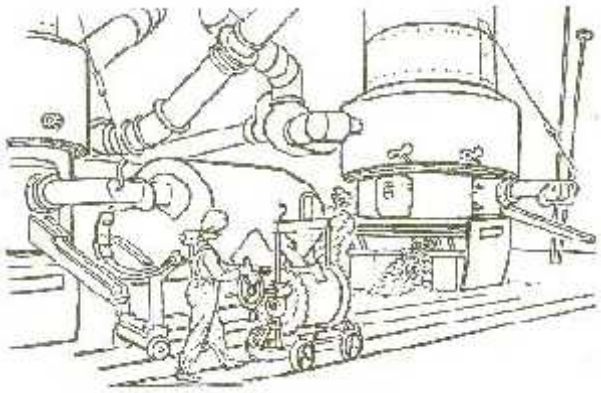
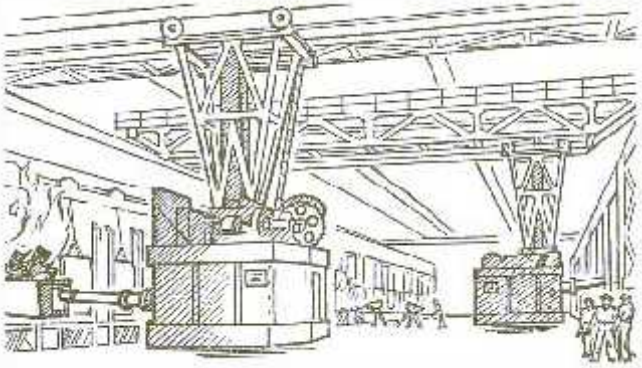
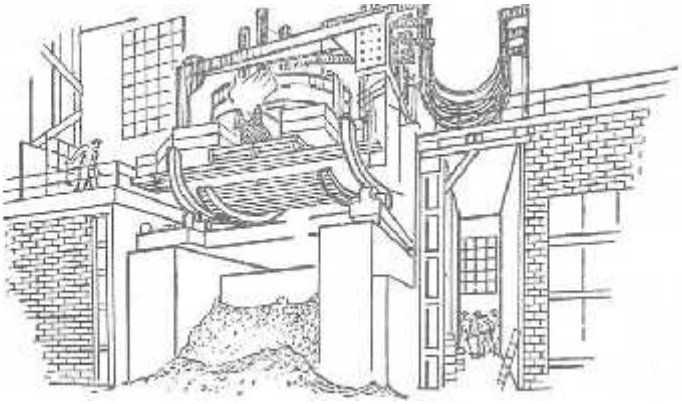


ICRM - Center



CERTIFIED REFERENCE MATERIALS



FOR FERROUS METALLURGY

CATALOG
May 2018

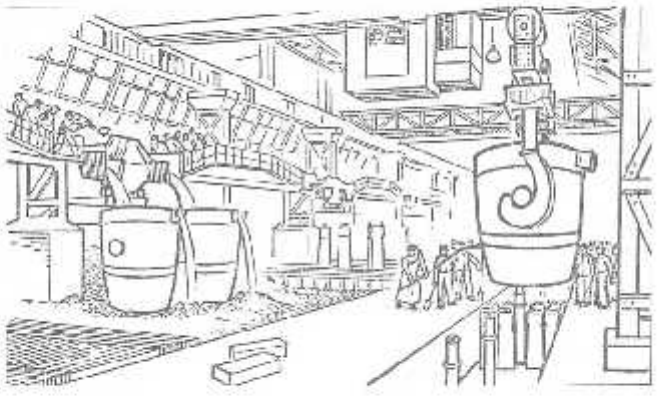


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Table of contents

The materials detailed in the catalogue are grouped by their matrix and sub-divided within the matrix by general alloy headings. All materials listed are the Certified RM according to definitions used ISO guide 30, and supplied with comprehensive certification in support.

The analytical data in the following pages indicates actual values for the current material. However, some CRM may be remade during the lifetime of this catalogue because the previous material is completely sold out. So the values then achieved may differ from those stated in the catalogue. Actual concentrations are indicated on the Certificate of Analysis dispatched with each material.

All concentrations within this catalogue are given in % by weight unless stated otherwise. Concentration values stated within brackets () are not certified and are listed for information only.

When placing an order please state on the order:

1. Quantity required 2. Catalogue numbe 3. Brief description as indicated in price list 4. Price

Please address orders, enquiries and correspondence to the following address:

Address	Telephone / fax	e-mail
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Bank's name: SBERBANK OF RUSSIA
Bank's address: 19 Vavilova, Moscow, 117997, Russia
SWIFT Code: SABR RU MM
ICRM-CENTER LTD
EURO account #: 40702978238001007807
USD account #: 40702840338001009202

The price list is issued as a separate publication. If some materials listed in this catalogue are available only as a part of a set this is noted in the price list.

Packing, insurance and freight are charged extra at cost. We will be pleased to forward our quotation detailing those costs upon request.

Payment terms are the following: USD or EURO pre-payment against pro-forma invoice. Bank's details are the subject to be forwarded with pro-forma invoice.

We have another catalogue with an additional information about CRM produced by other Russian institutions. These CRM are subject to availability and any delivery dates that may be quoted are conditional on supplies from manufacturers. We are unable to accept any liability for delay and if any item become unavailable during the lifetime of the catalogue we will advise you on suitable alternatives where appropriate.

To the extent that the law may permit, the following condition stands in substitution for all conditions and warranties as to merchantability and fitness for purpose implied by statute, common law or otherwise.

We use every effort to ensure uniformity of specification in the supply of samples but exact equivalence cannot be guaranteed and we do not warrant our standards beyond normally acceptable industry tolerances. In any event:

a. It is the responsibility of the customer to decide on the suitability and fitness for purpose of all items purchased.

b. Any items claimed to be defective must be returned to us (within 1 month of delivery) for examination and analysis and no claims can be entertained if this is not done.

c. We may at our option replace any item shown to be defective or refund the price paid. Our liability in respect of any such item will not in any circumstances exceed the amount paid for the item in question and no liability is accepted for consequential loss however arising.

These conditions shall apply to all contracts entered into by us to the exclusion of all other conditions and notwithstanding any terms that may appear on any printed stationery of any customer. No variation of these conditions shall be effective unless confirmed by us in writing on or prior to formal acceptance by us of any order.

