



USSR STATE STANDARD

FORGINGS MADE OF CORROSION-RESISTANT STEELS AND ALLOYS

GENERAL SPECIFICATIONS

GOST 25054-81

Official Edition

**USSR STATE COMMITTEE FOR STANDARDS
Moscow**

DEVELOPED by the Ministry of Chemical and Petroleum Mechanical Engineering

DEVELOPERS

A. L. Byelinkiy, Cand. Tech. Sci.; **B. N. Shevelkin**, Cand. Tech. Sci.; **M. N. Nikitayev**
Cand. Tech. Sci.; **M. A. Chuma**

SUBMITTED by the Ministry of Chemical and Petroleum Mechanical Engineering

Member of the Board **A. M. Vasilyev**

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Editor *Y. V. Vinogradskaya*
Technical Editor *O. Y. Nikitina*
Proof-reader *V. S. Chornaya*

B. METALS AND METALLIC PRODUCTS

Group B03

Amendment No. 1 to GOST 25054-81 Forgings Made of Corrosion-Resistant Steels and Alloys. General Specifications

Term of Introduction set by Decree No. 535, dated 14.03.86, of the USSR State Committee for Standards

from 01.07.86

Introduction. The word “press” shall be removed.

Section 1. Clause 1.2 shall be added (before the examples of identification numbers): “1.2. The identification numbers of forgings shall consist of the group number, the steel or alloy grade identification number, and the identification number of this Standard.

In case of forgings of groups II, IIK, III and IIK, the Brinell hardness shall be additionally specified after the steel or alloy grade.

In case of forgings of groups IV, IVK, V and VK, with mechanical properties different from those specified in table 2 of this Standard, the values of mechanical property indicators different from those established in this Standard shall be additionally specified in the identification number after the steel or alloy grade.”

The examples of identification numbers shall be reworded as follows:

“Forgings of group I, made from steel of grade 08X22H6T:

Поковка Гр. I 08X22H6T ГОСТ 25054-81

Same as above, forgings of group III, made from steel of grade 08X22H6T, with a hardness of HB 140-200:

Поковка Гр. III 08X22H6T HB 140-200 ГОСТ 25054-81

Same as above, forgings of group V, made from steel of grade 08X22H6T, with a yield stress $\sigma_{0.2} \geq 350$ MPa, a percentage elongation $\delta_5 \geq 20$ %, and an impact elasticity $KCU \geq 0.8$ MJ/m²:

*Поковка Гр. V 08X22H6T – $\sigma_{0.2} \geq 350$ МПа – $\sigma_{0.2} \geq 20$ % –
 $KCU \geq 0.8$ MJ/m² ГОСТ 25054-81*

Clause 2.6. Table 2. The column “Mechanical properties at 20°C”. For steel of grade 12X13, the following values shall be replaced: for ultimate strength, 539 (55) with 617 (63); for percentage elongation, 14 with 15; for percentage reduction of area, 35 with 40;

Note 1 shall be reworded as follows: “1. The mechanical properties of forgings with a diameter (thickness) exceeding 500 mm made from steel of grades marked with an asterisk “*” are optional until 01.01.88.”

Clause 2.10. The reference to GOST 6032-75 shall be replaced with a reference to GOST 6032-84.

Clause 3.1. The following paragraph shall be added after the words “mechanical testing results”: “results of testing for intercrystalline corrosion, in case of forgings of groups IIK, IIK, IVK and VK.”

Clause 4.14. The reference to GOST 1497-73 shall be replaced with a reference to GOST 1497-84.

Clause 4.17 shall be reworded as follows: “4.17. Chemical analysis shall be carried out in accordance with GOST 20560-81, GOST 12344-78, GOST 12345-80, GOST 12346-78, GOST 12347-77, GOST 12348-78, GOST 12349-83, GOST 12350-78, GOST 12351-81, GOST 12352-81, GOST 12353-78, GOST 12354-81, GOST 12355-78, GOST 12356-81, GOST 12357-84, GOST 12358-82, GOST 12359-81, GOST 12360-82, GOST 12361-82, GOST 12362-79, GOST 12363-79, GOST 12364-84, GOST 12365-84 or using another method that ensures the accuracy stipulated by the specified standards.”

Clause 4.18. The reference to GOST 7565-73 shall be replaced with a reference to GOST 7565-81.

Clause 4.19. The references to GOST 6032-75 shall be replaced with a reference to GOST 6032-84, the reference to GOST 4204-66 with a reference to GOST 4204-77.

Clause 5.4. The reference to GOST 18617-73 shall be replaced with a reference to GOST 18617-83.

Appendix. Table. The column for 03X17H14M3. The values 1 050-1 100°C shall be replaced with 1 080-1 100°C; the column XH65MB. The value 1 150 (± 10)°C shall be replaced with 1 070 (± 20)°C.

