Soaking at 500° leads to the precipitation of carbides along the grain boundaries and to a drop in a_k. The rate of decrease in a_k is the same for all the steels studied as the duration of soaking increases. Heating at 550° caused TIC in all the steels, despite the fact that the content of Nb was 10 times greater than that of C. At a C content of 0.04 to 0.07%, TIC appeared after

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ACCESSION NR: AR4027946

soaking 1500 hr, whereas it did so after 500 hr in steel with 0.12 to 0.20% C. For the maximum possible prevention of TIC, the C content should be lowered to 0.02-0.3% and the steel should be stabilized with titanium or Nb. N. Kalinkina

DATE ACQ: 19Mar64 SUB CODE: ML ENCL: 00

Card 2/2

BABAKOV, A.A.; FEDOROVA, V.I.; SOLOV'YEV, L.L.; IOIA, V.N.; DOBOKA, L.I.; CHERKASHINA, N.P.; SHAMIL', Yu.P.; SMOLYAKOV, V.F.; BABKOV, T.M.; MOSHKEVICH, Ye.I.; PARALA, A.N.; KEFESHKO-KRAVCHENKO, S.I.; ALEKSEYENKO, M.F.; KOROBKO, M.I.; KOROBKO, I.M.; AVENIR, N.M.; MATOV, A.A.; MIGUTSKIY, L.R.

Inventions. Met. i gornorud. prom. no.4:83 Jl-Ag '64.
(MIRA 18:7)

L 9093-65 EWT(m)/EWP(q)/EWP(b) ASD(f)/AFMD(c)/ASD(m)-3 MJW/JD

ACCESSION NR: AP4042254 S/0064/64/000/007/0541/0547

AUTHOR: Yegorov, V. P.; Kruglov, B. I.; Sharonova, T. N.; Babakova, A. A.; Kakhovskiy, N. I.; Brusentsova, V. M.; Vasil'yeva, N. M.; Kareva, Ye. N.; Yushchenko, K. A.

TITLE: Industrial use of steels with lowered nickel content

SOURCE: Khimicheskaya promy*shlennost', no. 7, 1964, 541-547

TOPIC TAGS: stainless steel, low nickel stainless steel, EP53 stainless steel, EP54 stainless steel, steel composition, steel microstructure, steel mechanical property, steel corrosion resistance, steel weldability, weld metal property, stainless steel corrosion

ABSTRACT: To determine the suitability of low-nickel stainless steels for use in the chemical industry, the corrosion resistance of OKh21N5T (EP-53) and OKh21N6M2T (EP-54) stainless steels has been investigated under laboratory, semi-industrial, and industrial conditions. These specimens, with joints made by means of manual or submerged arc welding, were tested in nitric acid with concentrations of 2—80% at temperatures of 40, 60, and 80C. Metallographic examination of the

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welded joints of chemical equipment after more than one year of operation revealed no intergranular corrosion of the parent or weld metal, or of the metal in the heat-affected zone. EP-53 steel has satisfactory corrosion resistance in nitric-oxide-containing media, in 60% nitric acid at temperatures up to 60C, in urea solutions up to 120C, and in acid and alkaline solutions of ammonium nitrate at 80—90C. EP-54 steel is corrosion resistant in an ammonium-sulfate solution containing up to 20g/l free sulfuric acid at a temperature up to 90C; it is, however, susceptible to intercrystalline corrosion under conditions of urea synthesis. Test results make it possible to recommend EP-53 steel as a substitute for 1Kh18N10T (AISI-321) steel in the production of

300C. The EP-54 steel needs additional testing. Orig. art. has: 9 tables and 3 figures.

ASSOCIATION: LKHK ; GIAP; ToNIIChM; Institut elektrosvarki im Ye. O. Patona (Institute of Electrical Welding)

SUBMITTED: 00	ATD PRESS: 3105	ENCL: 00	
SUB CODE: MM, IE	NO REF SOV: 000	OTHER: 000	

Card 2/2

BABAKOV, A.A., kand. tekhn. nauk; LOMAKIN, N.D., kand. tekhn. nauk; AKSENOV, E.N., inzh.; KALUGIN, V.F., inzh.

Review of F.A. Ksenzuk's, and N.A. Troshchenkov's book "Rolling and finishing of stainless steel strip." Stal' 23 [i.e. 24] no.4:348 Ap '64. (MIRA 17:5)

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii imeni I.P. Bardina.

L 59277-65 EWT(m)/EWP(w)/EPF(c)/EWA(d)/T/EWP(t)/ENT(z)/EWP(b)/EWA(c) Pad IJP(c)
MJW/JD/HW/JG/WB

ACCESSION NR: AT5016060 UR/2776/65/000/039/0087/0090

AUTHOR: Zhadan, T. A.; Babakov, A. A.

TITLE: Structure and properties of Cr-Mn stainless steels

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov, no. 39, 1965. Spetsial'nyye stali i splavy (Special steels and alloys), 87-90

TOPIC TAGS: stainless steel, metallographic examination, heat treatment, metal mechanical property, impact resistance, corrosion resistance

ABSTRACT: Stainless steels were studied containing 18-25% Cr, 2-6% Mn, 0.08% C, 0.6% Si and 0.5% Ti with 2% Ni additions, and also without Ni, in order to develop economic alloying of stainless steels. Structures and properties were investigated on heat treated samples (800 to 1200°C anneal with air cool). The electrolytically etched structures showed the effects of

[illegible] temperature and the U content. Tendencies toward brittle behavior were not-

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ed for steels having greater amounts of ferrite phase. By adding 2% Ni, the gion of embrittlement is displaced in the same direction as for the higher Cr conts. Steels, containing 25% Cr and 2% Ni, at Mn contents of 2 to 8% have lowered impact strength. Cr-Mn steels, after annealing at temperatures designed to produce optimal ferritic structures, display tendencies toward intercrystalline corrosion. The opposite is true for stable two-phase steels

a wide range of temperatures (900-1200°C). Orig. art. has: 7 figures.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 002 OTHER: 002

Card 2/2

L 59268-65 EPF(c)/EPF(n)-2/EWT(m)/EWP(k)/EWP(z)/EWA(c)/EWP(b)/T/EWA(d)/EWP(w)/
EWP(t) Pf-4/Pu-4/Pi-4 IJP(c) JD/HW/JG/WB

ACCESSION NR: AT5015058 UR/2776/65/000/039/0073/0080

67
56
B+1

AUTHOR: Babakov, A. A.; Gulyayev, A. P.; Zhadan, T. A.; Tufanov, D. G.

