

**DANIELI****EUROPEAN AND RUSSIAN METALLIC
MATERIALS - COMPARISON**Specification No. **COMP-EN-GOST**

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1 PURPOSE

This standard is a guideline for the selection of Russian GOST metallic materials to replace European ones.

2 ABBREVIATIONS

STD DAN:	DANIELI Standard
d_N:	Nominal diameter
d_R:	Relevant section diameter (see ANNEX A)
t_{rw}:	Relevant wall thickness (of castings)
t_N:	Nominal thickness
w:	Section width
R_e:	Yield strength (Or if no yield occurs, 0,2 % Proof strength)
R_m:	Tensile strength
CEV:	Carbon Equivalent Value ($CEV = C + Mn/6 + Cr/5 + Mo/5 + V/5 + Cu/15 + Ni/15$)
HSLA:	High Strength Low Alloy (Steels)

3 APPLICATION

This standard includes metallic materials, divided in the following groups:

- STEELS DESIGNATED ACCORDING TO APPLICATIONS AND PROPERTIES
- SPECIAL CONSTRUCTIONAL STEELS
- TOOL STEELS
- STAINLESS STEELS
- CAST IRONS
- COPPER AND COPPER ALLOYS

The following materials are not included in this specification:

- All non metallic materials
- Piping materials
- Fasteners materials

The materials comparison CANNOT be applied to equipments that shall be marked/certified CE, PED or ASME or any other contractual marking that request specific materials use.

The material comparison CANNOT be applied to materials with specific characteristics defined by STD DAN (e.g. 2.8.515, etc.) or by other technical specifications.

In case of profiles/sections the comparison applies only to the material grade characteristics, not to dimensions, tolerance, etc.

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4 DEFINITIONS**“Alloy Elements”**

- Cr, Ni, Mo, V are always considered alloy elements. The same is true for Al, W, Co, Ti, Nb, Zr, B, N.
- Mn is considered an alloy element only if the minimum content is $\geq 1\%$
- Si is considered an alloy element only if the minimum content is $\geq 0,60\%$
- S, P, Se, Te, Pb, Cu, Ce are considered alloy elements only if there is a minimum value required for the material. Otherwise they are considered as impurities.
- Sn and Zn are considered alloy elements for Copper alloys only.

The other terminology used in this standard and the relevant definitions are the ones applied to the documents mentioned in chapter 5 “REFERENCES”.

5 REFERENCES

The standards mentioned here below shall always be applied in the indicated year edition, included subsequent corrigenda and/or addenda.

GOST 380:2005	Common quality carbon steel. Grades
GOST 801:1978	Bearing steel. Specifications
GOST 493:1979	Tin-free foundry bronzes. Grades
GOST 494:1990	Brass tubes. Specifications
GOST 535:2005	Common quality carbon bar and shaped sections. General specifications
GOST 613:1979	Tin foundry bronzes. Grades
GOST 977:1988	Steel castings. General specifications
GOST 1050:1988	Carbon structural quality steel gauged bars with special surface finish. General specifications
GOST 1412:1985	Flake graphite iron for casting. Grades
GOST 2284:1979	Cold-rolled carbon structural steel strip. Specifications
GOST 4543:1971	Structural alloy steel bars. Specifications
GOST R 52597:	Brass rods for machining on automatic machines. Specifications
GOST 5520:1979	Rolled carbon low-alloy and alloy steel sheets and plates for boilers and pressure vessels. Specifications
GOST 5632:1972	High-alloy steels and corrosion-proof, heat-resisting and heat treated alloys. Grades
GOST 5949:1975	Sorted and gauged corrosion-resistant, heat-resistant and high-temperature steel. Specifications
GOST 5950:2000	Tool alloy steel bars, strips and coils. General specifications
GOST 6688:1991	Brass bars of rectangular section. Specifications
GOST 7293:1985	Spheroidal graphite iron for castings. Grades
GOST 7350:1977	Plate steel, corrosion-resistant, heat-resistant and high-temperature. Specifications
GOST 8479:1970	Construction carbon and alloy steel forgings. General specification
GOST 14367: 1989	Rolled plate from carbon steel of general quality. Specifications
GOST 14959:1979	Spring carbon and alloy steel bars. Specifications
GOST 15527:2004	Pressure treated copper zinc alloys (brasses). Grades
GOST 17711:1993	Cast copper-zinc alloys brass
GOST 18143:1972	High-alloy corrosion-resistant and heat-resistant steel wire. Specifications
GOST 19281:1989	Rolled steel with increased strength. General specification
GOST 25054:1981	Forgings of corrosion-resisting steels and alloys. General specifications
ASTM A 370:2008	Test methods and definitions for mechanical testing of steel products
ASTM E 140: 2007	Standard Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, and Scleroscope Hardness

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EN 1561:2011	Founding - Grey cast irons
EN 1563:2011	Founding - Spheroidal graphite cast irons
EN 1652:1997	Copper and copper alloys - Plate, sheet, strip and circles for general purposes
EN 1982:2008	Copper and copper alloys - Ingots and castings
EN 10025-1:2004	Hot rolled products of structural steels - General technical delivery conditions
EN 10025-2:2004	Hot rolled products of structural steels - Technical delivery conditions for non-alloy structural steels
EN 10025-3:2004	Hot rolled products of structural steels - Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels
EN 10025-5:2004	Hot rolled products of structural steels - Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
EN 10025-6:2004	Hot rolled products of structural steels - Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition
EN 10028-1:2007	Flat products made of steels for pressure purposes - General requirements
EN 10028-2:2009	Flat products made of steels for pressure purposes - Non-alloy and alloy steels with specified elevated temperature properties
EN 10028-3:2009	Flat products made of steels for pressure purposes - Weldable fine grain steels, normalized
EN 10028-7:2007	Flat products made of steels for pressure purposes - Stainless steels
EN 10083-1:2006	Steels for quenching and tempering - General technical delivery conditions
EN 10083-2:2006	Steels for quenching and tempering - Technical delivery conditions for non alloy steels
EN 10083-3:2006	Steels for quenching and tempering - Technical delivery conditions for alloy steels
EN 10084:2008	Case hardening steels - Technical delivery conditions
EN 10085:2001	Nitriding steels - Technical delivery conditions
EN 10088-1:2005	Stainless steels - List of stainless steels
EN 10088-2:2005	Stainless steels - Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
EN 10088-3:2005	Stainless steels - Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes
EN 10089:2002	Hot-rolled steels for quenched and tempered springs - Technical delivery conditions
EN 10095:1999	Heat resisting steels and nickel alloys
EN 10132-1:2000	Cold rolled narrow steel strip for heat treatment - Technical delivery conditions - General
EN 10132-4:2000	Cold rolled narrow steel strip for heat treatment - Technical delivery conditions - Spring steels and other applications
EN 10210-1:2006	Hot finished structural hollow sections of non-alloy and fine grain steels - Technical delivery conditions
EN 10219-1:2006	Cold formed welded structural hollow sections of non-alloy and fine grain steels - Technical delivery conditions
EN 10250-1:1999	Open die steel forgings for general engineering purposes - General requirements
EN 10250-2:1999	Open die steel forgings for general engineering purposes - Non-alloy quality and special steels
EN 10250-3:1999	Open die steel forgings for general engineering purposes - Alloy special steels
EN 10250-4:1999	Open die steel forgings for general engineering purposes - Stainless steels
EN 10270-3:2011	Steel wire for mechanical springs - Stainless spring steel wire
EN 10277-1:2008	Bright steel products - Technical delivery conditions - General
EN 10277-2:2008	Bright steel products - Technical delivery conditions - Steels for general engineering purposes
EN 10283:2010	Corrosion resistant steel castings
EN 10293:2005	Steel castings for general engineering uses
EN 10295:2002	Heat resistant steel castings
EN 10297-1:2003	Seamless circular steel tubes for mechanical and general engineering purposes - Technical delivery conditions - Non-alloy and alloy steel tubes
EN 12163:2011	Copper and copper alloys - Rod for general purposes
EN 12164:2011	Copper and copper alloys - Rod for free machining purposes
EN 12167:2011	Copper and copper alloys - Profiles and bars for general purposes
EN 12168:2011	Copper and copper alloys - Hollow rod for free machining purposes
EN 12449:2012	Copper and copper alloys - Seamless, round tubes for general purposes
EN 13599:2002	Copper and copper alloys - Copper plate, sheet and strip for electrical purposes
EN 13600:2002	Copper and copper alloys - Seamless copper tubes for electrical purposes
EN 13601:2002	Copper and copper alloys - Copper rod, bar and wire for general electrical purposes
ISO 683-17:1999	Heat-treated steels, alloy steels and free-cutting steels - Ball and roller bearing steels
ISO 4957:1999	Tool steels
ISO/TR 15608:2005	Welding-Guidelines for a metallic materials grouping systems
SEW 410:1998	Corrosion resistant steel casting. Quality specifications

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6 RESPONSIBILITY

Technical Department shall use this standard as guideline to choose the European GOST material alternatives for the European materials specified in the tables.

The Purchasing office shall require a formal derogation Tab. 2÷Tab. 63.

The Purchasing office could change the material without any derogation for equipment not subjected to CE, PED, ASME marked or any other contractual marking that request specific materials use, only if all the characteristics indicated in Tab. 2÷Tab. 63 don't require a derogation according to Tab. 1.

- If a material could be changed without any derogation regardless of the dimensions, its designation (i.e. name and standard) is underlined and highlighted in Tab. 2 to Tab. 63 to be distinguished.
- If a material could be changed without any derogation only for some dimensions, those dimensions are underlined and highlighted in Tab. 2÷Tab. 63 to be distinguished. For the dimensions not underlined the derogation is still required.

Tab. 1**PROPERTIES EXPLANATION**

PROPERTIES	DESCRIPTION	Technical office derogation required
------------	-------------	--------------------------------------

CHEMICAL COMPOSITION

PERFECT MATCH	Alternative material minimum and maximum content of each element = 100% of the content of the European material.	NO
MATCH	<ul style="list-style-type: none"> - Alternative material <u>minimum</u> and <u>maximum</u> carbon content = 95÷110 % of European material - Alternative material <u>maximum</u> Sulphur/Phosphorus content ≤ European material value - Alternative material <u>minimum</u> content of all "alloy elements" = 95÷110 % of the European material. 	NO
POSSIBLE MATCH	<p>The material has one or more elements that have a possibility to be outside "match". <i>Example1: Cr content of the ASTM material 1,6 ÷ 2,0 % instead of 1,8 ÷ 2,2 %.</i> <i>Example2: max P content 0,035 % instead of 0,025 %.</i></p> <p>If those elements are indicated in Tab. 2÷Tab. 63 in brackets the first number is related to the European material, the second one to the ASTM one.</p>	YES
NO MATCH	<p>The material has one or more elements that have the certainty to be outside "match". <i>Example: Cr content 1,2÷1,6 % instead of 1,8÷2,2 %</i></p>	YES

MECHANICAL PROPERTIES IN THE SPECIFIED TEMPERATURE ⁽¹⁾

- **TENSILE PROPERTIES (Yield strength-Re and Tensile strength-Rm)**
- **LONGITUDINAL IMPACT STRENGTH**
- **SURFACE HARDNESS**
- **HARDNESS AFTER NITRIDING**

N/A	Not applicable, i.e. this property is not considered for the comparison of the materials	NO
SUPERIOR	Alternative material property value > 105 % of European material In this case the different values are indicated. <i>Example: "SUPERIOR (1100/1000)"</i>	NO
IDENTICAL	Alternative material property value = 100÷105 % of European material	NO
EQUIVALENT	Alternative material property value = 95÷99% of European material	NO
INFERIOR	Alternative material property value < 95% of European material In this case the different values are indicated. <i>Example: "INFERIOR (260/300)"</i>	YES
NOT COMPARABLE ⁽²⁾	<p>The alternative material has an impact strength value based on a different test (for instance KU test instead of KV). <i>Example: "NOT COMPARABLE (47 J/cm² KU / 31 J KV)" means that the Russian material has 47 J/cm² KU test impact strength instead of 31 J KV test impact strength of the European material.</i></p>	YES
INFORMATIVE DATA ONLY	<p>The alternative material relevant standard doesn't guarantee any property value. However some data are available for information purpose only. If necessary for design requirements that values shall be indicated in the drawing and the relevant tests indicated in the QCP. <i>Example "INFORMATIVE DATA ONLY (1000 / 900)", 1000 is the value of the ASTM material, 900 of the European material.</i></p>	YES
NO DATA	<p>The alternative material relevant standard doesn't guarantee any property value. In addition neither informative values are available.</p>	YES

⁽¹⁾ Applicable only in the given condition / heat treatment.