Until such a time as we have received full payment, items supplied to customers shall remain our property notwithstanding delivery to the customer and we shall be entitled to enter upon customer's premises to recover property if the customer shall go into liquidation, or if a receiver is appointed of the undertaking of the customer or any of his or its property.

This contract shall be governed by Russia law and any dispute shall be referred to the exclusive jurisdiction of the Russia Courts.

CERTIFIED REFERENCE MATERIALS FOR CHEMICAL ANALYSIS

Steel (chippings)

CRM	Material	Composition, % (by weight)																							
		C	Si	Mn	Cr	Ni	S	P	Cu	Mo	V	Al	W	Ti	Co	As	N	Zn	Pb	Sn	Sb	Mg	Al sol.	B	Nb	Se
S1/3	Carbon steel	0.0036	0.0099	0.0023	0.0064	0.0042	0.0034	0.0012	0.0033	0.00029		0.018		0.00017	0.0006	0.00026	0.027	0.00026	0.00010	0.00023						
S2/5	Carbon steel	0.0077	0.046	0.028	0.047	0.072	0.0054	0.0032	0.069			0.319				0.0026	0.0070									
S5/4	Carbon steel	0.212	0.102	0.316	0.069	0.056	0.0197	0.0089	0.092	0.0059		0.029				(0.02)							0.025			
S5/5	Carbon steel	0.206	0.103	0.316	0.069	0.057	0.0189	0.0091	0.092	0.0055		0.029											0.025			
S7/6	Carbon steel	0.355	0.327	0.702	0.034	0.039	0.0169	0.0201	0.032		0.0074	0.0086				(0.002)	0.0047									
S7/7	Carbon steel	0.343	0.326	0.697	0.034	0.039	0.0167	0.0195	0.033		0.0074	0.0086					0.0048									
S9/4	Alloy steel	0.040	3.12	0.065	0.045	0.097	0.0034	0.0063	0.139	0.0050	0.0009	0.0106		0.0057	0.0101	0.0061	0.0130	0.0006	0.00029	0.0040	0.0009	0.0007	0.0074			
S10-1/1	Alloy steel	0,209	0,569	1,04	0,060	0,063	0,0143	0,0100	0,111							(0.005)										
S15/5	Alloy steel	0,558	1,69	0,701	0,199	0,135	0,0185	0,0140	0,205							(0.005)										
S18/4	Alloy steel	1.42	0.241	0.199	0.555	0.193	0.0122	0.0180	0.142		0.262		4.55													
S19/5	Alloy steel	0.114	0.251	0.431	1.69	3.41	0.0062	0.0062	0.135		0.055													0.0021		
S20/5	Alloy steel	0.270	0.304	0.432	1.73	1.61	0.0049	0.0080	0.136		0.173		1.48			(0.004)										
S21/5	Alloy steel	0.333	0.281	0.278	2.65	0.193	0.0059	0.0110	0.183	0.755	0.71		4.93			(0.007)									0.067	
S22/4	Alloy steel	0.348	1.29	0.606	2.83	0.850	0.0060	0.0090	0.167	0.426	0.189		0.80			(0.005)										
S23/5	Alloy steel	0.047	0.445	0.216	5.02	0.054	0.0066	0.0062	0.024		0.515		0.74													
S23-1/1	Alloy steel	0.080		0.196	5.03	0.193	0.030	0.016	0.068		0.0079					(<0.004)										
S24/5	Alloy steel	0.9	0.2	0.4	3.0	0.2	0.01	0.02	0.2	3.4	2.2		5.5		0.07											
S25/4	Alloy steel	0.702	0.276	0.192	3.31	0.242	0.0053	0.0057	0.143							(0.004)										
S26/5	Alloy steel	1.0	0.4	0.4	4.0	0.2	0.01	0.02	0.14	0.3	2.3		10.0		5.5											
S27/4	Alloy steel	0.772	0.397	0.317	4.23	0.288	0.0138	0.0154	0.045	0.353	1.19		17.62		0.017	(0.006)										
S28/5	Alloy steel	0.503	0.888	0.339	6.02	0.605	0.0044	0.0091	0.024	0.599	0.64	1.59	3.46		0.0073	(0.002)		0.0012	0.00015		0.0004					
S29/4	Alloy steel	0.017	0.751	0.636	11.39	19.02	0.0026	0.0099	0.018		0.0099	0.149		2.88		(0.001)		0.0017	0.00017	0.0006	0.00027					
S30/4	Alloy steel	0.293	2.51	0.510	12.74	6.39	0.0053	0.0117																	0.060	
S31/4	Alloy steel	0.411	0.490	7.82	12.26	7.49	0.0086	0.0167	0.165	1.28	1.42			0.0127		(0.005)	0.033								0.365	
S32/4	Alloy steel	0.136	0.338	0.368	13.73	2.97	0.0141	0.0115	0.152	0.050	0.205		1.82			(0.005)										
S33/4	Alloy steel	0.020	0.354	0.733	15.25	22.48	0.0058	0.0095					4.38	1.38										0.0079		
S34/5	Alloy steel	0.106	0.519	0.232	15.52	3.97	0.0035	0.0135	0.159		0.58			0.511		(0.004)									0.089	
S35/5	Alloy steel	0.031	0.653	0.661	17.41	0.902	0.0034	0.0095		0.614	0.208			0.424												
S36/4	Alloy steel	0.111	0.842	14.82	17.08	0.116	0.0048	0.0195	0.017							(0.002)	0.329									
S37/5	Alloy steel	0.018	0.696	1.43	17.39	12.28	0.0079	0.0067	0.133						0.0069	(0.0004)									1.03	
S38/6	Alloy steel	0.056	0.970	1.60	17.06	8.47	0.0030	0.0135	0.096					0.445												
S39/4	Alloy steel	0.037	0.526	0.97	18.04	9.91	0.0048	0.0092	0.019							(<0.001)										0.213
S40/5	Alloy steel	0.307	0.831	1.51	18.79	9.18	0.0107	0.0133	0.065	1.051	0.197		1.10	0.402											0.475	
S40/6	Alloy steel	0.315	0.594	1.335	19.18	9.10	0.0027	0.0160	0.130	1.29	0.049		1.20	0.332											0.352	
S41/5	Alloy steel	0.085	1.41	1.51	18.65	8.85	0.0069	0.018	0.155		2.04					(<0.005)	0.142									

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Steel (chippings)