TITLE: Some properties of austenitic Cr-Ni stainless steels

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov, no. 39, 1965. Spetsial'nyye stali i splavy (Special steels and alloys), 73-80

TOPIC TAGS: stainless steel, cold deformation, cold working, heat treatment, metallographic examination, metal mechanical property, martensitic transformation, corrosion resistance, impact strength

ABSTRACT: The goal of this work was to study the properties of some austenitic stainless steels used in the chemical industry. Twenty-five steels were used in the investigation, containing 17-19% Cr, 12-14% Ni, 0.04-0.06% C with minor alloying additions of Mo, Cu, W, N_2, and Si. Representative microstructures of the heat-treated steels are given after (a) quenching from 1080°C in water, and (b) quenching plus a supplementary stabilization anneal at 820°C for 10 hrs (air cool). The structures were all austenitic, however, after treatment (b) the materials displayed pro-

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L 59268-65

ACCESSION NR: AT5016058

nounced segregation of carbides and carbonitrides. Also the grain sizes of the various steels differed depending on the alloying elements used. By using magnetic measurements, relative amounts of martensitic phase were determined by the anisometric method of Akulova. Only after deformation at low temperatures (-70°C) is the amount of martensite significant (20-44%), while only one steel, OKh18N10T, has as much as 3% martensite after deformation at +50°C. Mechanical properties for all of the steels are given in tabular form for both heat treatments, as well as for tempering done at 350 and 500°C. Impact strengths are given both before and after tempering. The tendency of the steels toward intercrystalline corrosion depending on heat treatment was studied. Standard tests (GOST 6032-52) were made on strips of material, which were boiled in water for 24 to 48 hrs. and then bent. Intercrystalline corrosion was indicated by the appearance of cracks in the bend. This test showed that steels without Ti and Nb additions display tendencies to intercrystalline corrosion in wide tempering intervals, for all conditions. Orig. art. has: 1 figure, 3 tables.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 000 OTHER: 000

Card 2/2 KC

L 59278-65 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c)
Pf-4/Pu-4 IJP(c) JD/HW/JG
ACCESSION NR: AT5016059 UR/2776/65/000/039/0081/0086

AUTHOR: Babakov, A. A.; Kozlova, N. A.; Fedorova, V. I.

TITLE: Stability of austenitic Cr-Mn-Ni solid solutions of stainless steel with nitrogen additions

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov, no. 39, 1965. Spetsial'nyye stali i splavy (Special steels and alloys), 81-86

TOPIC TAGS: stainless steel, heat treatment, metal mechanical property, austenite stability, martensitic transformation, metallographic examination, low temperature deformation

ABSTRACT: A new stainless steel was developed by partially replacing the Ni content of the standard alloy 1Kh18N10T with Mn and nitrogen. Eight steels were prepared for the study with varying contents of C, Cr, Ni, Mn, Si and N_2. The effect of Cr, C, and Mn on the structure and mechanical properties of these steels after quenching from various temperatures was investigated in connection with the degree of austenitic stability, which was related to the amount of martensite formed after low tem-

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L 59278-65

ACCESSION NR: AT5016089

5

perature deformation. Mechanical properties and magnetic characteristics were determined on sheet samples after quenching and plastic deformation. Mechanical properties of rods quenched from 1050 and 1250°C, were also determined at +20, -70, and -196°C. The microstructures of steels with 20-22% Cr, 4.8-5.2% Ni, 6.5-8.5% Mn and 0.25-0.33% N_2 show that a purely austenitic structure is possible if the content of Cr does not exceed 20-20.5% and if the quenching temperature remains approximately 1050°C. Increasing the Cr content to 22% results in formation of ferrite, the remaining composition being constant. Increasing the quenching temperature contributes to the appearance of ferrite, with some reduction in strength. Thus, a steel with 20% Cr, having an austenitic structure after quenching from 1050°C, would have 5-10% ferrite after quenching from 1250°C. The austenite was quite stable after room temperature deformation. However, strength was increased by testing at lower temperatures, with high ductility maintained. For example, at -196°C after quenching from 1050°C, the strength and creep resistance were about 150 and 100 kg/mm^2 respectively, while the elongation and reduction in area remained within the limits of 30-40%. Deformation of the steels at temperatures of -70 and -196°C led to transformation of the austenite into martensite, which was more noticeable for steels with 20% Cr. Orig. art. has: 4 figures, 1 table.

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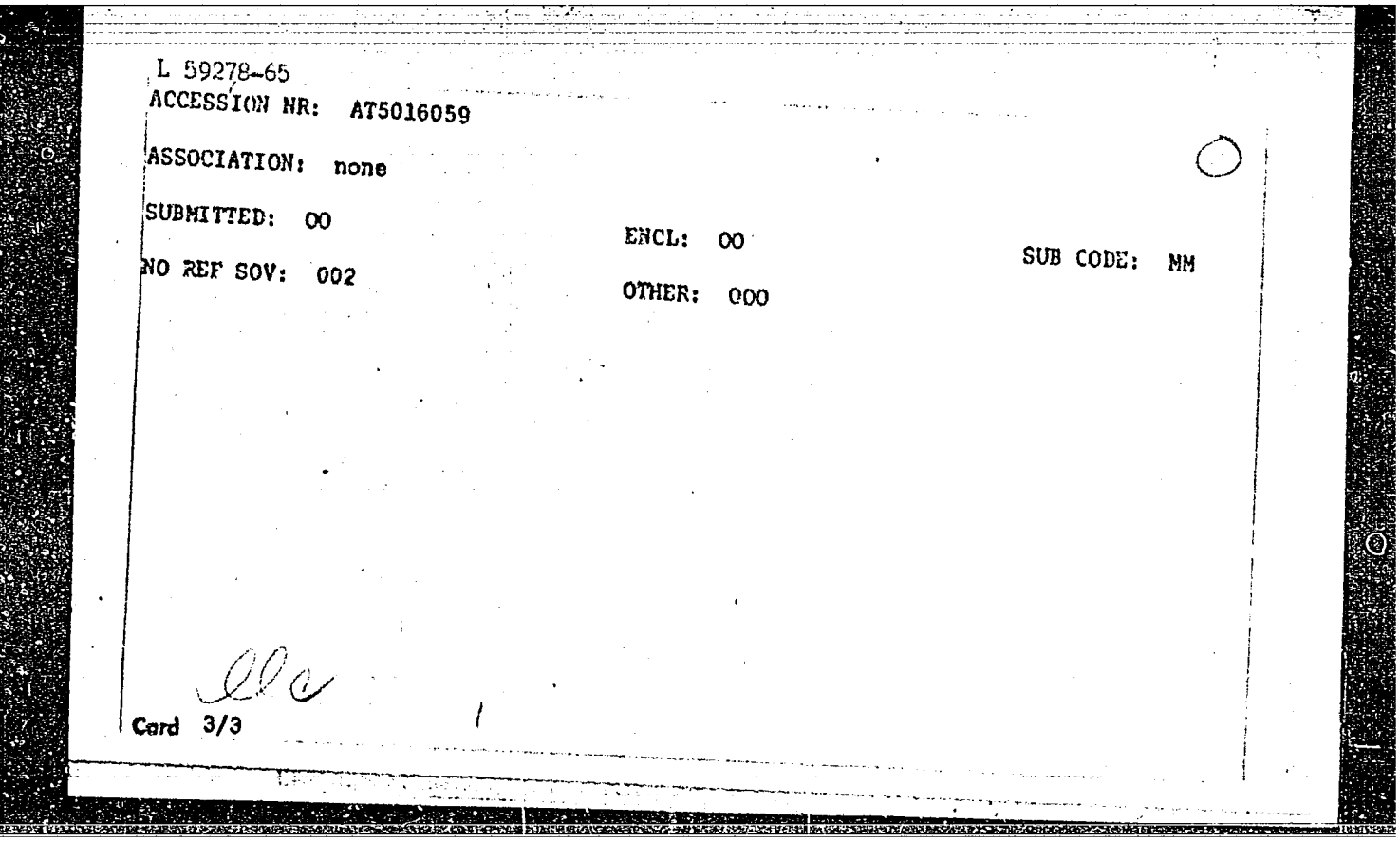