⁽²⁾ Applicable for impact strength only.

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7 COMPARISON TABLES**7.1 STEEL DESIGNATED ACCORDING TO APPLICATIONS AND PROPERTIES****7.1.1 STRUCTURAL QUALITY STEELS (HOT ROLLED PRODUCTS)****Tab. 2****BASIC STEELS, SEMI-KILLED (As rolled or Normalized / Normalized rolled condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa] (+20°C)			KV IMPACT STRENGTH [J] (+20°C)	REMARKS
		t _N [mm]	Re	Rm		
S235JR-EN 10025-2 (1.0037)	St3ps3-GOST 535 (Ст3пс3- ГОСТ 535) plates only	0÷10	plates: IDENTICAL	IDENTICAL	NOT COMPARABLE (see Tab. 6)	-
			bars/sections: SUPERIOR (255/235)			
		10÷20	IDENTICAL			
		20 ÷40	IDENTICAL			
	St3ps6-GOST 535 (Ст3пс6- ГОСТ 535) plates only	40÷63	IDENTICAL			
		63÷80	IDENTICAL			
		80÷100	IDENTICAL			
	St3ps3-GOST 14637 (Ст3пс3- ГОСТ 14637) sections/bars only	100÷150	IDENTICAL			
		150÷200	SUPERIOR (205/185)	SUPERIOR (370/340)		
			SUPERIOR (205/175)			
St3ps5-GOST 14637 (Ст3пс5- ГОСТ 14637) sections/bars only		200÷250	SUPERIOR (205/175)	SUPERIOR (370/330)		
	250÷400	SUPERIOR (205/165)				
S275JR-EN 10025-2 (1.0044)	09G2S-265-GOST 19281 (09Г2С-265-ГОСТ 19281)	0÷3	EQUIVALENT	IDENTICAL	NOT COMPARABLE (see Tab. 6)	-
		3÷16	EQUIVALENT	IDENTICAL		
		16÷40	IDENTICAL	IDENTICAL		
		40÷60	IDENTICAL	IDENTICAL		
		> 60	NO DATA	NO DATA		
S355JR-EN 10025-2 (1.0045)	09G2S-325-GOST 19281 (09Г2С-325-ГОСТ 19281)	0÷3	INFERIOR (325/355)	INFERIOR (450/510)	NOT COMPARABLE (see Tab. 6)	-
		3÷16	INFERIOR (325/355)	EQUIVALENT		
			16÷40			
		40÷60	EQUIVALENT			
		> 60	NO DATA	NO DATA		
	09G2S-345-GOST 19281 (09Г2С-345-ГОСТ 19281)	0÷3	EQUIVALENT	EQUIVALENT		
		13÷16	IDENTICAL	IDENTICAL		
		16÷20	IDENTICAL	IDENTICAL		
		> 20	NO DATA	NO DATA		

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Tab. 3**QUALITY STEELS, SEMI-KILLED (Normalized/Normalized rolled condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa] (+20°C)			KV IMPACT STRENGTH [J] (0°C)	REMARKS
		t _N [mm]	Re	Rm		
S235J0-EN 10025-2 (1.0114)	St3ps4-GOST 535 (Ст3пс4-ГОСТ 535) plates only	0÷10	plates: IDENTICAL	IDENTICAL	NOT COMPARABLE (see Tab. 6)	-
			bars/sections: SUPERIOR (255/235)			
		10÷20	IDENTICAL			
		20 ÷40	IDENTICAL			
	St3ps7-GOST 535 (Ст3пс7-ГОСТ 535) plates only	40÷63	IDENTICAL			
		63÷80	IDENTICAL			
		80÷100	IDENTICAL			
	St3ps3-GOST 14637 (Ст3пс3-ГОСТ 14637) sections/bars only	100÷150	IDENTICAL			
		150÷200	SUPERIOR (205/185)	SUPERIOR (370/340)		
			SUPERIOR (205/175)			
St3ps5-GOST 14637 (Ст3пс5-ГОСТ 14637) sections/bars only		200÷250	SUPERIOR (205/175)	SUPERIOR (370/330)		
	250÷400	SUPERIOR (205/165)				
S275J0-EN 10025-2 (1.0143) 1.0553	09G2S-265-GOST 19281 (09Г2С-265-ГОСТ 19281)	0÷3	EQUIVALENT	IDENTICAL	NOT COMPARABLE (see Tab. 6)	-
		3÷16	EQUIVALENT	IDENTICAL		
		16÷40	IDENTICAL	IDENTICAL		
		40÷60	IDENTICAL	IDENTICAL		
		> 60	NO DATA	NO DATA		
S355J0-EN 10025-2 (1.0553)	09G2S-325-GOST 19281 (09Г2С-325-ГОСТ 19281)	0÷3	INFERIOR (325/355)	INFERIOR (450/510)	NOT COMPARABLE (see Tab. 6)	-
		3÷16	INFERIOR (325/355)	EQUIVALENT		
			16÷40			
		40÷60	EQUIVALENT			
		> 60	NO DATA	NO DATA		
	09G2S-345-GOST 19281 (09Г2С-345-ГОСТ 19281)	0÷3	EQUIVALENT	EQUIVALENT		
		13÷16	IDENTICAL	IDENTICAL		
		16÷20	IDENTICAL	IDENTICAL		
		> 20	NO DATA	NO DATA		

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Tab. 4**QUALITY STEELS, FULLY KILLED (Normalized/Normalized rolled condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa] (+20°C)			KV IMPACT STRENGTH [J] (0°C)	REMARKS
		t _N [mm]	Re	Rm		
S235J2-EN 10025-2 (1.0116)	St3sp4-GOST 535 (Ст3сп4- ГОСТ 535) plates only	0÷10	plates: IDENTICAL	IDENTICAL	NOT COMPARABLE (see Tab. 6)	-
			bars/sections: SUPERIOR (255/235)			
		10÷20	IDENTICAL			
		20 ÷40	IDENTICAL			
		40÷63	IDENTICAL			
	St3sp7-GOST 535 (Ст3сп7- ГОСТ 535) plates only	63÷80	IDENTICAL			
		80÷100	IDENTICAL			
		100÷150	IDENTICAL			
	St3sp4-GOST 14637 (Ст3сп4- ГОСТ 14637) sections/bars only	150÷200	SUPERIOR (205/185)	SUPERIOR (370/340)		
		200÷250	SUPERIOR (205/175)			
250÷400		SUPERIOR (205/165)	SUPERIOR (370/330)			
S275J2-EN 10025-2 (1.0144)		09G2S-265-GOST 19281 (09Г2С-265-ГОСТ 19281)	0÷3	EQUIVALENT	IDENTICAL	NOT COMPARABLE (see Tab. 6)
	3÷16		EQUIVALENT	IDENTICAL		
	16÷40		IDENTICAL	IDENTICAL		
	40÷60		IDENTICAL	IDENTICAL		
	> 60		NO DATA	NO DATA		
S355J2-EN 10025-2 (1.0570)	09G2S-325-GOST 19281 (09Г2С-325-ГОСТ 19281)	0÷3	INFERIOR (325/355)	INFERIOR (450/510)	NOT COMPARABLE (see Tab. 6)	-
		3÷16	INFERIOR (325/355)	EQUIVALENT		
			INFERIOR (325/345)			
			40÷60			
		> 60	NO DATA	NO DATA		
	09G2S-345-GOST 19281 (09Г2С-345-ГОСТ 19281)	0÷3	EQUIVALENT	EQUIVALENT		
		13÷16	IDENTICAL	IDENTICAL		
		16÷20	IDENTICAL	IDENTICAL		
		> 20	NO DATA	NO DATA		

Tab. 5**QUALITY ALLOY STEELS, FULLY KILLED AND FINE GRAINED (Normalized/Normalized rolled condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL							
NAME-STANDARD (W.nr.)	NAME-STANDARD	t _N [mm]	TENSILE PROPERTIES [MPa] (+20°C)		KV IMPACT STRENGTH [J]		WELDABILITY	Remarks
			Re	Rm	(-40°C)	(-50°C)		
S355NL-EN 10025-3 (1.0546)	09G2S-325-GOST 19281 (09Г2С-325-ГОСТ 19281)	0÷3	INFERIOR (325/355)	INFERIOR (450/510)	NOT COMPARABLE (See Tab. 6)		NOT COMPARABLE (European material belong to group 1.3 of ISO TR 15608;	-
		3÷16	INFERIOR (325/355)	EQUIVALENT				
		16÷40	INFERIOR (325/345)					
		40÷60	EQUIVALENT					
		> 60	NO DATA	NO DATA				
	09G2S-345-GOST 19281 (09Г2С-345-ГОСТ 535)	0÷3	EQUIVALENT	EQUIVALENT			Russian material belong to group 1.2 of ISO TR 15608)	
		13÷16	IDENTICAL	IDENTICAL				
		16÷20	IDENTICAL	IDENTICAL				
		> 20	NO DATA	NO DATA				