CRM	Material	Composition, % (by weight)																		
		C	Si	Mn	Cr	Ni	S	P	Cu	Mo	V	Al	Nb	Ti	Co	As	N	B	O	Ca
S42/4	Alloy steel	0.014	0.958	0.604	23.30	26.43	0.0049	0.0105	2.85	2.68		0.0140		0.270						
S43/4	Alloy steel	0.058	0.717	0.408	19.69	10.20	0.0048	0.0153	0.122	5.02			0.78	0.686		(0.004)				
S44-2	Alloy steel	0.015	0.227	0.455	23.74	5.78	0.0060	0.0101	0.018	0.051	0.135					(0.008)	0.269			
S45/5	Precise alloy	0.040	0.266	0.187	28.04	0.262	0.0015	0.0117	0.088			5.45		0.261						
S46/5	Precise alloy	0.01	0.1	0.4		29.3	0.003	0.002							17.2					
S47/4	Precise alloy	0.036	0.366	0.402		30.84	0.0083	0.0062	0.686						4.06					
S51/4 (powder)	Alloy steel	1.60	1.06	14.05	0.929	0.639	0.0174	0.047	0.282							(0.003)				
S51/5 (powder)	Alloy steel	1.139	1.95	14.58	0.187	0.078	0.0081	0.0191	0.292							(0.003)				
S55/2	Precise alloy	0.059	0.357	0.476	8.34	0.416	0.0030	0.0095			6.46				35.05					
S57/1	Alloy amor-phous	0.256	3.54			0.758	0.0039	0.0051										2.98		
S58	Alloy steel	0.348	1.27	1.25	0.123	0.086	0.0077	0.0076	0.100											
S59	Carbon steel	(0.3)	(0.4)	(0.5)	(0.2)	(0.01)	(0.03)	(0.025)	(0.09)			0.032								
S60	Alloy steel	0.405	0.932	0.634	13.10	0.405	0.0071	0.0206	0.120	0.135	0.137									
S61	Alloy steel	0.111	0.318	0.477	0.221	4.84	0.0089	0.0097	0.147											
S62 (powder)	High Alloy steel	0.071	0.032	0.064	17.24	13.00	0.0128	(<0.001)	0.0083			(0.02)		0.030					(0.35)	0.058
S63	Precise alloy	0.0024	0.175	0.402	0.016	27.73	0.0113	0.0166	0.284						18.63					
S64	Precise alloy	0.017	0.267	0.147	0.146	33.20	0.0037	0.0023	0.044						16.57					
S65	Precise alloy	0.0031	0.017	0.275	0.236	29.63	0.0119	0.0201	0.469						13.94					
S66	High Alloy steel	0.0124	0.050	0.0270	17.54	28.28	0.0054		3.30	1.78				0.486						0.202

CRM	Material	Composition, % (by weight)																				
		C	Si	Mn	Cr	Ni	S	P	Cu	Mo	V	Al	N	Pb	B	As	Al sol.	Nb	Sn	Sb	Zn	Pb	Ti
UNL1/2	Carbon steel	0.012	0.033	0.131	0.026	0.16	0.0091	0.0036	0.019	(0.001)			0.0151			0.0028							
UNL2/5	Carbon steel	0.188	0.085	0.286	0.046	0.048	0.0220	0.0060	0.084			0.053					0.049						
UNL3/4	Carbon steel	0.105	0.221	0.897	0.076	0.096	0.130	0.101	0.135				0.0038			(0.005)							
UNL4/3	Carbon steel	0.736	0.220	0.851	0.023	0.055	0.028	0.0200	0.037				0.0041			0.127							
UNL4/4	Carbon steel	0.734	0.221	0.853	0.023	0.055	0.0268	0.0200	0.037				0.0041			0.123							
UNL5/3	Alloy steel	0.115	0.484	1.36			0.0035	0.0053			0.085	0.021	0.0194					0.066					
UNL6/3	Alloy steel	0.095	0.220	0.555	1.10	0.168	0.0204	0.0162	0.0145	0.263	0.235	(<0.01)		0.00017		(<0.0005)			0.0004	0.0004	0.0011	0.00017	
UNL6/4	Alloy steel	0.128	0.253	0.557	0.934	0.194	0.0207	0.0159	0.159	0.249	0.207								0.0028	0.0008	0.0015	0.00019	
UNL7/3	Alloy steel	0.200	0.250	0.688	0.477	0.631	0.0033	0.0037	0.256						0.0020	(<0.0005)							0.037
UNL8/4	Alloy steel	0.134	0.047	1.19	0.156	0.076	0.189	0.041						0.160									
UNL9/3	Alloy steel	1.19	0.218	0.347	1.30	0.188	0.0152	0.0079	0.176														
UNL10/3	Alloy steel	0.095	0.961	0.678	0.750	0.636	0.022	0.027	0.447	0.0080	0.0077	0.0111	0.0063			(0.003)							
UNL11/4	Alloy steel	0.436	0.320	0.642	0.692	1.39	0.0127	0.022	0.198	0.196	0.0033					0.436							

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Steel (chippings)

CRM	Material	Composition, % (by weight)															
		C	Si	Mn	Cr	Ni	S	P	Cu	Mo	V	Al	B	As	Zr	W	N
UNL12/4	Alloy steel	0,736	0,276	0,360	0,794	0,316	0,0034	0,0070	0,387	0,200	0,685			0,736			
UNL13/2	Alloy steel	0.228	0.553	1.60	1.11	0.125	0.024	0.022	0.185					(0.005)	0.076		
UNL13/3	Alloy steel	0.225	0.538	1.603	1.107	0.127	0.0247	0.0219	0.188						0.076		
UNL14/3	Alloy steel	0.400	0.545	0.369	1.72	0.169	0.0040	0.0078	0.193		0.182	0.78				0.313	
UNL15/4	Alloy steel	0.392	0.531	0.668	2.07	0.713	0.0051	0.0056		0.205			0.0041	0.0078		0.66	
UNL16	Alloy steel	0.409	0.300	0.750	0.958	0.049	0.0237	0.020	0.082								
UNL16/1	Alloy steel	0.440	0.266	0.660	0.925	0.041	0.031	0.028	0.044								
UNL17	Alloy steel	0.139	0.394	0.436	0.721	0.378	0.0189	0.0205	0.299								0.0043
UNL18	Alloy steel	0.070	0.571	1.39	0.025	0.032	0.0305	0.0132	0.029								
UNL19	Alloy steel	0.382	0.238	0.864	0.741	0.703	0.0207	0.0179	0.154								