L 59278-65
ACCESSION NR: AT5016059

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 002 OTHER: 000

Card 3/3

L 45361-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) Pf-4/Pad IJP(c) MJW/JD/HW

ACCESSION NR: AP5007009 S/0129/65/000/003/0050/0052

AUTHOR: Cherkashina, N. P.; Barziy, V. V.; Babakov, A. A. 38 35 B

TITLE: Production of 1Kh21N5T sheet steel at the "Zaporozhstal'" Plant

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 3, 1965, 50-52

TOPIC TAGS: brittleness, metal mechanical property, heat treatment, steel hardening, austenite

ABSTRACT: To study the tendency of 1Kh21N5T steel toward embrittlement, sheet specimens of two melts differing in titanium content (see table 1 of the Enclosure) were quenched in water from 1100 and 1250°C (holding for 30 min) and tempered at 400-850°C. After heating to 1250°C, melt No. 1 had a purely ferritic structure, whereas melt No. 2 contained about 10% austenite. The metal of melt No. 1 with a two-phase structure (quenching from 1100°C) and the metal of melt No. 2 (quenched from 1250°C) both had a tendency toward brittleness. It was found that at 4.8-5.3% Ni and 0.09-0.11% C the greatest influence on embrittlement was exerted by excess titanium (0.15% more than the necessary minimum). To study the embrittlement tendency of steel of variable chemical compositions; the mechanical properties

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L 45381-65

ACCESSION NR: AP5007009

of cold-rolled sheets and impact strength of samples of hot-rolled sheets were determined after tempering for 1 hr at 550°C. A technological process similar to that used for Kh18N10T steel was adopted for rolling batches containing 0.25-0.50% Ti and 4.8-5.3% Ni. This composition insures the stability of the mechanical properties. Orig. art. has: 1 figure and 2 tables.

ASSOCIATION: Zavod "Zaporozhstal'" ("Zaporozhstal'" Plant); TsNIIChermet

SUBMITTED: 00 ENCL: 01 SUB CODE: MM

NO REF SOV: 000 OTHER: 000

Card 2/3

L 45381-65

ACCESSION NR: AP5007009 ENCLOSURE: 01

Table 1

Melt No.	Chemical composition, %					
	C	Mn	Si	Cr	Ni	Ti
1	0.10	0.65	0.60	21.27	5.14	0.65
2	0.11	0.61	0.53	21.00	5.15	0.55

Card 3/3

BABAKOV, A.A.; KOZLOVA, N.A.

Applying rapid methods of heat treatment of thin-sheet stainless steel of the ferritic class. Sbor. trud. TSNIICHM no.39:101-108 '65.
(MIRA 18:7)

BOCHKAREV, Konstantin Stepanovich, general-mayor; PRUSANOV, Ivan Petrovich, polkovnik; BABAKOV, Aleksandr Aleksandrovich, polkovnik; ROMANOV, I.M., red.

[Program of the CPSU on the defence of the socialist fatherland] Programma KPSS o zashchite sotsialisticheskogo otechestva. 2., perer. i dop. izd. Moskva, Voenizdat, 1965. 173 p. (MIRA 18:12)

(V) L 12093-66 EWT(m)/EWP(w)/EWP(v)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c)
ACC NR: AP6000604 LJP(c) JD/HM/HW/JG SOURCE CODE: UR/0129/65/000/012/0014/0019

AUTHOR: Ul'yanin, Ye. A.; Babakov, A. A.; Fedorova, V. I.

ORG: TsNIIChERMET

TITLE: Properties of chromium-manganese steel with nitrogen at low temperatures

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 12, 1965, 14-19, and bottom half of insert facing p. 41

TOPIC TAGS: chromium steel, manganese steel, nitrogen, impact strength, brittleness

ABSTRACT: These properties were investigated at temperatures reaching -196°C for two series of laboratory melts with various contents of Cr and N (19.9-22.0% Cr, 0.24-0.35% N) and identical contents of all the other alloy elements (0.035-0.05% C, 0.38-0.51% Si, 5.9-6.17% Mn, 4.99-5.18% Ni, 0.003-0.007% P and 0.007-0.013% S). The steels with 0.32-0.35% N have an austenitic structure to 1200°C, and the steels with 0.24-0.26% N, an austenitic-ferritic structure containing up to 30% δ-ferrite, with the content of δ-ferrite being the greater the higher the amount of ferrite-forming Cr in the steel. Tensile tests at room temperature showed that all the melts have high mechanical properties after quenching from 1050 and 1200°C. At +20 and -196°C N-containing Cr-Mn steel displays high strength, plasticity and impact toughness; thus the presence of as much as 30% of δ-ferrite in this steel does not appreciably

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UDC: 620.17:669.15-194:669.26'74

L 12093-66

ACC NR: AP6000604

affect its mechanical properties. If the content of δ-ferrite is smaller than 15%, it apparently exerts a positive effect, since it reduces proneness to the growth of austenite grain during high-temperature hardening. Moreover, small amounts of δ-ferrite in austenitic steel enhance its weldability. The steel investigated is prone to embrittlement when heated at 500-800°C and hence to a decrease in its strength, plasticity and impact toughness. The proneness of steel to embrittlement during tempering is determined by its C content. Melts containing 0.010% C do not get embrittled during tempering. The brittleness of austenitic Cr-Ni-Mn steel during 700-800°C tempering is caused by the segregation of the $M_{23}C_6$ carbide along grain boundaries. Orig. art. has: 4 tables, 5 figures.

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 006/ OTH REF: 000

Card 2/2

L 12090-66 EWT(m)/EWA(d)/EWP(t)/EWP(z)/EWP(b) IJP(c) MJW/JD/HW/WB
ACC NR: AP6000602 SOURCE CODE: UR/0129/65/000/012/0006/0010

AUTHOR: Babakov, A. A.; Svistunova, T. V.; Chermenskaya, N. F.