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Tab. 6

COMPARISON OF IMPACT STRENGTH AT DIFFERENT TEMPERATURES

NAME-STANDARD (W.nr.)	t _N [mm]	IMPACT STRENGTH [J or J/cm ²] – KV or KU test as specified					
		(+20°C)	(0°C)	(-20°C)	(-40°C)	(-50°C)	(-70°C)
S235JR-EN 10025-2 S275JR-EN 10025-2 S355JR-EN 10025-2	all	27 J KV	-	-	-	-	-
S235J0-EN 10025-2 S275J0-EN 10025-2 S355J0-EN 10025-2	all	-	27 J KV	-	-	-	-
S235J2-EN 10025-2 S275J2-EN 10025-2 S355J2-EN 10025-2	all	-	-	27 J KV	-	-	-
S355NL-EN 10025-3	all	40 J KV	34 J KV	27 J KV	20 J KV	16 J KV	-
St3sp3-GOST 535 (Cт3cn3- ГОСТ 535)	5÷10	KU TEST (No values)	-	-	-	-	-
St3sp6-GOST 535 (Cт3cn6- ГОСТ 535)	5÷10	KV TEST (No values)	-	-	-	-	-
St3sp4-GOST 535 (Cт3cn4- ГОСТ 535)	5÷10	108 J/cm ² KU	-	49 J/cm ² KU	-	-	-
St3sp7-GOST 535 (Cт3cn7- ГОСТ 535)	5÷10	34 J/cm ² KV	-	KU TEST (No values)	-	-	-
St3ps4-GOST 535 (Cт3nc4- ГОСТ 535)	3÷5	108 J/cm ² KU	-	49 J/cm ² KU	-	-	-
St3ps7-GOST 535 (Cт3nc7- ГОСТ 535)	3÷5	34 J/cm ² KV	-	KU TEST (No values)	-	-	-
St3sp3-GOST 14637 (Cт3cn3- ГОСТ 14637)	5÷9	78 J/cm ² KU	-	-	-	-	-
	10÷25	69 J/cm ² KU	-	-	-	-	-
	26÷40	49 J/cm ² KU	-	-	-	-	-
St3sp5-GOST 14637 (Cт3cn5- ГОСТ 14637)	5÷9	34 J/cm ² KV	-	39 J/cm ² KU	-	-	-
	10÷20	34 J/cm ² KV	-	29 J/cm ² KU	-	-	-
	20÷25	-	-	-	-	-	-
	26÷40	-	-	-	-	-	-
St3ps4-GOST 14637 (Cт3nc4- ГОСТ 14637)	5÷9	-	-	39 J/cm ² KU	-	-	-
	10÷25	-	-	29 J/cm ² KU	-	-	-
	26÷40	-	-	-	-	-	-
	0÷20	98	-	-	-	-	-
09G2S-265-GOST 19281 (09Г2С-265-ГОСТ 535)	20÷32	-	-	-	29 J/cm ² KV	-	-
	32÷100	59 J/cm ² KU	-	-	29 J/cm ² KV	-	-
	0÷5	64 J/cm ² KU	34 J/cm ² KV	34 J/cm ² KV	34 J/cm ² KV	-	34 J/cm ² KU
09G2S-325-GOST 19281 (09Г2С-325-ГОСТ 535)	5÷10	64 J/cm ² KU	34 J/cm ² KV	34 J/cm ² KV	34 J/cm ² KV	-	34 J/cm ² KU
	10÷20	59 J/cm ² KU	34 J/cm ² KV	34 J/cm ² KV	29 J/cm ² KV	-	29 J/cm ² KU
	20÷32	59 J/cm ² KU	-	-	29 J/cm ² KV	-	-
	32÷60	59 J/cm ² KU	-	-	29 J/cm ² KV	-	-
	0÷5	64 J/cm ² KU	40 J/cm ² KV	40 J/cm ² KV	39 J/cm ² KV	-	-
09G2S-345-GOST 19281 (09Г2С-345-ГОСТ 535)	5÷10	64 J/cm ² KU	40 J/cm ² KV	40 J/cm ² KV	39 J/cm ² KV	-	-
	10÷20	-	-	-	29 J/cm ² KV	-	-

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7.1.2 STRUCTURAL QUALITY STEELS (HOLLOW SECTIONS)**Tab. 7****FOR SEAMLESS HOLLOW SECTIONS (As rolled condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa]	KV IMPACT STRENGTH [J]	REMARKS
S275J0H-EN 10210 (1.0143)	09G2S-265-GOST 19281 (09Г2С-ГОСТ 19281)	NO DATA	NO DATA	-
E355-EN 10297-1 (1.0580)	09G2S-265-GOST 19281 (09Г2С-ГОСТ 19281)	NO DATA	NO DATA	-

Tab. 8**FOR SEAMLESS HOLLOW SECTIONS (As rolled condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa]	KV IMPACT STRENGTH [J]	REMARKS
S355J2H-EN 10210 (1.0570)	09G2S-GOST 19281 (09Г2С-ГОСТ 19281)	NO DATA	NO DATA	-

Tab. 9**FOR WELDED HOLLOW SECTIONS**

EUROPEAN MATERIAL	RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa]	KV IMPACT STRENGTH [J]	REMARKS
S275J0H-EN 10210 (1.0143)	09G2S-GOST 19281 (09Г2С-ГОСТ 19281)	NO DATA	NO DATA	-
S355J2H-EN 10219 (1.0570)	09G2S-GOST 19281 (09Г2С-ГОСТ 19281)	NO DATA	NO DATA	-

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7.1.3 STRUCTURAL QUALITY STEELS (CASTINGS)**Tab. 10****NON ALLOY STEEL CASTINGS (Normalized condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [Mpa] (+20°C)			KV IMPACT STRENGTH (+20°C)	REMARKS
GE240-EN 10293 (1.0446)	25L-GOST 977 (25Л-ГОСТ 977)	All	EQUIVALENT	EQUIVALENT	NOT COMPARABLE (39 KU [J/cm ²] / 27 KV [J])	-
GE300-EN 10293 (1.0558)	45L-GOST 977 (45Л-ГОСТ 977)	0÷30	IDENTICAL	INFERIOR (540/600)	NOT COMPARABLE (39 KU [J/cm ²] / 27 KV [J])	-
		31÷100	IDENTICAL	IDENTICAL		

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7.1.4 STRUCTURAL SPECIAL STEELS / HSLA WELDABLES STEELS (PLATES)**Tab. 11****HIGH YIELD STRENGTH WELDABLE STEELS (Quenched and tempered condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa] (+20°C)	KV IMPACT STRENGTH [J]		REMARKS
			(-20°C)	(-40°C)	
S690Q-EN 10025-6 (1.8931)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-
S690QL-EN 10025-6 (1.8928)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-
S890Q-EN 10025-6 (1.8940)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-
S890QL-EN 10025-6 (1.8983)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-

Tab. 12**IMPROVED ATMOSPHERIC CORROSION RESISTANCE STEELS / WEATHERING STEELS (Normalized condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION	TENSILE PROPERTIES [MPa] (+20°C)	KV IMPACT STRENGTH [J]		Remarks
				(0°C)	(-20°C)	
S355J0W-EN 10025-5 (1.8959)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-
S355J2W-EN 10025-5 (1.8965)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-
S355J0WP-EN 10025-5 (1.8945)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-
S355J2WP-EN 10025-5 (1.8946)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-

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7.1.5 PRESSURE PURPOSE QUALITY STEELS (PLATES)**Tab. 13****FINE GRAINED, FOR HIGH TEMPERATURE (Normalized)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa] (+20°C)		TENSILE PROPERTIES [MPa] (+200÷+400°C)	KV IMPACT STRENGTH [J]			Remarks
					(+20°C)	(0°C)	(-20°C)	
P265GH-EN 10028-2 (1.0425)	16K-GOST 5520 (16K-ГОСТ 5520)	0÷60	See Tab. 16	See Tab. 16	NOT COMPARABLE (see Tab. 15)			Creep properties in Tab. 14
		61÷250	NO DATA	NO DATA	NO DATA			
P355GH-EN 10028-2 (1.0473)	16GS-GOST 5520 (16ГC-ГОСТ 5520)	0÷160	See Tab. 16	See Tab. 16	NOT COMPARABLE (see Tab. 15)			Creep properties in Tab. 14
		161÷250	NO DATA	NO DATA	NO DATA			
	17GS-GOST 5520 (17ГC-ГОСТ 5520)	0÷20	See Tab. 16	See Tab. 16	NOT COMPARABLE (see Tab. 15)			Creep properties in Tab. 14
		21÷250	NO DATA	NO DATA	NO DATA			

Tab. 14**COMPARISON OF INFORMATIVE CREEP CHARACTERISTICS**

MATERIAL	Temperature °C	Strength For 1 % Elongation [MPa] after		Creep rupture strength [MPa] after		
		10 000 hours	100 000 hours	10 000 hours	100 000 hours	200 000 hours
16K-GOST 5520 (16KГОСТ 5520) vs P265GH-EN 10028-2	380	194/164	132/118	233/229	157/165	139/145
	390	188/150	121/106	215/211	143/148	125/129
	400	162/136	108/85	196/191	129/132	113/115
	410	146/124	96/84	178/174	116/111	101/101
	420	130/113	84/73	160/158	103/103	89/89
	430	116/101	74/65	144/142	91/91	77/78
	440	103/91	64/57	129/127	79/79	67/67
	450	91/80	54/49	115/113	69/69	58/57
	460	80/72	46/42	103/100	59/59	49/48
	470	72/62	38/35	92/86	50/50	41/40
16GS-GOST 5520 (16ГC-ГОСТ 5520) and 17GS-GOST 5520 (17ГC-ГОСТ 5520) vs P355GH-EN 10028-2	380	- / 195	- / 153	- / 291	- / 227	- / 206
	390	197/182	137/137	277/266	194/203	174/181
	400	175/167	106/118	248/243	172/179	151/157
	410	155/150	102/105	221/221	151/157	132/135
	420	137/135	93/92	194/200	132/136	115/115
	430	121/120	80/80	172/180	115/117	100/97
	440	106/107	69/69	150/161	100/100	86/82
	450	92/93	59/59	131/143	86/85	75/70
	460	80/83	50/51	116/126	75/73	64/60
	470	70/71	43/44	102/110	64/63	54/52
	480	61/63	37/38	88/96	54/5	45/44
	490	53/55	31/33	78/84	46/47	48/37
	500	- / 49	- / 29	- / 74	- / 41	- / 30

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Tab. 15**COMPARISON OF IMPACT STRENGTH AT DIFFERENT TEMPERATURES**

MATERIAL	thickness t_n	IMPACT STRENGTH [J or J/cm ²] – KV or KU test as specified				
		+20 °C	0°C	-20°C	-40°C	-70°C
P265GH- EN 10028-2 (1.0425)	250 ≤	27 J KV ⁽¹⁾	27 J KV ⁽¹⁾	27 J KV ⁽¹⁾	-	-
P355GH- EN 10028-2 (1.0473)	250 ≤	27 J KV ⁽¹⁾	27 J KV ⁽¹⁾	27 J KV ⁽¹⁾	-	-
16K-GOST 5520 (16K-ΓOCT 5520)	0÷60	69 J /cm ² KU	-	-	-	-
16GS-GOST 5520 (16ΓC-ΓOCT 5520)	0÷5	-	-	-	-	29 J /cm ² KU -
	6÷10	59 J /cm ² KU	-	-	39 J /cm ² KU	24 J /cm ² KU
	11÷20	59 J /cm ² KU	-	-	29 J /cm ² KU	24 J /cm ² KU
	21÷32	59 J /cm ² KU	-	-	29 J /cm ² KU	24 J /cm ² KU
	32÷60	59 J /cm ² KU	-	-	29 J /cm ² KU	24 J /cm ² KU
	60÷160	59 J /cm ² KU	-	-	29 J /cm ² KU	24 J /cm ² KU
17GS-GOST 5520 (17ΓC-ΓOCT 5520)	0÷5	-	-	-	-	-
	6÷10	-	-	-	44 J /cm ² KU	-
	11÷20	-	-	-	39 J /cm ² KU	-

(1) Transversal values instead of longitudinal values as for other values in the table.