CRM	Material	Composition, % (by weight)										
		C	Si	Mn	Cr	Ni	S	P	Cu	N	As	Pb
U1/11	Carbon steel	0.101	0.218	0.578	0.049	0.067	0.0267	0.0233	0.064	0.0076		
U1/12	Carbon steel	0.109	0.214	0.541	0.045	0.056	0.0249	0.0217	0.063	0.0072		
U2/7	Carbon steel	0.136	0.046	1.19	0.158	0.076	0.193	0.040	0.082		(0.005)	0.166
U3/9	Carbon steel	0.237	0.278	0.514	0.145	0.215	0.0271	0.0135	0.134		0.0033	
U3/10	Carbon steel	0.192	0.218	0.419	0.092	0.095	0.0257	0.0128	0.235		0.0122	
U4/10	Carbon steel	0.420	0.222	0.535	0.092	0.091	0.0172	0.0167	0.153		(0.01)	
U4/11	Carbon steel	0.417	0.228	0.537	0.094	0.090	0.0175	0.0170	0.157			
U5/10	Carbon steel	0.702	0.281	1.01			0.0229	0.023			(0.004)	
U6/7	Carbon steel	0.840	0.264	0.232	0.139	0.258	0.0154	0.0075	0.125		(0.004)	
U7/9	Carbon steel	1.02	0.156	0.255	0.123	0.102	0.0158	0.0080		0.0094	(0.01)	
U8/6	Carbon steel	1.24	0.246	0.245	0.124	0.040	0.0085	0.0190	0.071		(0.004)	
U10-4	Carbon steel	0,035					0,0112					
U10-5	Carbon steel	0.032					0.0124					
U11-5	Carbon steel	0.119					0.027					
U13-4	Carbon steel	0.888					0.0070					
U14-5	Carbon steel	0.0023					0.0057					
U15-6	Carbon steel	0.182					0.0218					
U17-4	Carbon steel	0.106					0.137					
U18/1	Carbon steel	0.0122	0.036	0.130	0.026	0.0163	0.0089	0.0038	0.018	0.0145		
U19/2	Carbon steel	0.233					0.030					
U20/1	Carbon steel	0.350	0.252	0.572	0.139	0.208	0.0216	0.0071	0.181			

Steel (chippings)

CRM	Material	Composition, % (by weight)									
		C	Si	Mn	Cr	Ni	S	P	Cu	N	As
U21/1	Carbon steel	0.454	0.281	0.743	0.144	0.153	0.0202	0.0140	0.184		
U21/2	Carbon steel	0.478	0.274	0.701	0.042	0.056	0.0189	0.0143	0.126		
U22	Carbon steel	0.231	0.286	0.127	0.209	0.143	0.057	0.028	0.137		
U22/1	Steel	0.233	0.295	0.563	0.150	0.111	0.0315	0.0126	0.117		
U23	Carbon steel	0.665	0.300	0.560	0.055	0.024	0.0277	0.0197	0.038	0.0050	
U24	Carbon steel	0.563	0.334	0.611	0.059	0.0138	0.0214	0.0129	0.0129	0.0079	
U25	Carbon steel	0.0025	0.032	0.104	0.0147	0.0061	0.0054	0.0053	0.0075	0.0063	(0.001)

Steel (chippings)

CRM	Material	Composition. % (by weight)					
		N	O	B	B (acid soluble)	C	S
5-1/1	Alloy steel			0.0012	0.0007		
5-2/1	Alloy steel			0.0030	0.0017		
5-3/1	Alloy steel			0.0096	0.0058		
6-1	Non-Alloy Steel					0.094	0.0205
6-2	Non-Alloy Steel					0.195	0.0250
7-2/2	Low-alloy steel	0.0039					
7-3/2	Low-alloy steel	0.0093					
7-10	Carbon steel	0.0038					
7-11	Carbon steel	0.0152					
7-12	Alloy steel	0.155					
7-21 (7-5/3)	Steel	0.0241					
7-22 (7-13)	Steel	0.398					
7-23	Steel	0.053					

Steel (Polished rods)

CRM	Material	Size	Composition. % (by weight)	
			N	O
7-6	Alloy steel	D=2.8-3mm, L=190-210mm	0.0067	0.0009
7-7	Alloy steel	D=1.5-2mm, L=110-120mm	0.0292	0.0055
7-8	Carbon steel	D=2.8-3.2mm, L=180-220mm	0.0072	0.0121
7-9	Carbon steel	D=2.3-2.8mm, L=210-230mm	0.0043	0.020

Steel (Pins)

CRM	Material	Size	Composition. % (by weight)	
			N	O
7-14	Steel	D=4mm, L=10mm	0.0101	0.0100
7-14/1	Steel	D=4mm, L=10mm	0.0101	0.011

Iron (Chippings)

CRM	Material	Composition. % (by weight)														
		C	Si	Mn	Cr	Ni	S	P	Cu	Mo	Ti	V	Co	Mg	As	Graphite
Ch1/9	Pig iron	2.94	0.293	0.271		0.061	0.0290	0.0125			0.046				(0.004)	(2.1)
Ch1-1	Pig iron	2.94	0.293	0.271	0.051	0.061	0.0290	0.0125	0.101		0.046					
Ch2/7 (powder)	Pig iron	3.61	0.836	0.079	0.218	0.222	0.071	0.078	0.142	0.444	0.293	0.521	0.124		(<0.002)	
Ch3/7	Cast iron	2.27	0.778	1.88			0.041	1.33							0.0013	
Ch4/7	Cast iron	2.78	1.60	0.742	0.706	0.525	0.0276	0.194	0.221						(0.006)	
Ch4-1 (RM)	Cast iron	2.15	1.667	1.262	0.325	0.538	0.0085	0.351	0.258							(1.5)
Ch5/7	Cast iron	2.27	1.86	1.27	0.327	0.061	0.0044	0.0115	0.069					0.042	(0.005)	1.02
Ch6/11	Alloy cast iron	3.01	2.38	0.776	0.261	0.79	0.031	0.289		0.318	0.028		0.048			(1.0)
Ch7/9	Cast iron	2.30	2.67	1.04	0.130		0.0154	0.590							(0.001)	
Ch8/4 (powder)	Cast iron	3.3					0.01									
Ch9/6 (powder)	Cast iron	2.94					0.095									
Ch10/4 (powder)	Cast iron	3.59					0.085									
Ch11/4 (powder)	Pig iron	3.61					0.0204									
Ch12/2 (powder)	Cast iron	4.33	2.82	0.968			0.0101	0.051							(<0.005)	
Ch12-1 (RM)	Cast iron	2.83	2.41	1.320			0.0060	0.049								
Ch13/1 (powder)	Alloy cast iron	4.16	2.90	1.11	1.30	0.454	0.034	0.067	0.91	1.16					(<0.002)	
Ch14/2 (powder)	Alloy cast iron	3.81	2.09	1.05	0.724	1.52	0.034	0.061	0.427	0.625			0.265		(<0.005)	
Ch15/2	Alloy cast iron	3,18	1,43	1,070	2,80	0,045	0,0107	0,036	0,695		0,776					
Ch16/1	Alloy cast iron	2.64	0.864	1.23	1.77	4.15	0.049	0.0237	0.242						(0.007)	
Ch17/1	Cast iron	1.66	2.08	1.32	0.299	0.039	0.0087	0.0313	0.0197					0.044	(0.002)	(0.8)
Ch18	Cast iron	1.91	1.167	4.27	15.61	0.168	0.0147	0.095	0.257							
Ch19	Pig iron	2.73	0.202	0.250	0.067	0.081	0.028	0.074			0.038				0.0125	1.73
Ch20	Pig iron	2.41	0.594	1.84	0.170	0.157	0.053	1.46	0.050		0.0040	(0.015)			0.089	
Ch22 (powder)	Bearing Cast Iron	3.16					0.106									