(IUS [Standards Information Catalog] No. 6, 1986)

B. METALS AND METALLIC PRODUCTS

Group B03

Amendment No. 2 to GOST 25054-81 Forgings Made of Corrosion-Resistant Steels and Alloys. General Specifications

Approved and introduced by Decree No. 1699, dated 26.05.87, of the USSR State Committee for Standards

Date of Introduction **01.01.88**

Clause 1.1. Examples of identification numbers shall be reworded as follows:

“Forgings of group I, made from steel of grade 08X22H6T:

Гр. I 08X22H6T ГОСТ 25054-81

Same as above, forgings of group III, made from steel of grade 08X22H6T, with a hardness of 140-200 HB:

Гр. III 08X22H6T 140-200 HB ГОСТ 25054-81

Same as above, forgings of group V, made from steel of grade 08X22H6T, with a yield stress $\sigma_{0.2} \geq 350$ MPa, a percentage elongation $\delta_5 \geq 20$ %, and an impact elasticity $KCU \geq 0.8$ MJ/m²:

*Гр. V 08X22H6T – $\sigma_{0.2} \geq 350$ МПа – $\delta_5 \geq 20$ % –
 $KCU \geq 0.8$ МДж/м² ГОСТ 25054-81.*

Clause 2.2. The words “press forging” shall be replaced with “forging”.

Clause 2.6. Table 2. The column “Impact elasticity”. The unit MPa (kgf/cm²) shall be replaced with MJ/m² (kgf×m/cm²);

for steel of grade 03X17H14M3 the value 176 (18) of the yield stress shall be replaced with 186 (19);

for steels of grades 08X18H10 and 08X18H10T the following values of the ultimate strength shall be replaced: 470 (48) with 479 (49) and 490 (50) with 500 (51);

Note 1 shall be reworded as follows: “1. For steels marked with an asterisk “*”, the norms for mechanical properties are specified for forgings with a diameter (thickness) of up to 600 mm. For forgings with a diameter (thickness) exceeding 600 mm, the norms for mechanical properties of these steels shall be established by agreement between the customer and the manufacturer.”

Clause 2.6. The second paragraph shall be reworded as follows: “For forgings of groups IV and IVK, the value of hardness shall not be considered as a rejection indicator.”

Clause 2.10. The reference to GOST 6032-84 shall be replaced with a reference to GOST 5632-72.

Clause 3.3. Table 4. The column “Conditions for building up a batch”. For forgings of groups I, II and III, the words “from one heat” shall be replaced with the words “of one grade”.

Amendment to GOST 25054-81 (cont.)

The column “Type of checking”. For forgings of groups V and VK, the type of checking “hardness” shall be removed.

Clause 4.4. The following words shall be added: “Cutting the samples for the mechanical testing of forgings of groups IV and IVK out of a specimen of the same or greater section, forged separately from metal of the same heat and in the same conditions as for the forgings, is allowed.

In this case, the specimen shall be heat treated with the forgings of this batch.”

Clause 4.14. The second paragraph shall be reworded as follows: “Carrying out the testing on samples with a diameter of 6 or 5 mm and with a gage length of 30 or 25 mm respectively is allowed”.

Clause 5.6 shall be reworded as follows: “5.6. The forgings shall be stored in conditions that ensure the impossibility of mechanical damage.”

(IUS No. 8, 1987)

Amendment No. 3 to GOST 25054-81 Forgings Made of Corrosion-Resistant Steels and Alloys. General Specifications

Approved and introduced by Decree No. 604, dated 22.03.89, of the USSR State Committee for Standards

Date of Introduction 01.01.90

Clause 2.1. The following paragraph shall be added: "The forging dimensions shall be established with taking into account the allowances for machining, tolerances for dimensions and technological laps established by agreement between the manufacturer and the customer."

Clause 2.2. The second paragraph. The value 25 % shall be replaced with 75 %.

Clause 2.6. The first paragraph. The words "with a diameter (thickness) of up to 600 mm inclusive," shall be added after the words "For forgings of groups IV, IVK, V and VK,".

Clause 2.7. Table 2. Note 1 shall be removed.

(IUS No. 6, 1989)

B. METALS AND METALLIC PRODUCTS

Group B03

Amendment No. 4 to GOST 25054-81 Forgings Made of Corrosion-resistant Steels and Alloys. General Specifications

Approved and introduced by Decree No. 974, dated 24.04.90, of the USSR State Committee for Product Quality Management and Standards

Date of Introduction 01.11.90

Clause 2.1. The words “approved in accordance with the established procedure” shall be replaced with “executed in accordance with GOST 3.1126-88.”

Clause 2.7. Table 2 shall be reworded as follows (*see the next page*).

Clause 3.1. The words “or separately” shall be added to the first paragraph.

Clause 3.3. The second paragraph. The words: “The norms for ultrasonic inspection are established in GOST 24507-80” shall be added after the words “to ultrasonic inspection.”.

Clause 4.17. The following references shall be replaced: GOST 12344-78 with GOST 12344-88, and GOST 12345-80 with GOST 12345-88.

Clause 4.20. The words “selected in accordance with GOST 24507-80” shall be added.