Tab. 16**COMPARISON OF TENSILE PROPERTIES [MPa] at the indicated temperatures:**

MATERIAL	t_n	Rm (min÷max)	Re								
	[mm]	+20°C	+20°C	+50°C	+100°C	+150°C	+200°C	+250°C	+300°C	+350°C	+400°C
16K-GOST 5520 (16K-ΓOCT 5520)	0÷5	400÷490	255	-	-	-	206	186	157	137	118
	6÷10	400÷490	255								
	11÷20	400÷490	215								
	21÷32	400÷490	205								
16GS-GOST 5520 (16ΓC-ΓOCT 5520)	0÷5	490	325	-	-	-	245	225	196	176	157
	6÷10	490	325								
	11÷20	480	315								
	21÷32	470	295								
	33÷60	460	285								
17GS-GOST 5520 (17ΓC-ΓOCT 5520)	60÷160	450	275								
	0÷5	510	345	-	-	-	265	245	225	206	176
	6÷10	510	345								
	11÷20	490	335								
P265GH- EN 10028-2	0÷16	410 ÷ 530	265	256	241	223	205	188	173	160	150
	17÷40	410 ÷ 530	255	247	232	215	197	181	166	154	145
	41÷60	410 ÷ 530	245	237	223	206	190	174	160	148	139
	61÷100	410 ÷ 530	215	208	196	181	167	153	140	130	122
	101÷150	400 ÷ 530	200	193	182	169	155	142	130	121	114
	151÷250	390 ÷ 530	185	179	168	156	143	131	121	112	105
P355GH- EN 10028-2	0÷16	510 ÷ 650	355	343	323	299	275	252	232	214	202
	17÷40	510 ÷ 650	345	334	314	291	267	245	225	208	196
	41÷60	510 ÷ 650	335	324	305	282	259	238	219	202	190
	61÷100	490 ÷ 630	315	305	287	265	244	224	206	190	179
	101÷150	480 ÷ 630	295	285	268	249	228	209	192	178	167
	151÷250	470 ÷ 630	280	271	255	236	217	199	183	169	159

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Tab. 17**FINE GRAINED, FOR HIGH TEMPERATURE (Normalized)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa]		KV IMPACT STRENGTH [J]		
		(+20°C)	(+200÷+400°C)	(+20°C)	(0°C)	(-20°C)
P275NH-EN 10028-2 (1.0487)	09G2S-GOST 5520 (09Г2С-ГОСТ 5520)	See Tab. 20	See Tab. 20	NOT COMPARABLE (See Tab. 19)		
				NOT COMPARABLE (See Tab. 19)		
P355NH-EN 10028-2 (1.0565)	17G1S-GOST 5520 (17Г1С-ГОСТ 5520)	See Tab. 20	See Tab. 20	NOT COMPARABLE (See Tab. 19)		

Tab. 18**FINE GRAINED, FOR LOW TEMPERATURES (Normalized)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD	TENSILE PROPERTIES [MPa]		KV IMPACT STRENGTH [J] (+20 to -50°C)	Remarks
		(+20°C)	(+200÷+400°C)		
P275NL1-EN 10028-2 (1.0488)	09G2S-GOST 5520 (09Г2С-ГОСТ 5520)	See Tab. 20	See Tab. 20	NOT COMPARABLE (See Tab. 19)	-
P355NL1-EN 10028-2 (1.0566)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-

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Tab. 19**COMPARISON OF IMPACT STRENGTH AT DIFFERENT TEMPERATURES**

MATERIAL	thickness t_N	IMPACT STRENGTH [J or J/cm ²] – KV or KU test as specified					
		+20 °C	0°C	-20°C	-40°C	-50 °C-	-70°C
P275NH-EN 10028-2 (1.0487)	250 ≤	75 KV ⁽¹⁾ 50 KV ⁽²⁾	65KV ⁽¹⁾ 40 KV ⁽²⁾	45 KV ⁽¹⁾ 30 KV ⁽²⁾	-	-	-
P355NH-EN 10028-2 (1.0565)	250 ≤	75 KV ⁽¹⁾ 50 KV ⁽²⁾	65KV ⁽¹⁾ 40 KV ⁽²⁾	45 KV ⁽¹⁾ 30 KV ⁽²⁾	-	-	-
P275NL1-EN 10028-2 (1.0488)	250 ≤	80 KV ⁽¹⁾ 60 KV ⁽²⁾	70 KV ⁽¹⁾ 50 KV ⁽²⁾	50 KV ⁽¹⁾ 35 KV ⁽²⁾	40 KV ⁽¹⁾ 27 KV ⁽²⁾	30 KV ⁽¹⁾	-
P355NL1-EN 10028-2 (1.0566)	250 ≤	80 KV ⁽¹⁾ 60 KV ⁽²⁾	70 KV ⁽¹⁾ 50 KV ⁽²⁾	50 KV ⁽¹⁾ 35 KV ⁽²⁾	40 KV ⁽¹⁾ 27 KV ⁽²⁾	30 KV ⁽¹⁾	-
09G2S-GOST 5520 (09Г2С-ГОСТ 5520)	0÷5	-	-	-	-	-	-
	6÷10	64 J/Cm ² KU	-	-	39 J/Cm ² KU	-	29 J/Cm ² KU
	11÷20	59 J/Cm ² KU	-	-	34 J/Cm ² KU	-	24 J/Cm ² KU
	21÷32	59 J/Cm ² KU	-	-	34 J/Cm ² KU	-	24 J/Cm ² KU
	32÷60	59 J/Cm ² KU	-	-	34 J/Cm ² KU	-	24 J/Cm ² KU
	60÷160	59 J/Cm ² KU	-	-	34 J/Cm ² KU	-	24 J/Cm ² KU
⁽¹⁾	Longitudinal values; only for $t_N \leq 40$ mm.						
⁽²⁾	Transversal values.						

Tab. 20**COMPARISON OF TENSILE PROPERTIES [MPa] at the indicated temperatures:**

MATERIAL	t _N	Rm (min÷max)	Re								
	[mm]	+20°C	+20°C	+50°C	+100°C	+150°C	+200°C	+250°C	+300°C	+350°C	+400°C
09G2S-GOST 5520 (09Г2С-ГОСТ 5520)	0÷5	345	490	■	■	■	245	225	196	176	157
	6÷10	345	490								
	11÷20	325	470								
	21÷32	305	460								
	33÷60	285	450								
	61÷80	275	440								
	81÷160	265	430								
P275NH-EN 10028-2 (1.0487)	0÷16	390 ÷ 510	275	343	323	299	275	252	232	214	202
	17÷40	390 ÷ 510	265	334	314	291	267	245	225	208	196
	41÷60	390 ÷ 510	255	324	305	282	259	238	219	202	190
	61÷100	370 ÷ 490	235	305	287	265	244	224	206	190	179
	101÷150	360 ÷ 480	225	285	268	249	228	209	192	178	167
	151÷250	350 ÷ 470	215	271	255	236	217	199	183	169	159
P355NH-EN 10028-2 (1.0565)	0÷16	490 ÷ 630	355	266	250	232	213	195	179	166	156
	17÷40	490 ÷ 630	345	256	241	223	205	188	173	160	150
	41÷60	490 ÷ 630	335	247	232	215	197	181	166	154	145
	61÷100	470 ÷ 610	315	227	214	198	182	167	153	142	133
	101÷150	460 ÷ 600	305	218	205	190	174	160	147	136	128
	151÷250	450 ÷ 590	295	208	196	181	167	153	140	130	122
P275NL1-EN 10028-2 (1.0488)	0÷16	390 ÷ 510	275	-	-	-	-	-	-	-	-
	17÷40	390 ÷ 510	265								
	41÷60	390 ÷ 510	255								
	61÷100	370 ÷ 490	235								
	101÷150	360 ÷ 480	225								
	151÷250	350 ÷ 470	215								
P355NL1-EN 10028-2 (1.0566)	0÷16	490 ÷ 630	355	-	-	-	-	-	-	-	-
	17÷40	490 ÷ 630	345								
	41÷60	490 ÷ 630	335								
	61÷100	470 ÷ 610	315								
	101÷150	460 ÷ 600	305								
	151÷250	450 ÷ 590	295								

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7.2 SPECIAL CONSTRUCTIONAL STEELS**7.2.1 CASE-HARDENING STEELS (BARS AND OPEN DIE FORGED)****Tab. 21****CASEHARDENING STEELS (Carburized, Quenched and stress relief tempered condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		CORE HARDNESS ⁽²⁾ (+20°C)		REMARKS
		Alloy elements	Impurities (P and S) ⁽¹⁾	d _R [mm]	[HB]	
17NiCrMo6-4- EN 10084 (1.6566)	20HN2M-GOST 4543 (20XH2M-GOST 4543) (only rolled bars)	NO MATCH (1,60±2 vs 1,2±1,5 Ni; 0,4±0,6 vs 0,8±1,1 Cr) POSSIBLE MATCH (0,15±0,22 vs 0,14±0,20 C; 0,40±0,70 vs 0,60±0,90 Mn 0,20±0,30 vs 0,15±0,25 Mo;	POSSIBLE MATCH (No indication vs 0,025 P max; No indication vs 0,035 S max)	17÷40	INFORMATIVE DATA ONLY (275/315)	(3)
				41÷60	INFORMATIVE DATA ONLY (240/260)	
				61÷80	INFORMATIVE DATA ONLY (225/255)	
				41÷100	INFORMATIVE DATA ONLY (210/245)	
				> 100	NO DATA	
18CrNiMo7-6- EN 10084 (1.6587)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-
14NiCrMo13-4- EN 10084 (1.6657)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-
(1)	P / S content over the limit of the European material could lower the fatigue limit (for instance 0,025 % ≤ P ≤ 0,035 % could have only 80 % of the fatigue limit of the same steel with P ≤ 0,025 %).					
(2)	Core = at distance from surface = effective case-hardening thickness x 3. Core ≠ center					
(3)	INFORMATIVE VALUES: Inferior Average Oil Critical diameter to obtain 70 % core martensite: 25 mm instead of 40 mm Calculated according to ASTM A 255 for the nominal (average) chemical composition, and grain size 7					

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7.2.2 QUENCHING AND TEMPERING STEELS (ROLLED BARS)**Tab. 22****NON ALLOY QUALITY STEELS (Normalized condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)	REMARKS
		Alloy elements	Impurities (P and S) ⁽¹⁾		
C40-EN 10083-2 (1.0511)	40-GOST 1050 (40-ГОСТ 1050)	MATCH	MATCH	INFORMATIVE DATA ONLY (100 % of C40)	-
C45-EN 10083-2 (1.0503)	45-GOST 1050 (45-ГОСТ 1050)	MATCH	MATCH	INFORMATIVE DATA ONLY (100 % of C45)	-
(1)	P / S content over the limit of the European material could lower the fatigue limit (for instance $0,025 \% \leq P \leq 0,035 \%$ could have only 80 % of the fatigue limit of the same steel with $P \leq 0,025 \%$).				

Tab. 23**NON ALLOY SPECIAL STEELS (Normalized condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)	REMARKS
		Alloy elements	Impurities (P and S) ⁽¹⁾		
C40E-EN 10083-2 (1.1186)	40-GOST 1050 (40-ГОСТ 1050)	MATCH	POSSIBLE MATCH (0,040 vs 0,035 S max)	INFORMATIVE DATA ONLY (100 % of C40)	-
C45E-EN 10083-2 (1.1191)	45-GOST 1050 (45-ГОСТ 1050)	MATCH	POSSIBLE MATCH (0,040 vs 0,035 S max)	INFORMATIVE DATA ONLY (100 % of C45)	-
(1)	P / S content over the limit of the European material could lower the fatigue limit (for instance $0,025 \% \leq P \leq 0,035 \%$ could have only 80 % of the fatigue limit of the same steel with $P \leq 0,025 \%$).				