ORG: TsNIIChERMET

TITLE: Effect of silicon on the mechanical properties and proneness to intercrystalline corrosion of chromium-nickel-molybdenum alloy

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 12, 1965, 6-10 bottom half of insert facing p. 40, and top half of insert facing p. 41

TOPIC TAGS: nickel base alloy, corrosion resistance, intercrystalline corrosion, phase diagram metal grain structure / EP375 type Cr-Ni-Mo alloy

ABSTRACT: Cr-Ni-Mo alloys of the Kh15N55M16V (EP375) type (>0.08% C, 1% Si, 1% Mn, 0.020% S, 0.025% P, 0.35% V, 7% Fe, 2.5% Co, 14.5-16.5% Cr, 15-17% Mo (Ni base)) -- hastelloy, langaloy, etc. --are used in chemical industry in redox media and various aggressive media. Their principal shortcoming is proneness to intercrystalline corrosion in the zone of the thermal influence of welding as well as following reheating to 650-1000°C, due chiefly to the segregation of the ternary σ-phase along grain boundaries. Glass et al. (Metallkunde, 1960, no. 5)showed that reducing the Si content of these alloys to hundredths of a percent can retard the segregation rate of σ-phase in Ni-Cr-Mo alloys of the 25% Cr-15% Mo system. In this connection, the

Card 1/2 fw UDC: 620.17:669.018.5

L 12090-66

ACC NR: AP6000602

the authors present the results of a comparative investigation of the mechanical properties (hardness, impact strength, corrosion resistance) and proneness to intercrystalline corrosion of three types of Cr-Ni-Mo alloys containing 0.06 - 1.60% Si, 15.0-25.2% Cr, 14.7-17.2% Mo. Proneness to intercrystalline corrosion was determined for sheet specimens following 48-hr boiling in a solution of 30% H_2SO_4 + 40 g/liter $Fe_2(SO_4)_3$ with subsequent 90° bending around a frame. At the same time the depth of penetration of intercrystalline corrosion was determined by the metallographic method. The corrosion resistance of alloys in 50% H_2SO_4 at 70°C was determined according to weight loss. It was established that the presence of Si in the alloys adversely affects their properties by accelerating the segregation of secondary phases. Of the investigated alloys, the alloy Kh15N65M15B[*] with its lower Si content (0.9%) is recommended for pilot industrial tests. Orig. art. has: 2 tables, 4 [3] figures.

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 000/ OTH REF: 004

Add'l. ref. 1 Alloy designations shown in journal

* Kh15N65M15V (EP567) 19

Kh15N70M15 19

Kh25N10M15 19

Card 2/2

UL'YANIN, Ye.A.; BABAKOV, A.A.; FEDOROVA, V.I.

Properties at low temperatures of chromium-manganese steel with nitrogen. Metalloved. i term. obr. met. no. 12:14-19 D '65. (MIRA 18:12)

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii imeni Bardina.

L 04656-67 EWP(k)/EWT(m)/T/EWP(v)/EWP(t)/ETI IJP(c) JD/HW

ACC NR: AP6014435 (N) SOURCE CODE: UR/0125/65/000/012/0012/0017

AUTHORS: Fartushnyy, V. G.; Kakhovskiy, N. I.; Babakov, A. A.; Fedorova, V. I. 42 41 B

ORG: [Fartushnyy, Kakhovskiy] Institute of Electro-Welding im. Ye. O. Paton, AN UkrSSR (Institut elektrosvarki AN UkrSSR); [Babakov, Fedorova] TsNIIChM

TITLE: Austenitic chromium-manganese-nitrogen steel and its welding technology 16 4

SOURCE: Avtomaticheskaya svarka, no. 12, 1965, 12-17

TOPIC TAGS: alloy steel, metal welding, weldability, automatic welding, seam welding/ Kh17AG14 steel, ST-3 steel

ABSTRACT: A technique for welding steel Kh17AG14 and a combination of the latter with steel St3 in the presence of flux and of different inert gases (CO_2, argon) was developed. In addition, the usual mechanical properties and magnetic permeability, as well as the microstructure, of the steel Kh17AG14 were determined. The experimental results are presented in graphs and tables (see Fig. 1). It was found that steel Kh17AG14 possesses high plasticity but tends towards embrittlement in the temperature interval 600--800C. Welding of the steel should be carried out with electrodes having the same composition as the steel or, in some cases, with the OKh18N9FBS rod. Welding of the combination Kh17AG14 -- St3 may be carried out

Card 1/2

UDC: 621.791.(756+856):669.140

L 04656-67

ACC NR: AP6014435

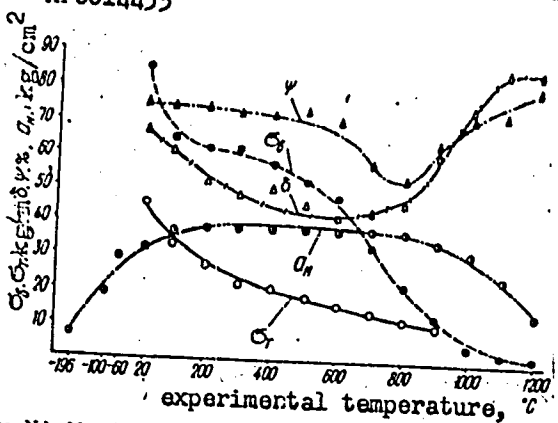

Fig. 1. Change in the mechanical properties of the steel Kh17AG14, as a function of the experimental temperature.

with Cr-Ni-Mn 20-9-7, Cr-Ni 18-8, or EA-2 type electrodes. The authors thank G. P. Manzheley for carrying out the carbide analysis. Orig. art. has: 4 tables and 6 graphs.

SUB CODE: 13, 11/ SUBM DATE: 24Sep65/ ORIG REF: 006/ OTH REF: 002

kh

Card 2/2

Joining of dissimilar metals 18

L 40058-66 EWT(m)/T/EWP(w)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6016588 (N) SOURCE CODE: UR/0126/66/000/005/0026/0027

AUTHORS: Ul'yanin, Ye. A.; Babakov, A. A.

ORG: TsNII hERMET

TITLE: The effect of carbon on the mechanical properties of austenite steel at low temperatures

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 5, 1966, 26-27

TOPIC TAGS: metallography, austenite steel, metal grain, carbon steel / Kh21G7AN5 austenite steel, Kh17G9AN4 austenite steel

ABSTRACT: A study was performed to establish the attainable limit of carbon in austenite steels so that the steels do not become brittle at low temperatures. The chemical content of the steels investigated was (in %): Kh21G7AN5 steel: 0.15--0.18 Si, 7.3--7.8 Mn, 5.8--5.9 Ni, 20.5--21.2 Cr, and 0.29--0.31 N; Kh17G9AN4 steel: 0.11--0.19 Si, 11.4--11.8 Mn, 5.7--5.9 Ni, 17.6--17.7 Cr, and 0.30--0.32 N. The carbon content in both steels varied from 0.005 to 0.08%. Specimens of both steels were prepared through hardening in water at 1050C, followed by immersion in a lead bath at 700C for 20 minutes. Experiments were performed to measure the sensitivity of both steels to exposure to 700C for 1, 5, 10, 40, and 80 minutes. It was found that the carbon content determines the sensitivity for both steels. Additional tests were performed in measuring the variation of impact strength as a function of

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UDC: 620.17:669.14.018.84

L 40058-66

ACC NR: AP6016588

exposure to 700C. The microstructure of the specimens was examined after certain tests. It is concluded that the strength of these steels after exposure to low temperatures is reduced as a result of the separation of $Cr_{23}C_6$ grains to the surface. Specimens having 0.03% C and less steel after exposure are not subject to embrittlement above -253C. The phase analysis was conducted by V. S. Mal'tseva and V. A. Belyayeva. Orig. art. has: 2 figures and 2 tables.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 001

Card 2/2 gd

L 42922-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JT

ACC NR: AP6029056 SOURCE CODE: UR/0413/66/000/014/0082/0082

INVENTOR: Averchenko, P. A.; Alekseyenko, M. F.; Babakov, A. A.; Babitskaya, A. N.; Batrakov, V. P.; Bondarenko, A. L.; Gabuyev, G. Kh.; Yel'tsov, K. S.; Kulygin, G. V.; Lola, V. N.; Orekhov, G. N.; Pridantsev, M. V.; Sklyarov, P. I.; Smolyakov, V. F.; Soroko, L. N.; Solov'yev, L. L.; Frantsov, V. P.; Shamil', Yu. P.; Moshkevich, Ye. I.; Natanov, B. S.