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Nickel alloys (Chippings)

CRM	Material	Composition. % (by weight)																				
		C	Si	Mn	Cr	Ni	S	P	Cu	Mo	Ti	Al	Fe	W	V	B	As	Pb	Nb	Mg	Co	Ce	Sb
N2/3	High-quality nickel alloy	0.018	1.40	0.84	5.59	76.3	0.0025	0.0034	0.083			0.20					(<0.001)						
N3/4	Nickel alloy	0.0064	0.264	0.424	2.16		0.0018		4.98														
N4/3	High-quality nickel alloy	0.0057	0.81	0.762	0.070			0.0019	5.65	4.87			5.80				(<0.001)						
N5/3	Nickel alloy	0.076	0.60	0.274	20.03		0.0033	0.0014			0.28		0.53				(<0.0005)						
N6/4	Nickel alloy	0.0083	0.115		20.02		0.0024	0.0022	0.77		2.66	0.82	0.180			0.0097		0.0004					
N7/3	Nickel alloy	0.007	0.1	0.04	14.4		0.002	0.002	0.2	2.9	2.0	1.2	2.0						1.83				
N8/3	Nickel alloy	0.0103	0.421	0.010	14.06		0.0016	0.0023	0.011	4.30	2.18		0.61	6.05	0.58	0.020				0.0015			
N9/4	Nickel alloy	0.0102	0.096	0.010	17.44				0.0122	2.88	2.10	1.33	7.63	3.09		0.0049			0.83				
N10/4	Nickel alloy	0.0074	0.093	0.237			0.0028	0.0022	(0.005)	27.04	0.085		0.399		1.57		(<0.001)						
N11/3	Nickel alloy	0.057	0.263	0.147	27.04		0.0030	0.0016				2.83	0.47				(<0.0005)						
N12/3	Nickel alloy	0.012	0.107	0.440	15.49		0.0027	0.0021		16.12			0.085	4.08									
N13/4	Nickel alloy	0.0097	0.407	0.203	17.89		0.0020	0.0018		4.39	1.12	2.83	0.268	6.50		0.0098					5.52	0.0047	
N14/3	Nickel alloy	0.0120	0.67	0.385	24.35	57.0	0.0029	0.0020	0.0082	1.32	0.40	0.164	2.16	13.47			(<0.0005)						
N15/3	Nickel alloy	0.05	0.2	0.05	10.0			0.002	0.02	5.6	2.6	4.0	0.5	5.5	0.3	0.02					15.04		
N16/2	Nickel alloy	0.049	0.267	0.224	21.12		0.0019	0.0028	0.011	0.49	2.71	0.90	1.11		0.030	0.0066			0.367				0.00014

Ferroalloys (powder)

CRM	Material	Composition. % (by weight)																	
		C	Si	Mn	Cr	S	P	Al	Cu	Ti	Fe	Ca	Zn	N	As	Sn	Ni	V	Co
F1/3	Ferrosilicon	0.499	24.5	0.510	0.361	0.0027	0.042	0.74		0.072		(0.01)							
F2/4	Ferrosilicon	0.045	44.3	0.302	0.242	0.0024	0.031	0.83				0.032							
F3/3	Ferrosilicon	0.049	77.7	0.122	0.095	0.0023	0.025	1.96		0.121		0.40							
F4/2	Ferrosilicon	0.023	74.1	0.140	0.119	(0.002)	0.024	0.076	0.073	0.094		(0.03)	0.0013	(0.02)			0.061		
F5/3	Manganese. Metallic	0.079	1.25	95.9		0.0095	0.062		0.0055		2.73								
F6-1	Ferromanganese	1.59	1.60	83.9		0.0106	0.158		0.029		12.77								
F7/4	Ferromanganese	6.80	0.269	79.8		0.0037	0.372				12.75								
F7/5	Ferromanganese	6.79	0.366	77.2		0.0039	0.123				15.65								
F9/2 (chipping)	Ferrochromium	0.012																	0.042
F10/2 (chipping)	Ferrochromium	0.018																	
F11/4	Ferrochromium	0.119	0.68	0.161	71.41	0.0021	0.023				27.20			0.035			0.362	0.084	

Ferroalloys (powder)