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Tab. 24**ALLOY SPECIAL STEELS (Quenched and tempered condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)			KV IMPACT STRENGTH (+20°C)	Remarks
		Alloy elements	Impurities ⁽¹⁾	d _R	Re	Rm		
25CrMo4- EN 10083-3 (1.7218)	30HM- GOST 4543 (30XM- ГОСТ 4543)	POSSIBLE MATCH (0,26÷0,34 vs 0,22÷0,29 C; 0,4÷0,7 vs 0,6÷0,9 Mn)	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	IDENTICAL	IDENTICAL	N/A	-
				17÷25	INFERIOR (735/800)	SUPERIOR (930/800)	NOT COMPARABLE (78 J/cm2 KU / 50 J KV)	
	30HMA- GOST 4543 (30XMA- ГОСТ 4543)	POSSIBLE MATCH (0,26÷0,34 vs 0,22÷0,29 C; 0,4÷0,7 vs 0,6÷0,9 Mn)	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	IDENTICAL	IDENTICAL	N/A	-
				17÷25	INFERIOR (735/800)	SUPERIOR (930/800)	NOT COMPARABLE (88J/cm2 KU / 50 J KV)	
42CrMo4- EN 10083-3 (1.7225)	38HGM- GOST4543 (38XГМ- ГОСТ 4543)	POSSIBLE MATCH (0,34÷0,40 vs 0,38÷0,45 C)	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	INFERIOR (835/900)	INFERIOR (980/1100)	N/A	-
				17÷25	SUPERIOR (835/750)	EQUIVALENT	NOT COMPARABLE (78 J/cm2 KU / 35 J KV)	
	38HM- GOST 4543 (38XM- ГОСТ 4543)	POSSIBLE MATCH (0,35÷0,42 vs 0,38÷0,45 C; (0,35÷0,65 vs 0,6÷0,9 Mn)	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	EQUIVALENT	INFERIOR (980/1100)	N/A	-
				17÷25	SUPERIOR (885/750)	EQUIVALENT	NOT COMPARABLE (69 J/cm2 KU / 35 J KV)	
50CrMo4- EN 10083-3 (1.7228)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-	-	-
51CrV4- EN 10083-3 (1.8159)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-	-	-

⁽¹⁾ P / S content over the limit of the European material could lower the fatigue limit (for instance 0,025 % ≤ P ≤ 0,035 % could have only 80 % of the fatigue limit of the same steel with P ≤ 0,025 %).

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ALLOY SPECIAL STEELS (Quenched and tempered condition)

EUROPEAN MATERIAL		RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)			KV IMPACT STRENGTH (+20°C)	Remarks
		Alloy elements	Impurities (P and S) ⁽¹⁾	d _R	Re	Rm		
39NiCrMo3-EN 10083-3 (1.6510)	40HGNM-GOST 4543 (40XГНМ-ГОСТ 4543)	MATCH	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	SUPERIOR (835/785)	EQUIVALENT	N/A	-
				17÷25	SUPERIOR (835/735)	SUPERIOR (980/930)	NOT COMPARABLE (98 J/cm2 KU / 35 J KV)	
	40HN2MA-GOST 4543 heat treatment I (40XH2MA-ГОСТ 4543) heat treatment I	NO MATCH (1,25÷1,65 vs 0,7÷1,1 Ni)	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	SUPERIOR (930/785)	SUPERIOR (1080/980)	N/A	-
				17÷25	SUPERIOR (930/735)	SUPERIOR (1080/930)	NOT COMPARABLE (78 J/cm2 KU / 35 J KV)	
	40HN2MA-GOST 4543 heat treatment II (40XH2MA-ГОСТ 4543) heat treatment II	NO MATCH (1,25÷1,65 vs 0,7÷1,1 Ni)	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	SUPERIOR (835/785)	IDENTICAL	N/A	
				17÷25	INFERIOR (835/735)	SUPERIOR (980/930)	NOT COMPARABLE (98 J/cm2 KU / 35 J KV)	
34CrNiMo6-EN 10083-3 (1.6582)	38H2N2MA-GOST 4543 (38X2H2MA-ГОСТ 4543)	POSSIBLE MATCH (0,33÷0,40 vs 0,30÷0,38C; 0,25÷0,50 vs 0,60÷0,90 Mn)	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	INFERIOR (930/1000)	INFERIOR (1080/1200)	N/A	-
				17÷25	IDENTICAL	EQUIVALENT	NOT COMPARABLE (78 J/cm2 KU / 45 J KV)	
	40H2N2MA-GOST 4543 (40X2H2MA-ГОСТ 4543)	POSSIBLE MATCH (0,35÷0,42 vs 0,30÷0,38 C; 0,30÷0,60 vs 0,60÷0,90 Mn)	POSSIBLE MATCH (no indication vs 0,025 P max and 0,035 S max)	0÷16	INFERIOR (930/1000)	INFERIOR (1080/1200)	N/A	-
				17÷25	IDENTICAL	EQUIVALENT	NOT COMPARABLE (78 J/cm2 KU / 45 J KV)	
30CrNiMo8-EN 10083-3 (1.6580)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-	-	-
36NiCrMo16-EN 10083-3 (1.6773)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-	-	-

(1) P / S content over the limit of the European material could lower the fatigue limit (for instance 0,025 % ≤ P ≤ 0,035 % could have only 80 % of the fatigue limit of the same steel with P ≤ 0,025 %).

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7.2.3 QUENCHING AND TEMPERING STEELS (OPEN DIE FORGED)**Tab. 25****NON ALLOY QUALITY STEEL (Normalized condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)			KV IMPACT STRENGTH [J] (+20°C)	Remarks
		Alloy elements	Impurities (P and S) ⁽¹⁾	d _R	Re	Rm		
C40-EN 10250-2 (1.0511)	40-KT 245-GOST 8479 (40-KT 245-ГОСТ 8479)	MATCH	MATCH	≤ 100	INFERIOR (245/290)	INFERIOR (470/550)	N/A	-
				101÷250	INFERIOR (245/260)	INFERIOR (470/530)	N/A	-
	40-KT 275-GOST 8479 (40-KT 275-ГОСТ 8479)	MATCH	MATCH	≤ 100	EQUIVALENT	EQUIVALENT	N/A	-
				101÷250	SUPERIOR (245/260)	IDENTICAL	N/A	-
C45-EN 10250-2 (1.0503)	45-KT 315 GOST 8479 (45-KT 315-ГОСТ 8479)	MATCH	MATCH	≤ 100	IDENTICAL	SUPERIOR (570/530)	N/A	-
	45-KT 275 GOST 8479 (45-KT 315-ГОСТ 8479)	MATCH	MATCH	101÷250	IDENTICAL	INFERIOR (530/560)	NOT COMPARABLE (34 J/cm ² KU / 18 KV)	-
				251÷300	SUPERIOR (275/240)	EQUIVALENT	NOT COMPARABLE (34 J/cm ² KU / 15 KV)	
				301÷500	SUPERIOR (275/240)	EQUIVALENT	NOT COMPARABLE (29 J/cm ² KU / 15 KV)	
				501÷800	SUPERIOR (275/230)	IDENTICAL	NOT COMPARABLE (29 J/cm ² KU / 12 KV)	
				801÷1000	NO DATA	NO DATA	NO DATA	

(1) P / S content over the limit of the European material could lower the fatigue limit (for instance 0,025 % ≤ P ≤ 0,035 % could have only 80 % of the fatigue limit of the same steel with P ≤ 0,025 %).

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Tab. 26**NON ALLOY SPECIAL STEEL (Normalized condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)			KV IMPACT STRENGTH [J] (+20°C)	Remarks
		Alloy elements	Impurities (P and S) ⁽¹⁾	d _R	Re	Rm		
C45E-EN 10250-2 (1.1191)	45-KT 315 GOST 8479 <i>(45-KT 315-ГОСТ 8479)</i>	MATCH	POSSIBLE MATCH (0,040 vs 0,035 S max)	≤ 100	IDENTICAL	SUPERIOR (570/530)	N/A	-
	45-KT 275 GOST 8479 <i>(45-KT 315-ГОСТ 8479)</i>	MATCH	POSSIBLE MATCH (0,040 vs 0,035 S max)	101÷250	IDENTICAL	INFERIOR (530/560)	NOT COMPARABLE (34 J/cm ² KU / 18 KV)	-
				251÷300	SUPERIOR (275/240)	EQUIVALENT	NOT COMPARABLE (34 J/cm ² KU / 15 KV)	
				301÷500	SUPERIOR (275/240)	EQUIVALENT	NOT COMPARABLE (29 J/cm ² KU / 15 KV)	
				501÷800	SUPERIOR (275/230)	IDENTICAL	NOT COMPARABLE (29 J/cm ² KU / 12 KV)	
				801÷1000	NO DATA	NO DATA	NO DATA	
20Mn5-EN 10250-2 (1.1133)	20GS-KT245 GOST 8479 <i>(20ГC-KT 245ГОСТ 8479)</i>	MATCH	POSSIBLE MATCH (0,040 vs 0,035 S max)	≤ 100	INFERIOR (245/300)	INFERIOR (470/530)	NOT COMPARABLE (49 J/cm ² KU / 50 KV)	-
	101÷250			INFERIOR (245/280)	INFERIOR (470/520)	NOT COMPARABLE (39 J/cm ² KU / 50 KV)		
	251÷300			INFERIOR (245/260)	EQUIVALENT	NOT COMPARABLE (34 J/cm ² KU / 40 KV)		
	301÷750			NO DATA	NO DATA	NO DATA		
(1)	P / S content over the limit of the European material could lower the fatigue limit (for instance 0,025 % ≤ P ≤ 0,035 % could have only 80 % of the fatigue limit of the same steel with P ≤ 0.025 %).							

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Tab. 27**ALLOY SPECIAL STEELS (Quenched and tempered condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES (+20°C) [MPa]			KV IMPACT STRENGTH [J] (+20°C)	Remarks
		Alloy elements	Impurities (P and S) ⁽¹⁾	d _R [mm]	Re	Rm		
25CrMo4-EN 10250-3 (1.7218)	30HMA-KT 490-GOST 8479 (30XMA-KT490-ГОСТ 8479)	POSSIBLE MATCH (0,26÷0,33 vs 0,22÷0,29 C; 0,6÷0,9 vs 0,4÷0,7 Mn)	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	100 ≤	SUPERIOR (490/450)	INFERIOR (655/700)	NOT COMPARABLE (59 J/cm ² KU / 50 J KV)	-
	30HMA-KT590-GOST 8479 (30XMA-KT590-ГОСТ 8479)	POSSIBLE MATCH (0,26÷0,33 vs 0,22÷0,29 C; 0,6÷0,9 vs 0,4÷0,7 Mn)	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	101÷250	SUPERIOR (440/400)	EQUIVALENT	NOT COMPARABLE (49 J/cm ² KU / 45 J KV)	-
				251÷300	SUPERIOR (440/400)	EQUIVALENT	NOT COMPARABLE (49 J/cm ² KU / 38 J KV)	-
				301÷500	NO DATA	NO DATA	NO DATA	-
42CrMo4-EN 10250-3 (1.7225)	38HGM-KT 590 GOST 8479 (38XГМ-KT590-ГОСТ 8479)	POSSIBLE MATCH (0,34÷0,40 vs 0,38÷0,45 C)	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	100≤	SUPERIOR (590/500)	EQUIVALENT	NOT COMPARABLE (59 J/cm ² KU / 27 J KV)	Surface hardness in the induction hardened condition: <

⁽¹⁾ P / S content over the limit of the European material could lower the fatigue limit (for instance 0,025 % ≤ P ≤ 0,035 % could have only 80 % of the fatigue limit of the same steel with P ≤ 0,025 %).