Amendment to GOST 25054-81 (cont.)

Table 2

Class of steel	Steel grade	Mechanical properties at +20°C, no less than											Brinell hardness (on the forging surface), no more than
		Yield stress, $\sigma_{0.2}$ MPa (kgf/mm ²)	Ultimate strength, σ_u , MPa (kgf/mm ²)	Percentage elongation, δ_5 , %			Percentage reduction of area ψ , %			Impact elasticity KCU, J/m ² (kgf×m/cm ²)			
				for forgings with solid section and a diameter (thickness) of, mm									
				up to 200	over 200 and up to 500	over 500 and up to 1 000	up to 200	over 200 and up to 500	over 500 and up to 1 000	up to 200	over 200 and up to 500	over 500 and up to 1 000	
Martensite	20X13	441 (45)	647 (66)	16	15	14	50	45	40	64 (6.5)	49 (5.0.)	39 (4.0)	197-248
	30X13	588 (60)	735 (75)	12	11	10	40	38	35	39 (4.0)	34 (3.5)	29 (3.0)	235-277
	09X16H4Б	784 (80)	931 (95)	8	7	7	42	38	35	59(6.0)	54 (5.5)	49 (5.0)	269-302
	07X16H4Б	690 (70)	882 (90)	14	12	11	55	45	40	88(9.0)	69 (7.0)	59 (6.0)	269-302
	20X17H2	666 (68)	813 (83)	15	13	12	40	35	30	59(6.0)	54 (5.5)	49 (5.0)	248-293
Martensite- ferrite	12X13	392 (40)	617 (63)	18	16	15	50	44	40	74(7.5)	59 (6.0)	49 (5.0)	187-229
	14X17H2	539 (55)	686 (70)	15	13	12	40	35	30	59 (6.0)	54 (5.5)	49 (5.0)	248-293
Ferrite	08X13	392 (40)	539 (55)	17	16	14	50	40	35	83 (8.5)	69 (7.0)	49 (5.0)	187-229

Amendment to GOST 25054-81 (cont.)

Table 2(cont.)

Class of steel	Steel grade	Mechanical properties at +20°C, no less than											Brinell hardness (on the forging surface), no more than
		Yield stress, $\sigma_{0.2}$ MPa (kgf/mm ²)	Ultimate strength, σ_u , MPa (kgf/mm ²)	Percentage elongation, δ_5 , %			Percentage reduction of area ψ , %			Impact elasticity KCU, J/m ² (kgf×m/cm ²)			
				for forgings with solid section and a diameter (thickness) of, mm									
				up to 200	over 200 and up to 500	over 500 and up to 1 000	up to 200	over 200 and up to 500	over 500 and up to 1 000	up to 200	over 200 and up to 500	over 500 and up to 1 000	
Austenite-martensite	07X16H6	980 (100)	1176 (120)	13	12	12	50	50	50	69 (7.0)	69 (7.0)	69 (7.0)	341-415
	08X17H5M3	833 (85)	1176 (120)	15	13	10	40	38	35	69 (7.0)	59 (6.0)	39 (4.0)	341-415
Austenite-ferrite	15X18H12C4TiO	382 (39)	715 (73)	As agreed									
	08X18Г8H2T	265 (27)	588 (60)	As agreed									
	08X21H6M2T	343 (35)	539 (55)	22	18	18	40	37	35	78 (8.0)	59 (6.0)	39 (4.0)	140-200
	08X22H6T	343 (35)	539 (55)	20	19	18	40	37	35	78 (8.0)	59 (6.0)	39 (4.0)	140-200
Austenite	12X18H9T	196 (20)	510 (52)	40	37	35	48	44	40	—	—	—	170

Amendment to GOST 25054-81 (cont.)

Table 2 (cont.)

Class of steel	Steel grade	Mechanical properties at +20°C, no less than											Brinell hardness (on the forging surface), no more than
		Yield stress, σ _{0.2} MPa (kgf/mm ²)	Ultimate strength, σ _u , MPa (kgf/mm ²)	Percentage elongation,δ ₅ , %			Percentage reduction of area ψ, %			Impact elasticity KCU, J/m ² (kgf×m/cm ²)			
				for forgings with solid section and a diameter (thickness) of, mm									
				up to 200	over 200 and up to 500	over 500 and up to 1 000	up to 200	over 200 and up to 500	over 500 and up to 1 000	up to 200	over 200 and up to 500	over 500 and up to 1 000	
Austenite	04X18H10	157 (16)	441 (45)	40	39	38	50	47	45	—	—	—	179
	08X18H10	196 (20)	470 (48)	40	39	38	50	47	45	—	—	—	170
	08X18H10T	196 (20)	490 (50)	38	36	35	52	46	40	—	—	—	179
	12X18H10T	196 (20)	510 (52)	38	36	35	52	46	40	—	—	—	179
	03X18H11	176 (18)	441 (45)	40	40	40	55	48	45	—	—	—	179
	10X14Г14H4T	245 (25)	637 (65)	As agreed									
	10X17H13M2T	196 (20)	510 (52)	38	36	30	50	47	45	—	—	—	200
	10X17H13M3T	196 (20)	510 (52)	38	36	30	50	45	40	—	—	—	200

Amendment to GOST 25054-81 (cont.)