ORG: none

TITLE: Stainless steel. Class 40, No. 183947.

SOURCE: Izobret prom obraz tov zn, no. 14, 1966, 82

TOPIC TAGS: stainless steel, chromium titanium steel, molybdenum containing steel, nitrogen containing steel, titanium containing steel

ABSTRACT: This Author Certificate introduces a stainless steel containing chromium, molybdenum, and nitrogen. In order to improve weldability, the steel has the following composition: 0.08% C, up to 0.8% Mr, up to 0.8% Si, 15—18% Cr, 0.2—0.6% Mo, 0.04—0.15 N, 0.4—1.2% Ti, up to 0.035 S, and up to 0.030 P. [WW]

SUB CODE: 11/ SUBM DATE: 30Jan65/ ARB PRESS: 50:S

Card 1/1 UDC: 669.14.018.8: 669.15'26-194

L 04189-67 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD
ACC NR: AT6026545 (A) SOURCE CODE: UR/2776/66/000/046/0020/0029

AUTHOR: Sinel'nikov, M. I.; Babakov, A. A.; Barziy, V. K.; Demchishin, A. V.; Laskaronskiy, L. N.; Lyublin, Ye. B.; Fel'dgandler, E. G.; Cherkashina, N. P.; Chernyavskaya, S. G.

ORG: Central Scientific Research Institute of Ferrous Metallurgy, Moscow (Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii)

TITLE: A study of the plasticity of 1Kh21N5T (EI811) steel at high temperatures

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov, no. 46, 1966. Spetsial'nyye stali i splavy (Special steels and alloys), 20-29

TOPIC TAGS: stainless steel, heat treatment, ~~hot ductility~~ plasticity, metallographic examination, austenite, ferrite, temperature dependence / 1Kh21N5T steel, EI811 steel

ABSTRACT: Ten heats of EI811 steel containing 4.8-5.3% Ni and 0.25-0.53% Ti were prepared in order to study the effect of temperature and ingot cementation time on phase composition. The dependence between phase ratios and metal plasticity at high temperatures was also studied. Samples were water quenched after heating at 1000, 1100, 1200, 1250 and 1300°C for 1, 2, 5 and 10 hr. Hot torsion tests were conducted at a twist rate of 60 rpm at 900, 1000, 1100, 1200, 1250 and 1300°C after a 20 min soak.

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L 04189-67
ACC NR: AT6026545

The number of hot twists to fracture increased as a function of temperature. After fracturing, the samples were water quenched to retain the high temperature structure and then examined metallographically. The amount of austenite as a function of heat treatment for each steel is given. Micrographs of each treatment are shown for representative steel samples. The quantity of ferrite increased with rise in temperature or increase in time at temperature, with the most intense $\alpha \rightarrow \gamma$ conversion occurring in the 1200-1300°C range; by holding for 10 hrs in this range almost all of the structure became ferritic. The plasticity at different temperatures depended on the ratio of α- and γ-phases in the structure at the given temperature. Maximum plasticity resulted for γ-phase contents less than 25-30%. It was recommended that the ingots of EI811 steel be soaked at higher temperatures throughout rolling than is normally typical, i. e., at 1290 to 1310°C instead of 1250 to 1270°C. Orig. art. has: 1 table, 6 figures.

SUB CODE: 11/ SUBM DATE: none

Card 2/2

L 04191-67 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/JG
ACC NR: AT6026543 SOURCE CODE: UR/2776/66/000/046/0005/0012

AUTHOR: Babakov, A. A.; Fel'dgandler, E. G.; Kareva, Ye. N.; Savkina, L. Ya.

ORG: Central Scientific Research Institute of Ferrous Metallurgy, Moscow (Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii)

TITLE: Mechanical and corrosion properties of the new two-phase Okh21N6B stainless steel

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Sbornik trudov, no. 46, 1966. Spetsial'nyye stali i splavy (Special steels and alloys), 5-12

TOPIC TAGS: stainless steel, titanium, columbium, magnetization, mechanical property, corrosion resistance, metallographic examination / OKh21N5 steel, OKh21N6B steel

ABSTRACT: A study was done on the effects of columbium additions on the ferritic-austenitic structure of OKh21N5 steels, to which titanium is normally added. Two laboratory heats of OKh21N6B steel were made with Nb contents of 0.44 and 0.73%. Mechanical and magnetic properties were given as functions of quenching temperature which ranged from 1000 to 1300°C. For both alloys the fracture strength decreased monotonically with temperature while 0.2% yield strength, elongation and impact strength changed slightly. Magnetization saturation increased with rise in quench temperature due to an increase in the amount of ferrite phase, as confirmed by metallo-

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graphy. Changes in these mechanical properties and magnetic saturation were given as functions of tempering temperature after quenching from 1000°C. After tempering in the interval 450-700°C for 1, 10 and 100 hrs little change in fracture strength resulted although other properties were affected; the 0.2% yield strength increased with tempering temperature, while elongation and impact strength decreased. The magnetic saturation increased from 4000 to 11000 gauss during tempering to 700°C. All these properties were not greatly affected by the Nb content. Microstructures showed that after quenching the steel had a ferritic-austenitic structure with dispersed carbides. Independent of time, tempering to 600°C did not change this structure, however, in the range 650-700°C (10 to 100 hrs) austenite nodules formed within ferrite grains and martensite platelets formed in the austenite. The number of twists to fracture, given as a function of testing temperature, increased from 4 to 1000°C to 20 at 1250°C. OKh21N6B and OKh21N5T steels behaved similarly in corrosion tests conducted in boiling 30, 50 and 65% HNO_3. However, welded samples of OKh21N6B were 3 times as stable in 65% HNO_3. Welded and unwelded samples of OKh21N6B did not exhibit intercrystalline corrosion tendencies after quenching from 1000 and 1200°C. Orig. art. has: 5 figures, 2 tables.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 001

L 04772-67 EWT(m)/EWP(w)/EWP(t)/EWP(k)/EWP(b)/ETI IJP(c) JD/HM WB

ACC NR: AP6025721 SOURCE CODE: UR/0365/66/002/004/0450/0454

AUTHOR: Babakov, A. A.; Posysayeva, L. I.; Zotova, Ye. V.