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ALLOY SPECIAL STEELS (Quenched and tempered condition)

EUROPEAN MATERIAL		RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES (+20°C) [MPa]			KV IMPACT STRENGTH [J] (+20°C)	Remarks
		Alloy elements	Impurities (P and S) ⁽¹⁾	d _R [mm]	Re	Rm		
36CrNiMo4-EN 10250-3 (1.6511)	40HN2M-KT590-GOST 8479 (40XN2M-KT590-ГОСТ 8479)	NO MATCH (0,37÷0,44 vs 0,32÷0,4 C;	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	≤100	SUPERIOR (590/550)	INFERIOR (735/800)	NOT COMPARABLE (59 J/cm² KU / 45 J KV)	-
		1,25÷1,65 vs 0,9÷1,2 Ni;		101 ÷ 250			NOT COMPARABLE (49 J/cm² KU / 45 J KV)	
	40HN2M-KT540-GOST 8749 (40XN2M-KT540-ГОСТ 8479)	NO MATCH (0,37÷0,44 vs 0,32÷0,4 C;	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	251 ÷ 300	SUPERIOR (540/500)	INFERIOR (685/750)	NOT COMPARABLE (49 J/cm² KU / 45 J KV)	-
		1,25÷1,65 vs 0,9÷1,2 Ni;		301 ÷ 500	SUPERIOR (540/500)	INFERIOR (685/750)	NOT COMPARABLE (44 J/cm² KU / 45 J KV)	
	40HN2M-KT490-GOST 8749 (40XN2M-KT490-ГОСТ 8479)	NO MATCH (0,37÷0,44 vs 0,32÷0,4 C;	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	501 ÷ 750	SUPERIOR (490/450)	SUPERIOR (655/700)	NOT COMPARABLE (39 J/cm² KU / 40 J KV)	-
		1,25÷1,65 vs 0,9÷1,2 Ni;						
0,6÷0,9 vs 0,9÷1,2 Cr)								
34CrNiMo6-EN 10250-3 (1.6582)	34HN1M-KT640 GOST 8749 (34XN1M-KT640-ГОСТ 8479)	MATCH	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	≤100	SUPERIOR (640/600)	IDENTICAL (785/750)	NOT COMPARABLE (59 J/cm² KU / 45 J KV)	-
				101÷ 250	SUPERIOR (640/600)	IDENTICAL (785/750)	NOT COMPARABLE (49 J/cm² KU / 45 J KV)	
	34HN1M-KT590-GOST 8749 (34HN1M- KT590 ГОСТ 977)	MATCH	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	251 ÷ 300	SUPERIOR (590/540)	EQUIVALENT (685/700)	NOT COMPARABLE (49 J/cm² KU / 45 J KV)	-
				301 ÷ 500	SUPERIOR (590/540)	EQUIVALENT (685/700)	NOT COMPARABLE (44 J/cm² KU / 45 J KV)	
	34HN1M-KT490-GOST 8749 (34HN1M- KT490 ГОСТ 977)	MATCH	POSSIBLE MATCH (no value indicated vs 0,035 P max and 0,035 S max)	501 ÷ 800	IDENTICAL	IDENTICAL	NOT COMPARABLE (39 J/cm² KU / 40 J KV)	-
				800 ÷ 1000	NO DATA	NO DATA	NO DATA	-
30CrNiMo8-EN 10250-3 (1.6580)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-	-	-
36NiCrMo16-EN 10250-3 (1.6773)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-	-	-

(1) P / S content over the limit of the European material could lower the fatigue limit (for instance 0,025 % ≤ P ≤ 0,035 % could have only 80 % of the fatigue limit of the same steel with P ≤ 0,025 %).

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7.2.4 QUENCHING AND TEMPERING STEELS (BRIGHT BARS)**Tab. 28****COLD DRAWN**

EUROPEAN MATERIAL		RUSSIAN MATERIAL		
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)	REMARKS
C45+C-EN 10277-2 (1.0503+C)	45-GOST 1050 +Cold drawing as in EN 10277-2	MATCH	INFORMATIVE DATA ONLY (100% of C45)	-

Tab. 29**TURNED**

EUROPEAN MATERIAL		RUSSIAN MATERIAL		
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)	REMARKS
C45+SH-EN 10277-2 (1.0503+SH)	45-GOST 1050 +Turning as in EN 10277-2	MATCH	INFORMATIVE DATA ONLY (100% of C45)	-

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7.2.5 QUENCHING AND TEMPERING STEELS (CASTINGS)**Tab. 30****ALLOY SPECIAL STEEL CASTINGS (Normalized condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)	KV IMPACT STRENGTH [J] (-40°C)	REMARKS
G20Mn5-EN 10293 (1.6220)	20GL-GOST 977 (20ГЛ-ГОСТ 977)	MATCH	IDENTICAL	NO DATA	-
	20GL-GOST 22357 (20ГЛ-ГОСТ 22357)	MATCH	IDENTICAL	NO DATA	-

Tab. 31**ALLOY SPECIAL STEEL CASTINGS (Quenched and tempered condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL							
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION		TENSILE PROPERTIES [MPa] (+20°C)			IMPACT STRENGTH [J] (+20°C)	Remarks
		Alloy elements	Impurities					
G42CrMo4+QT1-EN 10293 (1.7231)	40HML-GOST 977 (40ХМЛ-ГОСТ 977)	MATCH	POSSIBLE MATCH (0,0040 vs 0,025 S/P max)	≤ 100	INFERIOR (481/600)	INFERIOR (677/800)	NO DATA	-
				101÷150	INFERIOR (481/550)	EQUIVALENT	NO DATA	
				151÷250	SUPERIOR (700/481)	IDENTICAL	NO DATA	
G42CrMo4+QT2-EN 10293 (1.7231)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-	-	-

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7.2.6 NITRIDING STEELS (BARS AND OPEN DIE FORGED)**Tab. 32****NITRIDING STEELS (Quenched and Tempered and Gaseous Nitrided condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL								
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)			KV IMPACT STRENGTH [J] (+20°C)	NITRIDABILITY (HV)	Remarks
		Alloy elements	Impurities (P and S) ⁽¹⁾	d _R	Re	Rm			
31CrMoV9-EN 10085 (1.8519)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-	-	-	-
31CrMo12-EN 10085 (1.8515)	NO ANY ALTERNATIVE MATERIAL	-	-	-				-	-
34CrAlMo5-10-EN 10085 (1.8507)	38H2MJuA-GOST 4543 (38X2MJOA-ГОСТ 4543) ONLY FOR BARS	NO MATCH (0,35÷0,42 vs 0,3÷0,37 C; 1,35÷1,65 vs 1÷1,3 Cr)	POSSIBLE MATCH (no value specified vs 0,025 P max and 0,035 S max)	17 ÷ 30	SUPERIOR (835/600)	SUPERIOR (980/800)	88 J/cm ² KCU / 35 KV	INFORMATIVE DATA ONLY (950/950)	-
				30 ÷ 70	NO DATA	NO DATA	NO DATA	INFORMATIVE DATA ONLY (950/950)	
	38H2MJuA-GOST 8479 (38X2MJOA-ГОСТ 4543) ONLY FOR FORGED	NO MATCH (0,35÷0,42 vs 0,3÷0,37 C; 1,35÷1,65 vs 1÷1,3 Cr)	POSSIBLE MATCH (no value specified vs 0,025 P max and 0,035 S max)	17 ÷ 70	NO DATA	NO DATA	NO DATA	INFORMATIVE DATA ONLY (950/950)	
41CrAlMo7-10-EN 10085 (1.8509)	38H2MJuA-GOST 4543 (38X2MJOA-ГОСТ 4543) ONLY FOR BARS	POSSIBLE MATCH (0,35÷0,42 vs 0,38÷0,42 C; 1,35÷1,65 vs 1, 5÷1,8 Cr; 0,15÷0,25 vs 0,20÷0,35 Mo)	POSSIBLE MATCH (no value specified vs 0,025 P max and 0,035 S max)	17 ÷ 30	INFERIOR (750/835)	EQUIVALENT	88 J/cm ² KCU / 25 KV	INFORMATIVE DATA ONLY (950/950)	-
				30 ÷ 250	NO DATA	NO DATA	NO DATA	INFORMATIVE DATA ONLY (950/950)	-
	38H2MJuA-GOST 8479 (38X2MJOA-ГОСТ 4543) ONLY FOR FORGED	POSSIBLE MATCH (0,35÷0,42 vs 0,38÷0,42 C; 1,35÷1,65 vs 1, 5÷1,8 Cr; 0,15÷0,25 vs 0,20÷0,35 Mo)	POSSIBLE MATCH (no value specified vs 0,025 P max and 0,035 S max)	17 ÷ 40	NO DATA	NO DATA	NO DATA	INFORMATIVE DATA ONLY (950/950)	-
				41 ÷ 100	NO DATA	NO DATA			
				101 ÷ 160	INFERIOR (590/670)	INFERIOR (735/850)	49 J/cm2 KCU /30 J KV		
				161 ÷ 250	INFERIOR (590/625)	INFERIOR (735/800)			

(1) P / S content over the limit of the European material could lower the fatigue limit (for instance 0,025 % ≤ P ≤ 0,035 % could have only 80 % of the fatigue limit of the same steel with P ≤ 0,025 %).

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Rev. 00 Pag. 28 of 39**7.2.7 SPRING STEELS (HOT ROLLED BARS AND COLD ROLLED STRIPS)****Tab. 33****COLD ROLLED STEEL STRIP FOR SPRINGS (QT)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)	KV IMPACT STRENGTH [J] (+20°C)	REMARKS
		Alloy elements	Impurities (P and S)			
C67S-EN 10132-3 (1.1231)	70-GOST 2284 (70- ГОСТ 2284)	MATCH	POSSIBLE MATCH (0,035 vs 0,025 P and S max)	NO DATA	NO DATA	-
56Si7-EN 10132-4 (1.5026)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-

Tab. 34**HOT ROLLED BARS FOR SPRINGS**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					Remarks
	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)		KV IMPACT STRENGTH [J] (+20°C)	
56Si7-EN 10089 (1.5026)	55S2A-GOST 14959 (55C2A-ГОСТ 14959)	MATCH	INFERIOR (1175/1300)	INFERIOR (1270/1450)	NO DATA	-
61SiCr7-EN 10089 (1.7108)	60S2HA-GOST 14959 (60C2XA-ГОСТ 14959)	POSSIBLE MATCH (0,4÷0,7 vs 0,7÷1 Mn)	INFERIOR (1325/1470)	INFERIOR (1400/1550)	NO DATA	-
51CrV4-EN 10089 (1.8159)	50HGFA-GOST 14959 (50ХГФА-ГОСТ 14959)	MATCH	SUPERIOR (1325/1200)	SUPERIOR (1420/1350)	NO DATA	-
52CrMoV4-EN 10089 (1.7701)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-

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7.2.8 ROLLER BEARINGS STEELS**Tab. 35****THROUGH QUENCHING ROLLER BEARINGS STEELS**

EUROPEAN (W.nr. between brackets)		RUSSIAN			
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		SURFACE HARDNESS [HRC]	REMARKS
		Alloy elements	Impurities (P and S)		
100Cr6-ISO 683-17 (1.3505)	ShH15-GOST 801 (ШХ15-ГОСТ 801)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 S max)	NO DATA	-

7.2.9 SPECIAL STEELS FOR HIGH TEMPERATURES (PLATES AND CASTINGS)**Tab. 36****STEELS FOR HIGH TEMPERATURE (PLATES FOR PRESSURE PURPOSE) – NORMALIZED CONDITION**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa]		KV IMPACT STRENGTH [J] (0°C)	Remarks
			(+20°C)	(+100÷+500 °C)		
16Mo3-EN 10028-2 (1.5415)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-	-

Tab. 37-**STEELS FOR HIGH TEMPERATURE (CASTINGS FOR PRESSURE PURPOSE) – Quenched and tempered or Normalized and tempered condition ⁽¹⁾**

EUROPEAN MATERIAL	RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)		KV IMPACT STRENGTH [J] (+20°C)	Remarks
		Alloy elements	IMPURITIES (P and S)	Re	Rm		
GX15CrMo5-EN 10213	20H5ML-GOST 977 (20X5МЛ- ГОСТ 977)	POSSIBLE MATCH (0÷12 vs 0,15÷0,25 C)	POSSIBLE MATCH (0,040 vs 0,020 P max; 0,040 vs 0,020 S max)	INFERIOR (392/420)	INFERIOR (589 vs 630)	NOT COMPARABLE (40 J/cm2 KU / 27 KV)	-

⁽¹⁾

These two conditions could correspond to the same mechanical properties for this steel grade.