Table 2 (cont.)

Class of steel	Steel grade	Mechanical properties at +20°C, no less than											Brinell hardness (on the forging surface), no more than
		Yield stress, $\sigma_{0.2}$ MPa (kgf/mm ²)	Ultimate strength, σ_u , МПа (kgf/mm ²)	Percentage elongation, δ_5 , %			Percentage reduction of area ψ , %			Impact elasticity KCU, J/m ² (kgf×m/cm ²)			
				for forgings with solid section and a diameter (thickness) of, mm									
				up to 200	over 200 and up to 500	over 500 and up to 1 000	up to 200	over 200 and up to 500	over 500 and up to 1 000	up to 200	over 200 and up to 500	over 500 and up to 1 000	
	03X17H14M3	176 (18)	470 (48)	40	38	35	55	48	45	—	—	—	179
	08X17H15M3T	196 (20)	490 (50)	38	36	30	50	45	40	—	—	—	200
	12X18H9	196 (20)	490 (50)	40	37	35	48	44	40	—	—	—	179
	03X21H21M4ГБ	215 (22)	490 (50)	As agreed									
	10X23H18	196 (20)	490 (50)	35	32	30	47	43	40	—	—	—	179
Alloy on nickel base	XH65MB	294 (30)	735 (75)	35	32	30	40	37	35	—	—	—	220
	XH78T	196 (20)	588 (60)	30	27	25	40	37	35	—	—	—	200
Alloy on iron-nickel base	06XH28MДТ	216 (22)	510 (52)	36	33	30	40	35	30	—	—	—	200
	XH32T	176 (18)	470 (48)	36	33	30	40	37	35	—	—	—	—

(IUS No. 7, 1990)

USSR STATE STANDARD

FORGINGS MADE OF CORROSION-RESISTANT STEELS
AND ALLOYS

General Specifications

GOST
25054-81

OKP (All-Union Product Classification Code) 08 9380

Term set by Decree No. 5513, dated December 21, 1981, of the USSR State Committee
for Standards

from 01.01. 1983
until 01.01. 1988

Failure to comply with this Standard will result in legal proceedings

This Standard applies to forgings with a diameter (thickness) of up to 1 000 mm made by press forging or hot die forging from corrosion-resistant steels and alloys of grades 20X13, 09X16H4Б, 07X16H4Б, 20X17H2, 30X13, 12X13, 14X17H2, 08X13, 07X16H6, 08X17H5M3, 08X18Г8H2T, 15X18H12C4TiO, 08X21H6M2T, 08X22H6T, 10X14Г14H4T, 10X17H13M2T, 10X17H13M3T, 03X17H14M3, 08X17H15M3T, 12X18H9, 12X18H9T, 04X18H10, 08X18H10T, 12X18H10T, 03X18H11, 03X21H21M4ГБ, 10X23H18, XH65MB, XH78T, 06XH28MДT, XH32T, and designed for making articles of machine-tool industry.

1. CLASSIFICATION

1.1. The forgings shall belong to one of the groups specified in table 1, depending on their purpose.

Table 1

Group of forgings	Use
I	For parts whose dimensions are determined by design (without strength analysis), and which are not exposed to environmental factors that cause intercrystalline corrosion

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Table 1 (cont.)

Group of forgings	Use
II	For low-loaded parts whose safety factor exceeds the calculated safety factor, and which are not exposed to environmental factors that cause intercrystalline corrosion
IIK	For low-loaded parts whose safety factor exceeds the calculated safety factor, and which are exposed to environmental factors that cause intercrystalline corrosion
III	For low-loaded parts whose safety factor exceeds the calculated safety factor, and which are not exposed to environmental factors that cause intercrystalline corrosion
IIIK	For low-loaded parts whose safety factor exceeds the calculated safety factor, and which are exposed to environmental factors that cause intercrystalline corrosion
IV	For making parts that are designed to operate under combined stress or be subjected to dynamic influence and are not exposed to environmental factors that cause intercrystalline corrosion
IVK	For making parts that are designed to operate under combined stress or be subjected to dynamic influence and are exposed to environmental factors that cause intercrystalline corrosion
V	For making vital parts that are designed to operate under combined stress or be subjected to dynamic influence, and which are not exposed to environmental factors that cause intercrystalline corrosion
VK	For making vital parts that are designed to operate under combined stress or be subjected to dynamic influence, and which are exposed to environmental factors that cause intercrystalline corrosion

Examples of identification numbers:

Forging of group I:

Поковка Гр. I ГОСТ 25054-81

Forging of group II, with a hardness of HB 140-200:

Поковка Гр. II–HB 140-200 ГОСТ 25054-81

Forging of group III, non-corrodible, with hardness HB 140-200:

Поковка Гр. III K–HB 140-200 ГОСТ 25054-81

Corrosion-resistant forging of group IV, made from steel of grade 08X22H6T, with a yield stress $\sigma_{0.2} \geq 343$ MPa, an ultimate strength of $\sigma_u \geq 539$ MPa, percentage elongation $\delta_5 \geq 18$ %, percentage reduction of area $\psi \geq 35$ %, impact elasticity KCU ≥ 0.6 MPa:

Поковка Гр. IV K–08X22H6T – $\sigma_{0.2} \geq 343$ – $\sigma_u \geq 539$ – $\delta_5 \geq 18$ – $\psi \geq 35$ – KCU ≥ 0.6 ГОСТ 25054-81

2. TECHNICAL REQUIREMENTS

2.1. The forgings shall be made in accordance with the requirements of this Standard, standards or specifications and working drawings for particular types of forgings approved in accordance with the established procedure.

2.2. The forging surface shall have no mechanical damage or flaws that would reduce the strength, working capacity or worsen the appearance.

The surface of forgings subjected to machining shall have no flaws whose depth exceeds 50 % of the one-sided allowance for forgings made by die forging, or 25 % for forgings made by press forging.

Establishing, in the specification and technical documentation for the forgings, the requirements for flaws with depths exceeding the allowance, and the requirements for their correction and for monitoring the corrected places is allowed.

2.3. The flaws on forging surfaces that are not subjected to machining, except for separate hollows due to scale and nicks, shall be removed by flat chipping out and scraping, whose depth shall not be such as to bring the forging dimensions beyond the maximum deviations in accordance with the drawing.

Establishing, in the specification and technical documentation for the forgings, increased requirements for the quality of forging surfaces that are not machined is allowed.

2.4. The forgings shall have no flakes, shrinkage pipes or cracks. Establishing, in the specification and technical documentation for the forgings, the dimensions, amount and arrangement of permitted flaws is allowed.

2.5. Stipulating the necessity of descaling and establishing the method therefor is allowed in the specification and technical documentation for the forgings.

2.6. For forgings of groups IV, IVK, V and VK, the mechanical properties of the forging metal after the final heat treatment, as determined on longitudinal samples, and the metal hardness, for all groups except for group I, shall conform to the values specified in table 2.

For forgings of groups IV, IVK, V, VK, the value of hardness shall not be considered as a rejection indicator.

Reducing the norms for mechanical properties in accordance with table 3 is allowed in case of determining the mechanical properties of forgings on transversal, tangential or radial samples.

2.7. The mechanical properties of ring-type forgings made by expanding shall conform to the values specified in table 2.

2.8. The properties of forgings made of steels produced by an electroslag remelting, vacuum-arc remelting and by other refining methods of smelting shall be established by agreement between the manufacturer and the customer, in which case the plastic properties and impact elasticity shall be not worse than specified in table 2 for steels of opened smelting.

Table 2

P.4 GOST 25054-81

Class of steel	Steel grade	Mechanical properties at 20°C					Hardness at the forging surface, HB, no more than
		Yield stress, $\sigma_{0.2}$ MPa (kgf/mm ²)	Ultimate strength, σ_u , MPa (kgf/mm ²)	Percentage elongation, δ_5 , %	Percentage reduction of area ψ , %	Impact elasticity KCU, MPa (kgf/cm ²)	
		No less than					
Martensite	20X13	441 (45)	588 (60)	14	40	0.4 (4)	197-248
	30X13*	588 (60)	735 (75)	14	40	0.3 (3)	235-277
	09X16H4Б	784 (80)	931 (95)	7	35	0.5 (5)	269-302
	07X16H4Б	735 (75)	882 (90)	13	50	0.6 (6)	269-302
	20X17H2*	666 (68)	813 (83)	12	30	0.5 (5)	248-293
Martensite-ferrite	12X13*	392 (40)	539 (55)	14	35	0.5 (5)	187-229
	14X17H2	637 (65)	784 (80)	12	30	0.5 (5)	248-293
Ferrite	08X13*	392 (40)	539 (55)	14	35	0.5 (5)	187-229
Austenite-martensite	07X16H6	980 (100)	1176 (120)	12	50	0.7 (7)	341-415
	08X17H5M3	833 (85)	1176 (120)	10	35	0.4 (4)	341-415
Austenite-ferrite	08X18Г8H2Т	As agreed					
	15X18H12C4TiO	As agreed					
	08X21H6M2Т*	343 (35)	539 (55)	18	35	0.6 (6)	140-200
	08X22H6Т*	343 (35)	539 (55)	18	35	0.6 (6)	140-200
Austenite	10X14Г14H4Т	As agreed					
	10X17H13M2Т	196 (20)	510 (52)	35	45	—	No more than 200

Table 2 (cont.)