ORG: Central Scientific Research Institute of Ferrous Metallurgy (Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii)

TITLE: Physical-mechanical and technological properties of OKh23N28M3D3T (E1943) steel, resistant to sulfuric acid

SOURCE: Zashchita metallov, v. 2, no. 4, 1966, 450-454

TOPIC TAGS: corrosion resistant steel, austenite steel, steel property, welding, arc welding, metal deformation/OKh23N28M3D3T steel

ABSTRACT: The properties of OKh23N28M3D3T (E1943), one of the austenitic steels developed at TsNIIChERMET and the Institute of Physical Chemistry AN SSSR, are examined. E1943 has increased corrosion resistance to different aggressive media--sulfuric, phosphoric, oxalic, formic acids-- by which Kh18N10T and Kh17N13M3T steels are rapidly attacked. E1943 has a tendency toward embrittlement upon prolonged holding at 800-900°. This steel is not subject to intercrystalline corrosion after hardening at 1020-1050° in water and holding at 700° for 20 minutes. E1943 has good deformation properties under both hot and

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UDC: 620.193.41:669.228

ACC NR: AP6025721

cold working conditions, good technological effectiveness and weldability, especially with the use of argon arc welding. Because of these properties this steel lends itself to industrial use in media too corrosive for Kh17N13M3T and where N70M28 (EP-496) or Kh15N55M16 (EP-576) alloys are too expensive. Orig. art. has: 3 tables and 2 figures.

SUB CODE: 11/ SUBM DATE: 22Nov65/ ORIG REF: 007

Card 2/2

ACC NR: AP6035952 SOURCE CODE: UR/0129/66/000/010/0040/0041

AUTHOR: Babakov, A. A.; Lebedev, D. V.; Ovsyannikov, B. M.; Ol'yanin, Ye. A.

ORG: TsNIIChERMET

TITLE: Mechanical properties of Kh14G14N3T steel at -253C

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 10, 1966, 40-41

TOPIC TAGS: SOLID MECHANICAL PROPERTY, METAL GRAIN STRUCTURE, chromium manganese nickel steel, boron containing steel, steel property, steel subzero temperature property/Kh14GN3T steel, Kh14G14N3TR steel

ABSTRACT: The properties of Kh14G14N3T and Kh14G14N3TR steels in the as-cast and in hot-rolled conditions have been investigated at -253C. Annealed at 1050C and water quenched, the steels had a fine-grained austenitic-ferritic structure, while the Kh18N10T steel used for comparison had fully austenitic structure. At -253C, rolled and annealed Kh14G14N3T steel had a tensile strength of 160 kg/mm^2, a yield strength of 49 kg/mm^2, and elongation of 34%, and a reduction of area of 28%, compared to 185 kg/mm^2, 68 kg/mm^2, 32%, and 42% in the Kh18N10T steel and 152 kg/mm^2, 58 kg/mm^2, 38% and 50% for boron-bearing Kh17G14N3TR steel. Kh14G14N3T steel in the as-cast condition had a much lower strength, (70 kg/mm^2) and extremely low ductility, and an elongation and reduction of area of only 5%. At -253C, as-cast Kh14G14N3T steel had a crystalline fracture which was not observed in Kh14G14N3TR or in Kh18N10T steel.

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UDC: 620.17:669.14.018.8:536.48

ACC NR: AP6035952

Thus, hot-rolled Kh14G14N3T and Kh14G14N3TR steels have mechanical properties comparable to those of the Kh18N10T steel. Orig. art. has: 2 tables.

SUB CODE: 11 / SUBM DATE: none/ ORIG REF: 002

Card 2/2

YEVGRAFOVA, M.K., inzh.; IL'YASHEVICH, V.A., inzh.; VOL'NOVA, Z.G., nauchn. red.; BABAKOV, A.M., red.

[Continuous action equipment for the bleaching of cotton cloth and knitted fabrics] Oborudovanie nepreryvnogo deistvila dlia otbelki khlopchatobumazhnoi tkani i trikotazhnogo polotna. Moskva, 1963. 39 p. (Seriia III: Novye mashiny, oborudovanie i sredstva avtomatizatsii, no.67) (MIRA 17:7)

1. Moscow. TSentral'nyy institut nauchno-tekhnicheskoy informatsii po avtomatizatsii i mashinostroyeniya. 2. Vsesoyuznyy nauchno-issledovatel'skiy institut legkogo i tekstil'nogo mashinostroyeniya (for Il'yashevich).

BABAKOV, Grigoriy Alekseyevich; KATKOVA, N.[illegible] red.; SAKNYN', Yu., tekhn. red.

[In the land of cedar and sable]V kraiu kedra i sobolia. Sverdlovsk, Sverdlovskoe knizhnoe izd-vo, 1961. 62 p. (MIRA 15:8)
(Pelym Valley--Zoology) (Pelym Valley--Botany)

BABAKOV, I. M.

Babakov, I. M. - "One method of calculating harmonic coefficients of effect," Nauch zapiski Khar'k. mekhan. - mashinostroit, in-tr, Vol. IX, Issue 1, 1948, p. 3-8.

SO: U-3566, 15 March 53, (Letopis 'Zhurnal 'nykh Statey, No. 14, 1949).

PHASE I BOOK EXPLOITATION 510

Babakov, Ivan Mikhaylovich

Teoriya kolebaniy (Theory of Vibrations) Moscow, Gostekhizdat, 1958. 628 p. 15,000 copies printed.

Ed.: Levantovskiy, V.I.; Tech. Ed.: Brudno, K.F.

PURPOSE: This book is approved as a textbook on the theory of oscillations and the stability of motion for students of engineering and physics faculties of Soviet universities. Some chapters are more advanced and go beyond the teaching curriculum.

COVERAGE: The book consists of three parts. The first part deals with linear systems with a finite number of degrees of freedom. Equations of the system of small vibrations and the methods of their integration are presented. Approximate methods of the determination of frequencies and resonance in machines are studied. The second part deals with linear systems with an infinite number of degrees of freedom. Vibrations of straight rods, straight shafts and plates are studied and approximate methods of calculation are presented. Part three deals with

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the general theory of the stability of motion and simplest nonlinear systems. Certain general methods of nonlinear mechanics are studied. There are 90 references, 69 of which are Soviet (including 2 Ukrainian) 8 English, 11 German, and 2 French. The author thanks Professors N.I. Bezukhov, A.S. Vol'mir and A.I. Lur'ye for their help in preparing the book.

TABLE OF CONTENTS:

BABAKOV, Ivan Mikhaylovich; KREMENTULO, V.V., red.

[Theory of vibrations] Teoriia kolebanii. Izd.2., perer. Moskva, Nauka, 1965. 559 p. (MIRA 18:6)

BABAKOV, M.P., tekhnik

Electric relay for limiting the idle operation of the rectifiers of electrolytic tanks. Energetik 11 no.5:36 My '63. (MIRA 16:7)
(Electric relays) (Electric current rectifiers)

BABAKOV, M.P., inzh.

Electric device for signaling the threshold level of water in a boiler.
Energetik 12 no.2:13 F '64. (MIRA 17:4)

BABAKOV, M.P.; STREL'CHIK, A.A.