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7.3 TOOL STEELS**Tab. 38****COLD WORK TOOL STEELS**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD (CYRILLIC)	CHEMICAL COMPOSITION [%]		HARDNESS [HRC] (Depending on tempering temperature)	REMARKS
		Alloy elements	Impurities (P and S)		
90MnCrV8-ISO 4957 (1.2842)	9G2F-GOST 5950 (9Г2Ф- ГОСТ 5950)	MATCH	MATCH	NO DATA	-
X153CrMoV12-ISO 4957 (1.2379)	H12MF-GOST 5950 (Х12МФ- ГОСТ 5950)	NO MATCH (0,15 ÷0,3 vs 0,7 ÷1 V; 0,4÷0,6 vs 0,7÷1 Mo)	MATCH	NO DATA	-
X210Cr12-ISO 4957 (1.2080)	H12-GOST 5950 (Х12- ГОСТ 5950)	MATCH	MATCH	NO DATA	-

Tab. 39**SHOCK RESISTING TOOL STEEL**

EUROPEAN MATERIAL	RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD (CYRILLIC)	CHEMICAL COMPOSITION [%]		HARDNESS [HRC] Depending on tempering temperature)	REMARKS
		Alloy elements	Impurities (P and S)		
55NiCrMoV7-ISO 4957 (1.2714)	5HN2MF-GOST 5950 (4Х5МФC-ГОСТ 5950)	NO MATCH 1,5 ÷2,0 / 0,8÷1,2 Cr 1,2÷1,6 Ni / 1,5÷1,8 Ni POSSIBLE MATCH 0,46÷0,53 / 0,50÷0,60 C 0,8 ÷1,1 / 0,35÷0,55 Mo 0,3÷0,5 / 0,05÷0,15 V	MATCH	NO DATA	INFORMATIVE ONLY Higher hardenability because of higher Cr; Lower toughness because of lower Ni;
45NiCrMo16 (1.2767)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-

Tab. 40**HOT WORK TOOL STEEL**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD (CYRILLIC)	CHEMICAL COMPOSITION [%]		HARDNESS [HRC] Depending on tempering temperature)	REMARKS
		Alloy elements	Impurities (P and S)		
X37CrMoV5-1-ISO 4957 (1.2343)	4H5MFS-GOST 5950 (4Х5МФC- ГOCT 5950)	MATCH	MATCH	NO DATA	-
X40CrMoV5-1-ISO 4957 (1.2344)	4H5MF1S-GOST 5950 (4Х5МФ1C-ГOCT 5950)	MATCH	NO MATCH (0,03 vs 0,02 P max)	NO DATA	-
X38CrMoV5-3 - ISO 4957 (1.2367)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-

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7.4 STAINLESS STEELS**7.4.1 STAINLESS STEEL (PLATES)****Tab. 41****CORROSION RESISTING, AUSTENITIC, PLATES FOR GENERAL PURPOSE**

EUROPEAN MATERIAL	RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa]			Remarks
				(+20°C)		(+100÷500°C)	
		Alloy elements	Impurities (P ans S)	Re	Rm	Re	
X2CrNi18-9-EN 10088-2 (1.4307)	03H18N11-GOST 7350 (03X18H11-FOCT 7350)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 S max)	EQUIVALENT	EQUIVALENT	NO DATA	-
X2CrNi19-11-EN 10088-2 (1.4306)	03H18N11-GOST 7350 (03X18H11-FOCT 7350)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 S max)	EQUIVALENT	EQUIVALENT	NO DATA	-
X2CrNiMo17-12-2-EN 10088-2 (1.4404)	03H17N14M3-GOST 7350 (03X17H14M3-FOCT 7350)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 S max)	INFERIOR (196/220)	INFERIOR (490/520)	NO DATA	-

Tab. 42**CORROSION RESISTING, MARTENSITIC, PLATES FOR PRESSURE PURPOSE**

EUROPEAN MATERIAL	RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa]			Remarks
		Alloy elements	Impurities (P and S)	(+20°C)		(+100÷500°C)	
				Re	Rm	Re	
X2CrNi18-9-EN 10028-7 (1.4307)	03H18N11-GOST 7350 (03X18H11-FOCT 7350)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 S max)	EQUIVALENT	EQUIVALENT	NO DATA	-
X2CrNi19-11-EN 10028-7 (1.4306)	03H18N11-GOST 7350 (03X18H11-FOCT 7350)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 S max)	EQUIVALENT	EQUIVALENT	NO DATA	-
X2CrNiMo17-12-2-EN 10028-7 (1.4404)	03H17N14M3-GOST 7350 (03X17H14M3-FOCT 7350)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 S max)	INFERIOR (196/220)	INFERIOR (490/520)	NO DATA	-

Tab. 43**HEAT AND CREEP RESISTING, AUSTENITIC, PLATES- (Solution Annealed condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)		Remarks
		Alloy elements	Impurities (P and S)	Re	Rm	
X8CrNi25-21-EN 10095 (1.4845)	20H23N18-GOST 7350 (20X23H11-FOCT 7350)	POSSIBLE MATCH (0÷0,20 vs ±0,10 C; 22÷25 vs 24÷26 Cr; 17÷20 vs 19÷23 Mo)	POSSIBLE MATCH (0,020 vs 0,015 S max)	SUPERIOR (265/210)	SUPERIOR (540/500)	-

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7.4.2 STAINLESS STEELS (BARS AND WIRES)**Tab. 44****CORROSION RESISTING, AUSTENITIC, BARS FOR GENERAL PURPOSE**

EUROPEAN MATERIAL	RUSSIAN MATERIAL						
NAME-STANDARD (W.nr.)	NAME-STANDARD (Number)	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa]			Remarks
		Alloy elements	Impurities (P and S)	(+20°C)		(+100÷500°C)	
				Re	Rm	Re	
X2CrNi18-9-EN 10088-3 (1.4307)	03H18N11-GOST 5949 (03X18H12-GOST 5949)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 P max)	INFERIOR (155/175)	INFERIOR (440/500)	NO DATA	-
X2CrNi19-11-EN 10088-3 (1.4306)	03H18N12-GOST 5949 (03X18H12-GOST 5949)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 P max)	INFERIOR (155/180)	EQUIVALENT	NO DATA	-
X5CrNi18-10-EN 10088-3 (1.4301)	08H18N10-GOST 5949 (08X18H10-GOST 5949)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 P max)	INFERIOR (155/190)	INFERIOR (440/500)	NO DATA	-
X2CrNiMo17-12-2-EN 10088-3 (1.4404)	03H18N14M3-GOST 5949 (03X18H14M3-GOST 5949)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 P max)	EQUIVALENT	EQUIVALENT	NO DATA	-
X5CrNiMo17-12-2-EN 10088-3 (1.4401)	03H18N14M3-GOST 5949 (03X18H14M3-GOST 5949)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 P max)	EQUIVALENT	EQUIVALENT	NO DATA	-

Tab. 45**CORROSION RESISTING, MARTENSITIC, BARS FOR GENERAL PURPOSE**

EUROPEAN MATERIAL		RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD (Number)	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa](+20°C)		KV IMPACT STRENGTH (+20°C)	Remarks
			(Re)	(Rm)		
X20Cr13-EN 10088-3 (+QT700) (1.4021)	20H13-GOST 5949 +Heat treatment variant I (20X13-GOST 5949)	MATCH	INFERIOR (440/500)	INFERIOR (650/700)	NO DATA	-
X20Cr13-EN 10088-3 (+QT800) (1.4021)	20H13-GOST 5949 +Heat treatment variant II (20X13-GOST 5949)	MATCH	SUPERIOR (635/600)	EQUIVALENT	NO DATA	-
X30Cr13-EN 10088-3 (1.4028)	30H13-GOST 5949 (30X13-GOST 5949)	MATCH	NO DATA	NO DATA	NO DATA	-

Tab. 46**HEAT AND CREEP RESISTING, AUSTENITIC, BARS- (Solution Annealed condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD (Number)	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)		Remarks
		Alloy elements	Impurities (P and S)	Re	Rm	
X15CrNiSi25-21-EN 10095 (1.4841)	20H25N20S2-GOST 5949 (20X25H20C2-GOST 5949)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 S max)	SUPERIOR (295/230)	SUPERIOR (590/550)	-

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Tab. 47**CORROSION RESISTING, AUSTENITIC, WIRES FOR SPRINGS (Solution Annealed condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL				
NAME-STANDARD (W.nr.)	NAME-STANDARD (Number)	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)		Remarks
		Alloy elements	Impurities	d _N [mm]	R _m	
X10CrNi18-8-EN 10270-3 (1.4310)	12H18N9-GOST 18143 (12X18H9-GOST 18143)	MATCH	POSSIBLE MATCH (0,020 vs 0,015 P max)	< 0,2	NO DATA	-
				0÷3	INFERIOR (1130/2150)	
				3÷4	INFERIOR (1080/2100)	
				4÷5	INFERIOR (1080/2050)	
				5÷6	INFERIOR (1080/2000)	
				6÷10	NO DATA	

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7.4.3 STAINLESS STEELS (OPEN DIE FORGED)**Tab. 48****CORROSION RESISTING, AUSTENITIC (Solution Annealed condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD (Number)	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)		KV IMPACT STRENGTH [J] (+20°C)	REMARKS
			Re	Rm		
X5CrNi18-10-EN 10250-4 (1.4301)	08H18N10-GOST 25054 (08X18H10- ГОСТ 25054)	MATCH	IDENTICAL	INFERIOR (470/500)	NO DATA	-

Tab. 49**CORROSION RESISTING, MARTENSITIC (Quenched and Tempered condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD (Number)	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)		IMPACT STRENGTH [J] (+20°C)	REMARKS
			Re	Rm		
X20Cr13+QT700-EN 10250-4 (1.4021)	20H13-GOST 25054 (20X13- ГОСТ 25054)	MATCH	INFERIOR (441/500)	INFERIOR (588/700)	NOT COMPARABLE (40 KU vs 25 KV)	-
X20Cr13+QT800-EN 10250-4 (1.4021)	20H13-GOST 25054 (20X13- ГОСТ 25054)	MATCH	NO DATA	NO DATA	NO DATA	-

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7.4.4 STAINLESS STEELS (CASTINGS)**Tab. 50****CORROSION RESISTING, AUSTENITIC (Solution Annealed condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)	KV IMPACT STRENGTH [J] (+20°C)	REMARKS
GX2CrNi19-11-EN 10283 (1.4309)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-
GX5CrNi19-10-EN 10283 (1.4308)	10H18N9L-GOST 977 10X18H9Л - ГОСТ 977	POSSIBLE MATCH (0,14 vs 0,07 max C)	IDENTICAL	NOT COMPARABLE (99 J/cm ² KU vs 60 J KV)	-

Tab. 51**CORROSION RESISTING, MARTENSITIC (Quenched and Tempered condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL					
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]		TENSILE PROPERTIES [MPa] (+20°C)		KV IMPACT STRENGTH [J] (+20°C)	Remarks
		Alloy elements	Impurities (P and S)	Re	Rm		
GX20Cr14-SEW 410 (1.4027)	20H13L-GOST 977 (20X13Л-ГОСТ 977)	MATCH	MATCH	IDENTICAL	EQUIVALENT	N/A	-
GX23CrMoV12-1-EN 10293 (1.4931)	20H12VNMFL-GOST 977 (20X12BHMΦЛ-ГОСТ 977)	POSSIBLE MATCH (0,17÷0,23 vs 0,2÷0,26 C; 0,5÷0,7 vs 1-1,2 Mo; 0,15-0,3 vs 0,25-0,35 V W 0,7-1,1 vs 0-0,5)	POSSIBLE MATCH (0,025 vs 0,020 S)	INFERIOR (491/540)	INFERIOR (589/740)	NOT COMPARABLE (30 J/cm ² KU vs 27 KV)	-