Class of steel	Steel grade	Mechanical properties at 20°C					Hardness at the forging surface, HB, no more than
		Yield stress, $\sigma_{0.2}$ MPa (kgf/mm ²)	Ultimate strength, σ_u , MPa (kgf/mm ²)	Percentage elongation, δ_5 , %	Percentage reduction of area ψ , %	Impact elasticity KCU, MPa (kgf/cm ²)	
		No less than					
Austenitic	10X17H13M3T	196 (20)	510 (52)	35	40	—	200
	03X17H14M3*	176 (18)	470 (48)	40	45	—	179
	08X17H15M3T	196 (20)	490 (50)	35	45	—	200
	12X18H9	196 (20)	490 (50)	35	40	—	179
	12X18H9T	196 (20)	510 (52)	35	40	—	170
	04X18H10	157 (16)	441 (45)	40	45	—	179
	08X18H10	196 (20)	470 (48)	40	45	—	170
	08X18H10T	196 (20)	490 (50)	35	40	—	179
	12X18H10T	196 (20)	510 (52)	35	40	—	179
	03X18H11	176 (18)	441 (45)	40	45	—	179
	03X21H21M4ГБ	As agreed					
10X23H18*	196 (20)	490 (50)	35	40	—	179	
Alloys on nickel base	XH65MB*	294 (30)	735 (75)	30	35	—	220
	XH78T	196 (20)	588 (60)	25	35	—	200
Alloys on iron-nickel base	06XH28MДТ	216 (22)	510 (52)	30	30	—	200
	XH32T	176 (18)	470 (48)	30	35	—	—

Notes:

- * The mechanical properties of the specified steels are optional until 01.01.85.
- Forgings shall be made from steel of grade 07X16H4Б, when this is agreed between the manufacturer and the customer.

Table 3

Indicators of mechanical properties	Maximal reduction of norms for mechanical properties, %			
	for transversal samples	for radial samples	for tangential samples of forgings with a diameter of	
			up to 300 mm	exceeding 300 mm
Ultimate strength	10	10	5	5
Yield stress	10	10	5	5
Percentage elongation	50	35	25	30
Percentage reduction of area	40	35	20	25
Impact elasticity	50	40	25	30

2.9. The chemical composition of steels and alloys for forgings shall comply with the requirements of GOST 5632-72.

2.10. The forgings made from steels and alloys, provided for by GOST 6032-75, or from alloys of grades XH32T, XH78T or XH65MB shall be resistant against intercrystalline corrosion.

2.11. The forgings shall be heat treated. The heat treatment conditions are specified in the recommended Appendix.

The number of heat treatments shall not exceed two.

Forgings that have been dressed in cold or hot condition after heat treatment shall be additionally heat treated to relieve internal stress.

Additional tempering shall not be considered as heat treatment.

2.12. The group of forgings and the requirement for macro- and microstructure and mechanical properties at high temperatures ($\sigma_{0.2}$, σ_u , δ_5 and ψ), for internal defects and the impact elasticity at negative temperatures shall be specified in the specifications and technical documentation for a particular forging.

3. ACCEPTANCE PROCEDURE

3.1. The forgings shall be accepted in batches.

A batch shall consist of forgings made from steel of one grade, in accordance with one drawing and with the conditions for building up a batch specified in table 4, and shall be accompanied with one quality certificate containing the following:

- manufacturer's name and trade mark;
- number of the order;
- weight and number of forgings;

drawing number or forging code;
chemical analysis results and steel or alloy grade;
heat number, batch number and the forging group;
mechanical testing results;
heat treatment conditions;
technical control stamp;
number of this Standard.

Combining forgings of similar design and dimensions, made from steel of one grade in accordance different drawings, in one batch is allowed.

3.2. The appearance, dimensions and shape shall be checked on each forging of the batch.

3.3. To check the quality indicators of forgings, a sampling shall be selected in accordance with table 4.

Table 4

Group of forgings	Conditions of building up a batch	Type of checking	Sampling
I	Forgings from one heat of steel	—	—
II	Forgings from one heat of steel that have been heat treated together	Hardness	5 % from the batch, but no less than five forgings
IIK		Resistance against intercrystalline corrosion	One forging
		Hardness	5 % from the batch, but no less than five forgings
III	Forgings from one heat of steel that have been heat treated in the same conditions	Hardness	100 %
IIIK		Resistance against intercrystalline corrosion	One forging
		Hardness	100 %
IV	Forgings from one heat of steel that have been heat treated together	Tensile test	One forging for a batch of up to 100 pieces, or 1 % from the batch, but not less than two forgings, for a batch of more than 100 pieces
		Impact elasticity test	
		Hardness	100 %

Table 4 (cont.)

Group of forgings	Conditions of building up a batch	Type of checking	Sampling
IVK	Forgings from one heat of steel that have been heat treated together	Resistance against intercrystalline corrosion	One forging
		Tensile test	One forging for a batch of up to 100 pieces, or 1 % from the batch, but not less than two forgings, for a batch of more than 100 pieces
		Impact elasticity test	
		Hardness	
V		Tensile test	100 %
		Impact elasticity test	
		Hardness	
VK	Each forging shall be accepted separately	Resistance against intercrystalline corrosion	100 %
		Tensile test	
		Impact elasticity test	
		Hardness	

At the customer's request, the forgings selected in accordance with table 4 shall be subjected to ultrasonic inspection. In which case, no less than 50% of the forging volume shall be inspected.