Protection of electric motors from overheating. Prom. energ. 19 no.1:19-20 Ja '64. (MIRA 17:2)

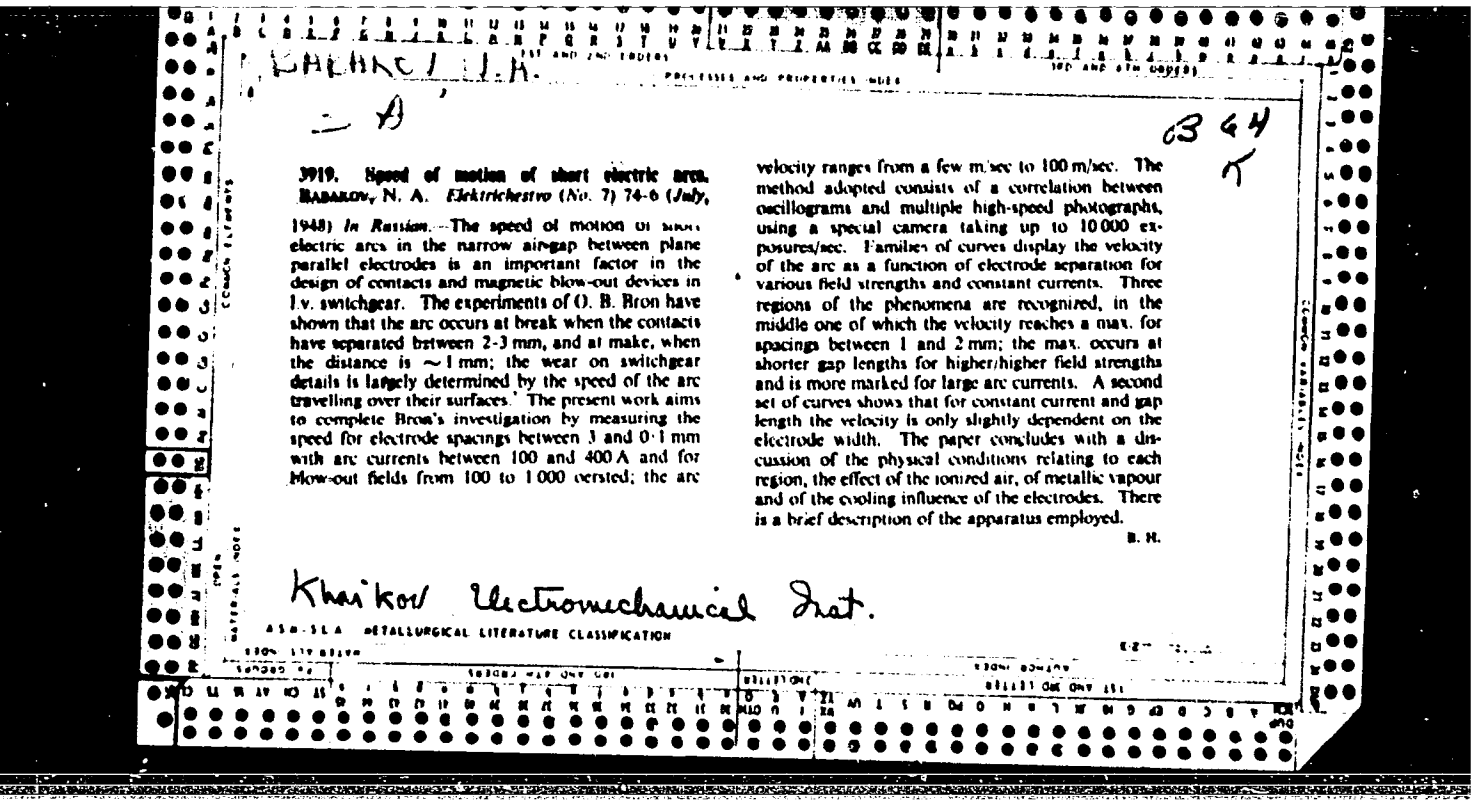
BESSONOV, L.A.; BABAKOV, N.A., prof., retsenzent; FOLOBKOV, D.S., prof., retsenzent; TAREYEV, B.M., prof. doktor tekhn. nauk retsenzent

[Principles of graph theory] Osnovy teorii grafov; uchebnoe posobie. Moskva, Vses. zaochnyi energ. in-t, 1964. 48 p. (MIRA 19:1)

BABAKOV, N.A., kandidat tekhnicheskikh nauk.

Entry of an electric arc into an arc extinguishing grid. Vest.elektroprom. 18 no.10:15-19 O '47. (MLRA 6:12)

1. NIMTI VMS.



3919. **Speed of motion of short electric arcs.** Babakov, N. A. *Elektrichestvo* (*No.* 7) 74-6 (*July*, 1948) *In Russian.*—The speed of motion of short electric arcs in the narrow airgap between plane parallel electrodes is an important factor in the design of contacts and magnetic blow-out devices in l.v. switchgear. The experiments of O. B. Bron have shown that the arc occurs at break when the contacts have separated between 2-3 mm, and at make, when the distance is ~1 mm; the wear on switchgear details is largely determined by the speed of the arc travelling over their surfaces. The present work aims to complete Bron's investigation by measuring the speed for electrode spacings between 3 and 0·1 mm with arc currents between 100 and 400 A and for blow-out fields from 100 to 1 000 oersted; the arc velocity ranges from a few m/sec to 100 m/sec. The method adopted consists of a correlation between oscillograms and multiple high-speed photographs, using a special camera taking up to 10 000 exposures/sec. Families of curves display the velocity of the arc as a function of electrode separation for various field strengths and constant currents. Three regions of the phenomena are recognized, in the middle one of which the velocity reaches a max. for spacings between 1 and 2 mm; the max. occurs at shorter gap lengths for higher/higher field strengths and is more marked for large arc currents. A second set of curves shows that for constant current and gap length the velocity is only slightly dependent on the electrode width. The paper concludes with a discussion of the physical conditions relating to each region, the effect of the ionized air, of metallic vapour and of the cooling influence of the electrodes. There is a brief description of the apparatus employed.

B. H.

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BABAKOVA, NA.

PA 187T16

USSR/Electricity - Rectifier Schemes, Jan/Feb 51
Detectors

"Selecting a Hookup Scheme for Rectifiers in Detector Apparatus," K. K. Karandeyev, N. A. Babakova, L'vov Polytech Inst

"Avtomat i Telemekh," Vol XII, No 1, pp 68-81

Authors expound reasons for selecting rectification schemes in detector apparatus and procedure for detg optimum values of the parameters of these schemes. Three bridge schemes with 4 and 2 rectifiers are subjected to exptl analysis.

187T16

USSR/Electricity - Rectifier Schemes, Jan/Feb 51
Detectors (Contd)

Authors derive formulas for finding the order of values of optimum parameters. Submitted 24 Mar 49; resubmitted 18 Oct 50 after revision.

187T16

BABAKOV, N A.

AID P - 2366

Subject : USSR/Electricity

Card 1/2 Pub. 27 - 29/30

Authors : Babakov, N. A., Prof., Tsypkin, Ya. L., Prof., Shumilovskiy, N. N., Prof., and others, members of the Chair of Automatic Control and Regulation of the All-Union Correspondence Institute of Electrical Engineering

Title : A. A. Voronov. Elementy Teorii Avtomaticheskogo Regulirovaniya (Elements of the Theory of Automatic Regulation). 2nd Ed., revised and supplemented, 471 pp., 1954, Military Publishing House of the Ministry of Defense of the USSR (Book review).