CRM	Material	Composition. % (by weight)															
		C	Si	Mn	Cr	S	P	Al	Cu	Ti	Fe	Ca	Zn	N	As	Sn	Mo	Others
F12/3 (chipping)	Ferrochromium	0.289																
F15/2 (chipping)	Ferrochromium	0,080	2,08		68,1	0,0019	0,036	0,30										1,79N
F17/4	Ferromolybdenum	0.081	0.54			0.066	0.032		0.52				0.0064		0.0111	0.0023	59.2	0.021W; 0.0029Pb; 0.00056Bi; 0.0039Sb;
F19/3	Ferrovanadium	0.418	1.47	3.30	1.21	0.0102	0.059	(0.005)	0.204						0.0009			42.6 V;
F20/3	Ferroniobium	0.136	0.67			0.0091	0.039	0.35		0.292	33.3			0.067		0.0014		63.5 Nb+Ta; 0.0056 Co;
F21/2	Ferroboron	0.047	0.73				0.0119	1.546	0.0120				0.0055					20.91 B;
F22/3	Ferroboron	0.161	7.82			0.018	0.021	7.78	3.43									8.95 B;
F23-1	Ferrosolicomanganese	1.45	21.18	67.53		0.0155	0.235											
F24/2	Ferrosilicochromium	0.02	49.9		29.18	0.0015	0.027	0.87										
F25/3	Silicocalcium		51.5			0.0056	0.011	0.67			23.06	21.3						
F26/2	Silicocalcium		59.5			0.030	0.024	1.52		0.156	6.29	29.9			(<0.001)			
F26/3	Silicocalcium		60.1			0.029	0.024	1.52		0.161	6.19	29.9						
F27/2	Ferrosilicozirconium	0.111	26.1			(0.001)	0.044	7.48	1.47	0.215	(12)							51.5 Zr;
F28/2	Ferrophosphorum		1.11	1.20		0.021	16.05											
F29/3	Manganese Metallic	0.146		87.5		0.031	0.055				2.26			4.63				
F30/3	Ferrotitanium	0.308	0.40	0.335	0.58	0.012	0.0044	3.63	0.113	70.0	19.74			0.68		0.100	0.92	0.6Ni; 0.56V; 0.397Zr; (3.5) O_2
F30/4	Ferrotitanium	0.154	0.163	0.189	0.154	0.0054	0.0030	3.83	0.065	70.3	21.51			0.38		0.077	0.60	0.053Ni; 2.29V; 0.231Zr;
F31/3	Master alloy with rare earths	0.032	39.6					7.60	0.51		16.26	1.76						39.0 sum of oxides of rare earths;15.65 Ce; 0.320 Mg

CRM	Material	Composition. % (by weight)												
		C	Si	Mn	Cr	S	P	Al	Cu	Ti	Fe	V	N	As
F32/3	Ferrovanadium. Nitrated	(0.4)	(1.2)	3.14		(0.008)	(0.05)	(<0.05)	(0.2)		(40)	40.2	7.51	(<0.001)
F35/2 (chipping)	Ferrochromium	0.79	0.181		68.9	0.0022	0.027				28.16		0.185	
F40	Ferrvanadium	0.096	1.31	1.49	0.185	0.014	0.022	2.12	0.081			80.1		

Ferroalloys (powder)

CRM	Material	Composition. % (by weight)																	
		C	Si	Mn	Cr	S	P	Al	Cu	W	Ti	Fe	V	Zn	N	As	Sn	Mo	Others
F41	Ferronickel low-ferrous	0.0124				0.132			0.47			5.68				0.058			91.4 Ni; 2.04 Co
F42	Ferrotitanium	0.55	6.74	1.10	2.22	0.023	0.050	11.41	1.32		27.15		0.249	0.129	(0.15)		0.033	0.106	(0.44)Zr
F43	Ferrotitanium	0.098	2.50	1.22	0.354	0.0058	0.038	11.11	0.336		31.9		0.152	0.032	0.085		0.013	0.0036	0.059Zr
F44	Silicocalcium with Mg	0.166	49.7			0.0066	0.014	1.68				19.91	(2.5)						12.6Ca; 9.6Mg
F45	Ferrochromium	0.071	1.10		69.0	0.0024	0.027	0.041							0.082				
F46	Ferrochromium	5.47	1.05		68.8	0.015	0.030								0.055				
F47	Ferrochromium	8.80	0.103		69.8	0.036	0.025								0.020				
F48	Ferrotungsten	0.074	0.47	0.695		0.211	0.035	0.64	0.096	71.0						0.037	0.031	0.047	0.0048Pb; 0.014Sb
F50	Ferrochromium	0.079	1.29		64.3	0.0058	0.0048	0.168							11.2				

Iron ores (powder)

CRM	Material	Composition. % (by weight)																									
		Fe	FeO	SiO_2	CaO	MgO	Al_2O_3	MnO	S	P	TiO_2	Cu	Na_2O	K_2O	Zn	Pb	V_2O_5	Co	BaO	As	Cr_2O_3	NiO	C	$Fe_{met.}$	Mn	MnO_2	Ni	V
R1/4	Iron-ore concentrate	66.0	26.1	7.38	0.17	0.38	0.28		0.029	0.0157																	
R3/2	Fe-Va pellets	58.72	2.53	3.74	4.47	2.48	2.50	0.232	0.0050	0.0027	2.49						0.56	0.020									
R5/7	Sintered iron ore	53.7	17.22	9.16	3.85	6.38	3.60	1.07	0.038	0.0281	0.50																
R8/3	Iron ore	38.2		16.57	0.89	2.17	10.35	0.432	0.031	0.165	0.85							(0.06)			2.53	0.67					
R10/3	Iron ore concentrate	90.9		4.04	0.182	0.32	0.30		0.0013	0.0102		0.0025	0.073	0.037	0.0019	0.00014							2.18	82.5			
R12/2	Manganese concentrate	1.56		15.00	2.02	1.16	1.87		0.029	0.209									0.53						43.24	52.4	
R13/3	Manganese-ore concentrate			2.01					0.070	0.196		0.0219				0.0013									58.88	90.4	0.101	
R14/5	Chromium ore	9.32	10.8	8.79	0.13	21.6	7.2		0.037	0.0017											47.0							0.044

Iron ores (powder)

CRM	Material	Composition. % (by weight)																	
		Fe	FeO	SiO_2	CaO	MgO	Al_2O_3	S	P	O_2	Mn	Si	C	V_2O_5	Na_2O	K_2O	Insoluble residue	Ash content	Fe magnetite
R15/2	Fe-Va concentrate	64.0	28.0	2.3	0.9									0.61					
R16/3	Pure ferrum powder	98.2						0.0198	0.0110	1.15	0.038	0.073	0.108				0.155		
R18/4	Coke							1.34	0.037						0.051	0.128		12.45	
R20/2	Iron magnetite ore	34.7	(17)	38.0	2.44	3.34	0.64												27.6
R20/2	Iron magnetite ore	34.7		37.6	2.54	3.42	0.67	0.073											27.6
R21/2	Pure ferrum powder	99.1						0.0143	0.0098	0.344	0.329	0.060	0.0085				0.146		
R22/2	Iron ore concentrate	67.3	(1)	3.35	0.144	0.24	0.25	(0.001)	0.0084										
R23/1	Fe-Va pellets	58.7		3.75	4.45														
R24/2	Iron ore	33.73		5.46	2.12	8.29	1.52	0.065	0.0055										

Iron ores (powder)