Tab. 52**HEAT AND CREEP RESISTING; AUSTENITIC (As cast condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD (W.nr.)	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)		REMARKS
			Re	Rm	
GX25CrNiSi18-9-EN 10295 (1.4825)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-
GX25CrNiSi20-14-EN 10295 (1.4832)	20H20N14S2L-GOST 977 (20X20H14C2Л-ГОСТ 977)	POSSIBLE MATCH (0÷0,2 vs 0,15÷0,35 C; 2÷3 vs 0,5÷2,5 Si)	SUPERIOR (245/230)	SUPERIOR (491/450)	-
GX40CrNiSi22-10-EN 10295 (1.4826)	40H24N12SL-GOST 977 (40X24H12CЛ-ГОСТ 977)	POSSIBLE MATCH (0÷0,4 vs 0,3÷0,5 C; 0,5÷1,5 vs 1÷2,5 Si 22÷26 vs 21÷23 Cr; 11÷13 vs 9÷11 Ni)	SUPERIOR (245/230)	SUPERIOR (491/450)	-
GX40CrNiSi25-12-EN 10295 (1.4837)	40H24N12SL-GOST 977 (40X24H12CЛ-ГОСТ 977)	POSSIBLE MATCH (0-0,4 vs 0,3-0,5 C; 0,5÷1,5 vs 1÷2,5 Si; 22-26 vs 21-23 Cr)	SUPERIOR (245/220)	SUPERIOR (491/450)	-
GX40CrNiSi25-20-EN 10295 (1.4848)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-
GX40NiCrSi35-26-EN 10295 (1.4857)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-

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7.5 CAST IRONS**Tab. 53****GREY CAST IRONS (as cast condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL	
NAME-STANDARD	NAME-STANDARD	TENSILE PROPERTIES [MPa] (+20°C)
EN-GJL-200-EN 1561	<u>SCh20-GOST 1412</u> (C420-ГОСТ 1412)	IDENTICAL
EN-GJL-250-EN 1561	<u>SCh25-GOST 1412</u> (C420-ГОСТ 1412)	IDENTICAL
EN-GJL-300-EN 1561	<u>SCh30-GOST 1412</u> (C420-ГОСТ 1412)	IDENTICAL

Tab. 54**SPHEROIDAL GRAPHITE CAST IRONS (as cast condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL	
NAME-STANDARD	NAME-STANDARD	TENSILE PROPERTIES [MPa] (+20°C)
EN-GJS-350-22-EN 1563	<u>VCh35-GOST 7293</u> (B4 35- ГОСТ 7293)	IDENTICAL
EN-GJS-400-15-EN 1563	<u>VCh40-GOST 7293</u> (B440-ГОСТ 7293)	IDENTICAL
EN-GJS-500-7-EN 1563	<u>VCh50-GOST 7293</u> (B450-ГОСТ 7293)	IDENTICAL
EN-GJS-600-3-EN 1563	<u>VCh60-GOST 7293</u> (B460-ГОСТ 7293)	IDENTICAL
EN-GJS-700-2-EN 1563	<u>VCh70-GOST 7293</u> (B470-ГОСТ 7293)	IDENTICAL
EN-GJS-800-2-EN 1563	<u>VCh80-GOST 7293</u> (B480-ГОСТ 7293)	IDENTICAL

Tab. 55**SPHEROIDAL GRAPHITE CAST IRONS –
Mechanical properties defined by cast-on samples (more accurate sample type) (as cast condition)**

EUROPEAN MATERIAL	RUSSIAN MATERIAL	
NAME-STANDARD	NAME-STANDARD	TENSILE PROPERTIES [MPa] (+20°C)
EN-GJS-350-22U-EN 1563	NO ANY ALTERNATIVE MATERIAL	-
EN-GJS-400-15U-EN 1563	NO ANY ALTERNATIVE MATERIAL	-
EN-GJS-500-7U-EN 1563	NO ANY ALTERNATIVE MATERIAL	-
EN-GJS-600-3U-EN 1563	NO ANY ALTERNATIVE MATERIAL	-
EN-GJS-700-2U-EN 1563	NO ANY ALTERNATIVE MATERIAL	-

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7.6 COPPER AND COPPER ALLOYS**7.6.1 CASTINGS****Tab. 56****Cu-Sn Alloys (As cast condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)		HARDNESS (+20°C)
			Re	Rm	
CuSn12-C-GS - EN 1982 (Sand casting)	BrO10Ts2-GOST 613) (БpO10Л2-ГОСТ 613)	POSSIBLE MATCH (9÷11 Sn + 1÷3 Zn vs 11,2±13) ⁽¹⁾	NO DATA	INFERIOR (215/260)	NO DATA
CuSn10Pb10-C-GS - EN 1982 (Sand casting)	BrO10S10 GOST 613 (БpO10Л10 ГОСТ 613)	MATCH	EQUIVALENT	NO DATA	NO DATA
CuSn7Zn4Pb7-C-GS - EN 1982 (Sand casting)	BrO4Ts7S5-GOST 613 (БpO4Л7C5-ГОСТ 613)	POSSIBLE MATCH (4÷7 vs 5,2÷8 Pb) POSSIBLE MATCH (3÷5 Zn and 6÷9 Sn vs 6,2÷8 Zn and 2,3÷5 Sn) ⁽¹⁾	SUPERIOR		
CuSn7Zn4Pb7-C-GZ-EN 1982 (Centrifugal casting)	NO ANY ALTERNATIVE MATERIAL	-	-		-
CuSn12Ni2-C-GZ - EN 1982 (Centrifugal casting)	NO ANY ALTERNATIVE MATERIAL	-	-		-
(1)	For the indicated quantities Sn and Zn have a similar effect.				

Tab. 57**Cu-Al Alloys (As cast condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES (+20°C) [MPa]		HARDNESS
CuAl10Fe2-C-GM-EN 1982 (Mould casting)	BrA9Zh3L-GOST 493 (БpA9Ж3Л-ГОСТ 493)	POSSIBLE MATCH (1,5÷3,3 / 2÷4 Fe)	NO DATA	INFERIOR (490/600)	NO DATA
CuAl10Fe2-C-GZ-EN 1982 (Centrifugal casting)	BrA9Zh3L-GOST 493 (sand / chill casting only)	-	-	-	-
CuAl10Fe5Ni5-C-GZ-EN 1982 (Centrifugal casting)	BrA9Z4N4Mts1-GOST 493 (sand /chill casting only)	-	-	-	-

Tab. 58**Cu-Zn Alloys (As cast condition)**

EUROPEAN MATERIAL		RUSSIAN MATERIAL			
NAME-STANDARD	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)		HARDNESS
CuZn38Al-C-GM – EN 1982 (Mould casting)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-
CuZn35Mn2Al1Fe1-C-GZ – EN 1982 Ts (Centrifugal casting)	LTs40Mts3A GOST 17711 (ЛЛ40Mу3A-ГОСТ 17711)	POSSIBLE MATCH (no min÷1 vs 0,5÷1,8 Fe; 2,5÷3,5 vs 0,5÷2,5 Mn)	NO DATA	INFERIOR (440/500)	NO DATA
CuZn35Mn2Al1Fe1-C-GS-EN 1982 (Sand casting)	NO ANY ALTERNATIVE MATERIAL	-	-	-	-
CuZn25Al5Mn4Fe3-C-GS-EN 1982 P (Sand casting)	LTs23A6Z3Mts2-GOST 17711 (ЛЛ23A6Ж3Mу2-ГОСТ 17711)	POSSIBLE MATCH (2÷4 vs 1,5÷3,5 Fe; 1,5÷3 vs 3÷5 Mn; 0,5÷1,5÷0,7÷2,2	NO DATA	INFERIOR (686/750)	NO DATA

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7.6.2 WROUGHT PRODUCTS FOR GENERAL PURPOSE**Tab. 59****Phosphur Deoxidized Cu**

EUROPEAN MATERIAL		RUSSIAN MATERIAL		
NAME-STANDARD	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES AND/OR HARDNESS (+20°C)	Remarks
Cu-DLP-EN 1652 (Plates)	M1r-GOST 1173 (M1p)	Work in progress	Work in progress	-
Cu-DHP-EN 12449 (Seamless tubes)	M1f -GOST 859 (M1ф)	Work in progress	Work in progress	-

Tab. 60**Cu-Zn Alloys**

EUROPEAN MATERIAL		RUSSIAN MATERIAL		
NAME-STANDARD	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES AND/OR HARDNESS (+20°C)	Remarks
CuZn40-EN 1652 (Plates)	L60-GOST 15527 (Л60-ГОСТ 15527)	MATCH	NO DATA	-
CuZn40-EN 12163 (Rods ⁽¹⁾ for general purpose)	L60-GOST 15527 (Л60-ГОСТ 15527)	MATCH	NO DATA	-
CuZn39Pb2-EN 12164 (Rods ⁽¹⁾ for free machining purpose)	LS59-1-GOST R 52597 (ЛС59-1-ГОСТ R 52597)	POSSIBLE MATCH (0,8÷1,9 vs 1,6÷2,5 Pb)	Work in progress	-
CuZn39Pb2-12167 (Rectangular bars and sections)	LS59-1-GOST 6688 (ЛС59-1-ГОСТ 6688)	POSSIBLE MATCH (0,8÷1,9 vs 1,6÷2,5 Pb)	Work in progress	-
CuZn39Pb2-EN 12168 (Free machining hollow bars)	LS59-1-GOST 494 (ЛС59-1-ГОСТ 494)	POSSIBLE MATCH (0,8÷1,9 vs 1,6÷2,5 Pb)	Work in progress	-

⁽¹⁾ According to the relevant standard rods are defined as products with round or polygon (square, hexagon, octagon, etc.) section.

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7.6.3 WROUGHT PRODUCTS FOR ELECTRICAL PURPOSE**Tab. 61****Oxidized Cu**

EUROPEAN MATERIAL		RUSSIAN MATERIAL		
NAME-STANDARD	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES AND/OR HARDNESS (+20°C)	NOTES
Cu-ETP-EN 13601 (Seamless tubes)	M0 (M0)	Work in progress	Work in progress	-

Tab. 62**Phosphur Deoxidized Cu**

EUROPEAN MATERIAL		RUSSIAN MATERIAL		
NAME-STANDARD	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES [MPa] (+20°C)	NOTES
Cu-HCP-EN 13599 (Plates)	NO ANY ALTERNATIVE MATERIAL	-	-	-
Cu-HCP-EN 13600 (Bars and wires)	NO ANY ALTERNATIVE MATERIAL	-	-	-
Cu-HCP-EN 13601 (Seamless tubes)	NO ANY ALTERNATIVE MATERIAL	-	-	-

Tab. 63**Oxygen free Cu – Bars**

EUROPEAN MATERIAL		RUSSIAN MATERIAL		
NAME-STANDARD	NAME-STANDARD	CHEMICAL COMPOSITION [%]	TENSILE PROPERTIES AND/OR HARDNESS (+20°C)	NOTES
Cu-OF-EN 13599 (Plates)	M0b or M1b (M0b or M1b 6)	Work in progress	Work in progress	-
Cu-OF-EN 13600 (Bars and wires)	M0b or M1b (M0b or M1b 6)	Work in progress	Work in progress	-

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