The sampling for checking macro- and microstructure, internal defects and impact elasticity at negative temperatures shall be established in the specifications and technical documentation for a particular forging.

3.4. The grade and chemical composition of metal for forgings shall be determined from the quality certificate of the blank metal.

In case of forgings made from metal smelted by the manufacturer of the forgings, the chemical composition of the metal shall be determined by the analysis of a heat sample. Carrying out the chemical analysis of the metal in forgings is allowed.

3.5. If unsatisfactory results are obtained even on one sample for even one of the parameters, in the course of testing, a re-testing shall be performed on double the number of samples taken from the same batch.

4. TEST METHODS

4.1. The appearance of forgings shall be assessed by visual examination without magnifying devices. Establishing other methods of the external surface monitoring in the specifications and technical documentation for forgings is allowed.

4.2. The number of samples for testing the metal of forgings shall be two, for tensile and impact elasticity testing, and four, for intercrystalline corrosion testing, two of which shall be check samples.

4.3. The mechanical properties of metal forgings of groups IV, IVK, V and VK shall be checked on longitudinal, transversal, tangential or radial samples in accordance with the requirements of the specifications and technical documentation for a particular forging.

4.4. Samples for determining the mechanical properties, for group IV, and the resistance against intercrystalline corrosion, for forgings of groups of IIK, IIK and IVK, shall be cut out of the specimen lap or out of the forging body or, in case of forgings of groups V and VK, out of the allowance provided on each forging.

Stipulating a specimen lap at each side of the forging for determining the mechanical properties is allowed in the specifications and technical documentation for forgings with a length exceeding 3 m.

4.5. Samples for determining the resistance against intercrystalline corrosion of the forgings of groups IIK and III are allowed to be cut out of a separately forged specimen of the metal from the same heat subjected to the same heat treatment.

4.6. The shape, dimensions and location of the specimen lap shall be specified in the forging drawing.

In case of making one forging from an ingot, the specimen lap shall be located on the sinkhead side.

4.7. The specimen lap shall separate from the forging by mechanical cutting without heating.

4.8. Samples for mechanical testing are not allowed to be subjected to additional heat treatment or to any heating.

4.9. In case of forgings of cylindrical or prismatic shape, the samples for mechanical testing shall be cut out of the lap or from the forging body at a distance of 1/3 of the radius or at a distance of 1/6 of the diagonal from the external surface of the forging.

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In case of cutting samples out of hollow or bored out forgings, the samples shall be cut out at a distance of $1/2$ of the forging wall thickness, for a wall thickness of up to 100 mm, or at a distance of $1/3$ of the forging wall thickness, for a wall thickness exceeding 100 mm, from the external surface.

4.10. In making transversal or tangential samples, their axes shall be at the same distance as for longitudinal samples.

4.11. The place for cutting samples out of the forgings of non-cylindrical and non-prismatic shape shall be specified in the forging drawing.

4.12. Cutting samples out of the forging surface at such distance, at which the influence of surface flaws is impossible, or out of the forging center is allowed by agreement between the manufacturer with the customer.

4.13. The mechanical properties of ring-type forgings made by expanding shall be determined on tangential samples.

4.14. The tensile test shall be carried out in accordance with GOST 1497-73 on cylindrical samples with a diameter of 10 mm and a gage length of 50 mm.

Carrying out the testing on samples with a diameter of 6 or 5 mm and with a gage length of 50 mm is allowed.

4.15. The impact elasticity shall be determined in accordance with GOST 9454-78 on type 1 samples.

4.16. Brinell hardness shall be determined in accordance with GOST 9012-59.

Using other methods to determine hardness is allowed, provided they ensure the required accuracy.

4.17. Chemical analysis shall be carried out in accordance with GOST 20560-75, GOST 12344-78, GOST 12345-80, GOST 12346-78, GOST 12347-77 GOST 12348-78 – GOST 12365-66 or using another method that ensures the accuracy stipulated by the specified standards.

4.18. The sampling for determining the chemical composition of the forging steel shall be carried out in accordance with GOST 7565-73.

4.19. Testing for the resistance against intercrystalline corrosion shall be carried out in accordance with GOST 6032-75.

The testing shall be carried out using the following techniques, depending of the alloy grade:

- a technique agreed between the manufacturer and a customer, for alloy grade XH78T;
- boiling, after provoking heating at 800°C for 30 minutes, in 30 % solution of sulfuric acid (GOST 4204-66) containing 40 g/l of ferrous sulfate (GOST 9485-74) for 48 hours, for alloy XH65MB;
- method AM GOST 6032-75, for the alloy of grade XH32T.

4.20. The ultrasonic inspection of forgings shall be carried out in accordance with the forging manufacturer's technique.