CRM	Material	Composition. % (by weight)																
		Fe	FeO	SiO_2	CaO	MgO	S	P	MnO	Al_2O_3	TiO_2	V_2O_5	Cr_2O_3	C	Na	K	P_2O_5	Cu
R25/1	Iron ore concentrate	67.3		3.37	0.14	0.25												
R27	Chromium ore	9.66	8.2	6.88	1.04	18.7	0.018	0.0021		7.08			50.1					
R27/1	Chromium ore	9.45	11.2	7.10	0.131	19.7	0.019	0.0019		8.08			50.8					
R28	Iron ore pellets fluxed	63.01	1.16	5.11	4.09	0.194	0.087	0.0121		0.37								
R29	Iron ore pellets non fluxed	64.95	0.48	6.13	0.45	0.149	0.0118	0.0123		0.38								
R30	Vanadium pentozide engineering	0.51		0.43	0.88		0.0072	0.0064	2.58		0.21	94.3		0.007	0.032	0.053		
R31	Titanic Iron Ore Concentrate	24.4		1.24						1.99	56.5		2.59				0.25	
R33	Iron Ore Concentrate	50.42		10.62	8.35	1.33	3.10	0.039										0.112
R35	Iron Ore			35.2			26.7											1.65

CRM	Material	Composition. % (by weight)												
		Fe	Fe_2O_3	SiO_2	CaO	MgO	S	P	MnO	Al_2O_3	TiO_2	Na_2O	K_2O	Others
R36	Iron Ore	57.47	0.73	16.28	0.037	0.39	0.0064	0.0138	0.024	0.71	0.031	0.076	0.015	16.5 Insoluble residue
R37	Iron Ore	65.81		3.06	0.050	0.029	1.29	0.0110	0.015	0.264	0.013			
R38	Iron Ore Concentrate	68.55	30.6	4.56	0.118	0.131	0.334	0.0122	0.035	0.212	0.022	0.036	0.087	
R39	Iron Ore	28.03	14.96	49.1	1.69	1.97	0.245	0.073	0.069	3.92	0.155	0.083	1.29	23.1 Fe magnetite
R40	Iron	90.95		4.13	0.90	0.299	0.0057	0.0094		0.82		0.084	0.05129	85.7 Fe metal; 1.393C

CRM	Material	Composition. % (by weight)															
		FeO	Fe_2O_3	S	Si	Mn	Cr	Ni	Cu	Al	C	K	Na	Ca	Mg	Cl	Impurities
R26/2	Ferric oxide (III)	(<0.1)	99.49	(0.04)	0.0110	0.292	0.0194	0.024	0.0090	0.026	(0.005)	(0.001)	(0.006)	(0.005)	(<0.005)	(0.1)	(0.1)

CRM	Material	Composition. % (by weight)										Composition, ppm (by weight)	
		Cu	Zn	Fe	S	Pb	As	Mo	Sb	Bi	SiO_2	Ag	Au
R34/1	Copper Concentrate	17.21	2.45	32.9	38.6	0.17	0.35	0.0097	0.068	0.0060	1.92	81	4.7

Slags, Flux, Refractories (powder)

CRM	Material	Composition. % (by weight)																		
		Fe	Fe_2O_3	SiO_2	CaO	MgO	Al_2O_3	MnO	S	P	TiO_2	K_2O	Na_2O	CaF_2	C	FeO	V_2O_5	Cr_2O_3	Mn	$CaCO_3$	Insoluble residue
SH1/2	Blast furnace slag		0.47	37.9	38.8	9.35	8.48	0.22	0.69												
SH4/4	Steel-smelting slag	23.2		16.7	25.5	18.3	3.62	4.17	0.037	0.259	1.02					25.5					
SH5/4	Converter slag	17.32	1.55	15.87	47.6	2.17	1.25	5.08	0.193												
SH6/2	Flux		1.30	39.2	12.72	1.60	3.00	38.5	0.0092	0.069				7.71							
SH7/3	Flux		0.56	23.4	24.0	11.4	29.8	0.40	0.031	0.011		0.94	1.41	28.5							
SH8/4	Flux	0.147		1.77	52.7		26.5		0.013	0.013				68.6	0.039						
SH9/3	Vanadium slag	28.9		16.63	1.61	3.53	1.76	9.73		0.015	7.39						22.2	3.32			
SH10/3	Limestone			0.050	55.8	0.32	0.012		0.0053	0.0035											(0.07)
SH11/1	Manganese slug									0.014									48.0		
SH12/3	Semiproduct	0.66		0.76	18.8	2.15	73.6											0.46			
SH13	Fluorite concentrate	0.353		13.0					0.103	0.012				84.7						0.51	
SH14	Blast furnace slag	0.89		28.2	32.5	11.9	15.4	0.59	0.45		9.63						0.23				
SH15	Flux		0.72	15.07	18.4	0.91	35.2	15.88	0.011	0.0066	5.65	0.22	1.28	15.5							
SH16	Slug	14.95		43.2	19.9	5.93	9.13	0.93	0.364	0.166	0.37										

Slags, Flux, Refractories (powder)

CRM	Material	Composition. % (by weight)																		
		Fe	Fe_2O_3	SiO_2	CaO	MgO	Al_2O_3	MnO	S	P	TiO_2	K_2O	Na_2O	C	Cr_2O_3	ZrO_2	P_2O_5	$ZrO_2 + HfO_2$	SiC	Al	Insoluble residue
K1/3	Refractory. silica type		1.36	96.1	1.35	0.045	0.55	0.031		0.0122											
K2/4	Fire clay		2.94	58.6	0.40	0.48	35.1	0.060			1.91	0.69	0.19								
K3/2	Refractory. mullite type		1.15	32.3	0.44	0.27	63.6				1.34	0.15	0.17								
K4/4	Dolomite		0.56	0.96	31.2	20.1	0.47	0.034													1.3
K5/2	Refractory. chromi-um-magnesite		8.47	8.64	1.15	54.8	4.28								22.6						
K6/4	Refractory. magnesite		2.26	2.12	2.95	92.4	0.54														
K7/3	Zircon ium refractory		0.72	0.69	5.40													92.2			
K8/2	Zirconium concen-trate		0.081	32.3			1.16		0.0064		0.163			(0.01)		65.9	0.110				
K9/2	Silicon carbide	(0.06)																	99.6	(0.002)	
K10/3	Refractory. corundum		1.82	(0.2)	(0.03)		97.0				0.35	(0.03)	(0.5)	(0.05)							