Periodical : Elektrichestvo, 5, 87-88, My 1955

Abstract : The authors of the book review discussed it at the meeting of the members of the chair. After a systematic discussion of every chapter, the authors conclude that the book presents a valuable contribution to the presentation of this new and rapidly developing branch of

Elektrichestvo, 5, 87-88, My 1955

Card 2/2 Pub. 27 - 29/30

engineering. Its most important deficiencies are its insufficient development of the theory of non-linearity and that not enough numerical examples are given. Otherwise, the book is highly recommended and was approved by the Ministry of Culture of the USSR.

Institution: None

Submitted : No date

BABAKOV, N.A., prof., doktor tekhn.nauk

Criteria for the evaluation of distortion in automatic control systems. Trudy VZEI no.9:161-170 '58. (MIRA 12:10)
(Automatic control)

RYBAKOV, B.V. Prinimali uchastiye: TOLOKONNIKOV, M.I.; BASHMACHNIKOV, S.I.; SMIRNOV, A.K.; KHOMUTOV, A.I.; SHAMANINA, V.I.; SHIBAYEV, Z.K. BABAKOV, N.A., doktor tekhn.nauk, red.; MAZALOV, N.D., kand.tekhn.nauk, red.; SOBOLEVA, N.M., tekhn.red.

[Automatic and remote control in the national economy] Avtomatika i telemekhanika v narodnom khoziaistve. Pod red. N.A.Babakova i N.D.Mazalova. Moskva, Vses.in-t nauchn.itekhn.informatsii, 1960. 226 p. (MIRA 13:10)

(Automatic control) (Remote control)

80158

16.9500

S/105/60/000/05/28/028
B007/B008

AUTHORS: Shumilovskiy, N.N., Professor, Doctor of Technical Sciences, Gol'dfarb, L.S. Professor, Doctor of Technical Sciences, Babakov, N.A., Professor, Doctor of Technical Sciences, Goryainov, O.A., Docent, Candidate of Technical Sciences, Naumov, B.N., Docent, Candidate of Technical Sciences

TITLE: Ya.Z. Tsypkin. Teoriya impul'snykh sistem (Theory of Impulse Systems). 724 Pages, Price 23 Rubles 25 Kopecks. Gosudarstvennoye izdatel'stvo fiziko-matematicheskikoy literatury (State Publishing House of Physics and Mathematical Literature), 1959

PERIODICAL: Elektrichestvo, 1960, No. 5, pp. 94-95

TEXT: This is a book review. The book belongs to those fundamental monographs which determine new trends in science and establish new scientific doctrines. The book contains the research results of the author in the field of the theory of impulse systems. Since 1948 the author has been dealing with the problems raised by the theory of intermittent control. He expanded this theory later and

Card 1/3

Ya.Z. Tsypkin. Teoriya impul'snykh sistem (Theory of Impulse Systems). 724 Pages, Price 23 Rubles 25 Kopecks. Gosudarstvennoye izdatel'stvo fiziko-matematicheskikoy literatury (State Publishing House of Physics and Mathematical Literature), 1959

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B007/B008

showed that the intermittent control is applicable to a wider class of technical systems, than the systems of automatic control. The author classified the various types of quantization of amounts and the types of impulse elements corresponding to them. The book consists of 6 chapters. A classification of the systems from the point of view of the methods for the transmission of signals in these systems is made in the introduction. The basic definitions are given in the 1st chapter and many characteristic examples of impulse systems are investigated. The mathematics for the investigation of impulse systems is given in the 2nd chapter. The theory of open impulse systems is explained in the 3rd chapter. The methods explained in the 3rd chapter are used in the 4th chapter for the investigation of a number of important impulse systems. The entire complex of problems from the theory of closed impulse systems is given in the 5th chapter. Typical impulse systems are analyzed in the 6th chapter. The book is written intelligibly, but it requires a certain theoretical preparation and knowledge. The present review was discussed and approved at the meetings of the kafedra "Avtomatika i telemekhanika" MEI (Chair of "Automation and Telemechanics" at the Moscow Institute

Card 2/3

Ya. Z. Tsypkin. Teoriya impul'snykh sistem (Theory of Impulse Systems). 724 Pages, Price 23 Rubles 25 Kopecks. Gosudarstvennoye izdatel'stvo fiziko-matematicheskikoy literatury (State Publishing House of Physics and Mathematical Literature), 1959

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B007/B008

of Power Engineering) and the kafedra "Avtomaticheskiy kontrol' i regulirovaniye" VZEI (Chair of "Automatic Control and Regulation" at the All-Union Correspondence Institute of Power Engineering).

Card 3/3

S/105/60/000/011/008/009
B012/B058

AUTHORS: Vladziyevskiy, A. P., Dikushin, V. I., Petrov, I. I., Babakov, N. A., Tareyev, B. M., Chilikin, M. G., and Others

TITLE: V. G. Zusman, on the Occasion of His 50th Birthday and the 25th Anniversary of His Engineering, Scientific, and Pedagogical Activities

PERIODICAL: Elektrichestvo, 1960, No. 11, p. 94

TEXT: For 20 years Vladimir Grigor'yevich Zusman has directed the elektrotekhnicheskiy otdel Eksperimental'nogo nauchno-issledovatel'skogo instituta metallorezhushchikh stankov (ENIMS) (Department of Electrical Engineering at the Experimental Scientific Research Institute of Metal-cutting Machine Tools) which plays an important role in laying down the technological rules for the electrical equipment of machine tools and other machinery. He is the author of more than 45 published papers and inventions in the field of electric drive and automatic control systems. He has delivered a great number of lectures at All-Union Technical

Card 1/2

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V. G. Zusman, on the Occasion of His 50th Birthday and the 25th Anniversary of His Engineering, Scientific, and Pedagogical Activities

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B012/B058

Conferences. His main studies deal with controllable electric drives involving electronic, dynamoelectric, magnetic, and semiconductor amplifiers, as well as electromagnetic clutches of various types and improvements of low-voltage apparatus. His studies on theory and practice of comprehensive automation in machine building are noteworthy. In recent years, his team developed a series of new systems for the numerical control of machine tools, extensively using electronic means, and the calculation technique. V. G. Zusman's pedagogical activity dates back to 1936, and at present he is teaching at the Vsesoyuznyy zaochnyy energeticheskiy institut (All-Union Correspondence Institute of Power Engineering). There is 1 figure.

Card 2/2

POPKOV, S.L.; BABAKOV, N.A., doktor tekhn. nauk, prof., red.

[Manual for the couse on computer equipment and apparatus; electronic analog computers] Uchebnoe posobie po kursu: Schetnoe reshaiushchie pribory i ustroistva; elektronnye modeliruiushchie ustroistva. Moskva, 1962. 75 p. (MIRA 16:4)

1. Moscow. Vsesoyuznyy zaochnyy energeticheskiy institut. Kafedra avtomaticheskogo kontrolya i regulirovaniya. (Electronic analog computers)

BABAKOV, N.; BULGAKOV, V.

Modernization of temperature control devices. Radio no.10:27 O '63. (MIRA 16:11)