4.21. Methods for testing macro- and microstructure, internal defects, mechanical properties at high temperatures, the impact elasticity at negative temperatures shall be established in the specifications and technical documentation for a particular forging.

5. MARKING, PACKING, TRANSPORTATION AND STORAGE

5.1. The forgings shall be marked in accordance with the drawing for a particular forging. The marking shall be legible and contain the following:

manufacturer's trade mark;
technical control department stamp;
part drawing number or forging code;
steel grade;
heat number;
group number;
forging number (for forging groups V and VK).

The marking signs may be made by stamping or may be made with an indelible paint.

Should it be impossible to mark the forgings owing to their design or dimensions, the batch of the forgings shall be supplied with a label containing the marking data and the number of the forgings in the batch.

5.2. The type of marking for die forged forgings shall be established in the specifications and technical documentation for a particular forging.

5.3. The transport marking of forgings shall comply with GOST 14192-77.

5.4. The way of packaging forgings shall be established in the specifications and technical documentation for the forgings and shall ensure the protection of the forgings from mechanical damage.

The forgings with a weight of up to 10 kg shall be transported in wooden boxes made in accordance with GOST 18617-73, GOST 10198-78 and other specifications and technical documentation.

5.5. The forgings shall be transported in opened vehicles by all types of transport in accordance with the haulage rules and the conditions of loading and fixing of cargoes effective at a particular type of transport.

5.6. The forgings shall be stored in closed locations, under sheds or on trestles in conditions that ensure the impossibility of mechanical damage.

APPENDIX
(Recommended)

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Steel grade	20X13	30X13	07X16H4B	09X16H4B
Heat treatment conditions	Quenching at 1 000-1 050°C in the air or in oil, tempering at 660-770°C, cooling in the air	Quenching at 1 000-1050°C in the air or in oil, tempering at 700-750°C, cooling in the air	Quenching at 1 000-1 050°C in oil, 1 st stage tempering at 650°C, 2 nd stage tempering at 635°C, cooling in the air	Heating to 1 140°C, maintaining the temperature for 5-5.5 hours, cooling in the air, tempering at 600-620°C, cooling in the air; quenching at 1 030-1 050°C, cooling in the air or in oil, tempering at 600-620°C, cooling in the air; quenching at 1 030-1 050°C, cooling in the air or in oil, tempering at 600-620°C, cooling in the air

cont.

Steel grade	20X17H21	2X13	14X17H2	08X13
Heat treatment conditions	Quenching at 1 000-1 050°C in oil, tempering at 680-700°C, cooling in the air	Quenching at 1 000-1 050°C in oil, tempering at 700-790°C, cooling in the air	Quenching at 980-1 020°C in oil, tempering at 680-700°C, cooling in the air	Quenching at 1 000-1 050°C in oil, tempering at 700-780°C, cooling in oil

cont.

Steel grade	07X16H6	08X17H5M3	08X18Г8H2T	15X18H12C4TiO
Heat treatment conditions	Quenching at 1 000°C in water, treatment with cold air at a temperature of minus 70°C for 2 hours, ageing at 380-400°C, cooling in the air	Quenching at 960 (±10)°C in the air and subsequent treatment with cold air at a temperature of minus 70°C, keeping for 2 hours, ageing at 380-400°C for 1 hour, cooling in the air	Quenching at 950-1 040°C in water	Quenching at 950°C in water

cont.

Steel grade	08X21H6M2T	08X22H6T	10X14Г14H4T
Heat treatment conditions	Quenching at 1 000-1 050°C in water	Quenching at 1 000-1 050°C in water	Quenching 1 000-1 080°C in water

cont.

Steel grade	10X17H13M2T	10X17H13M3T	03X17H14M3
Heat treatment conditions	Quenching at 1 050-1 100°C in water or in the air	Quenching at 1 050-1 100°C in water or in the air	Quenching at 1 050-1 100°C in water

cont.

Steel grade	08X17H15M3T	12X18H9	12X18H9T
Heat treatment conditions	Quenching at 1 050-1 100°C in water or in the air	Quenching at 1 050-1 100°C in water	Quenching at 1 050-1 100°C on air or in water

cont.

Steel grade	04X18H10	08X18H10	08X18H10T
Heat treatment conditions	Quenching at 1 050-1 100°C in water	Quenching at 1 050-1 100°C in water or in the air	Quenching at 1 050-1 100°C in water or in the air

cont.

Steel grade	12X18H10T	03X18H11	03X21H21M4ГБ
Heat treatment conditions	Quenching at 1 050-1 100°C in water or in the air	Quenching at 1 050-1 100°C in water or in the air	Quenching at 1 060-1 080°C in water

cont.

Steel grade	10X23H18	XH65MB	XH78T
Heat treatment conditions	Quenching at 1 000-1 050°C in water or in the air	Quenching at 1 150,10°C in water	Quenching at 980-1020°C in water or in the air

cont.

Steel grade	06XH28MДТ	XH32T
Heat treatment conditions	Quenching at 1 050-1 100°C in water or in the air	Quenching at 1 100-1 150°C in water or in the air