Dust of ferrous metallurgy smokes (powder)

CRM	Composition. % (by weight)																					
	Fe	FeO	SiO_2	CaO	MgO	Al_2O_3	MnO	S	P	Cr_2O_3	TiO_2	NiO	C	Zn	Pb	K	Na	Cu	F	V	Co	As	Sn	Others
E1	29.7	(21)	10.3	5.85	9.3	3.06	1.56	0.072	(0.02)	20.3	2.79	3.68	0.684	(0.2)	(0.05)	(0.1)	(0.1)	(0.1)	(0.7)	(0.04)	(0.03)	(0.004)	(<0.0005)	
E2	56.4	6.2	1.76	7.97	1.64		1.41	0.116	0.065				1.383	0.59	0.276	(0.2)	(0.1)	(0.04)	(0.5)	(0.01)	(0.003)	(0.002)	(<0.0005)	(4.2) impurities; (0.1) Cr; (0.03) Ni; (0.07) Al

CRM	Composition. % (by weight)																		
	Fe	SiO_2	CaO	MgO	Al_2O_3	MnO	S	P	Cr_2O_3	TiO_2	NiO	C	Zn	Pb	CuO	As	Co	V_2O_5	F
E4	44.6	7.46	8.8	0.82	2.33	0.47	0.44	0.033		0.20		13.2	1.52	0.015	0.034	0.0018		0.041	0.023
E5	44.3	7.17	7.9	2.26	2.87	0.50	0.26	0.041	0.085	1.63	0.022	13.0	0.27		0.013		0.013	0.39	0.049

CERTIFIED REFERENCE MATERIALS FOR SPECTROCHEMICAL ANALYSIS

Steel

002-005 (cylinders Ø 45-46mm, h 25-35mm)

CRM	Material	Composition. % (by weight)													
		C	Si	Mn	Cr	Ni	Mo	Ti	Cu	Al	Co	S	P	As	Sn
002	Carbon steel	0.0024	0.033	0.104	0.0147	0.0061	0.00042	0.0005	0.0074	0.054	0.0011	0.0055	0.0052	0.0010	0.00040
003		0.0064	0.084	0.036	0.034	0.074	0.005	0.0063	0.062	0.201	0.008	0.0052	0.0040	0.0025	0.0020
004		0.0033	0.0116	0.040	0.087	0.119		0.0013	0.078	0.257	0.011	0.0033	0.0033	0.0040	
005		0.007	0.044	0.0281	0.046	0.074	0.005	0.0047	0.067	0.317	0.008	0.0053	0.0028	0.0027	0.0021

UG0/5-UG9/5 (cylinders Ø 45-50mm, h 28-32mm)

CRM	Material	Composition. % (by weight)													
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	Nb	S	P
UG0/5	Carbon and alloy steel	1.32	(0.2)	(0.2)	0.60	0.351	(0.01)	(0.05)	(0.01)	(0.01)	0.265	0.108	(0.01)	(0.007)	(0.01)
UG1/5		0.62	1.23	0.79	0.069	0.048	(0.01)	0.061	0.045	0.070	(0.01)	0.022	0.078	(0.03)	(0.02)
UG3/5		0.93	0.79	0.98	0.77	0.97	0.81	0.048	0.29	0.54	0.10	0.10	0.21	(0.005)	(0.03)
UG4/5		0.56	1.80	1.26	0.17	0.68	0.14	0.087	0.17	0.054	0.098	0.010	0.053	(0.006)	(0.008)
UG5/5		(0.2)	0.145	0.52	1.42	0.42	0.38	0.44	(0.003)	0.29	0.37	0.19	(0.01)	(0.03)	(0.005)
UG6/5		0.232	0.51	0.39	1.85	(0.2)	0.16	(0.2)	(0.01)	0.34	0.257	(0.4)	(0.01)	(0.008)	(0.006)
UG7/5		(0.3)	(0.2)	0.68	0.99	2.27	0.35	0.25	(0.002)	0.23	(0.03)	(0.07)	(0.1)	(0.01)	(0.005)

UG0/9-UG9/9 (cylinders Ø 38-42mm, h 25-35mm)

CRM	Material	Composition. % (by weight)																		
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	Nb	S	P	Sn	Pb	N	As	B
UG0/9	Carbon and alloy steel	1.33	0.170	0.208	0.55	0.36	0.074	0.024	0.029	0.0087	0.307	0.139	0.041	0.0045	0.0040	(0.0008)	(0.002)	0.0022	(0.001)	(0.0002)
UG1/9		0.63	1.63	0.84	0.046	0.105	0.063	0.135	0.069	0.024	0.020	0.027	0.124	0.017	0.030	(0.002)	(0.002)	(0.002)	(0.001)	(0.0003)
UG4/9		0.53	2.23	1.28	0.139	0.71	0.061	0.117	0.126	0.054	0.099	0.023	(< 0.001)	0.016	0.017	0.081	0.008	(0.004)	(0.001)	(0.0003)
UG9/9		1.04	0.319	0.310	0.310	0.242	1.60	0.308	0.130	0.215	0.163	0.073	0.0046	0.021	0.0053	(0.001)	(0.002)	0.0027	(0.003)	(0.0002)

Steel

UG0/10-UG9/10 (cylinders Ø 40-50mm, h 25-32mm)

RM	Material	Composition. % (by weight)															
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	Nb	S	P	Sn	N
UG0/10	Carbon and alloy steel	1.321	0.244	0.268	0.596	0.353	(0.006)	0.052	0.017	0.0037	0.265	0.101	0.0033	0.0044	0.0090	0.0043	0.0120
UG1/10		0.51	1.51	0.659	0.067	0.190	0.074	0.051	0.016	0.042	0.096	0.015	0.091	0.0042	0.0053	0.0030	0.0164
UG3/10		0.38	0.453	0.644	1.83	0.243	0.006	0.042	0.161	0.0053	0.230	0.84		0.0077	0.0104	0.0057	0.012
UG4/10		0.695	1.61	0.834	0.130	0.156	0.006	0.089	0.0044	0.0239	0.050	0.064	0.030	0.0060	0.031		0.0192
UG5/10		0.088	0.135	0.177	1.51	1.87	0.43	0.049	0.027	0.121	0.490	0.47	(0.003)	0.0055	0.0067	0.0036	0.0059
UG7/10		0.33	0.217	0.71	0.99	2.28	0.34	0.248	0.0018	0.234	0.0184	0.072	0.123	0.0075	(0.003)	0.0006	0.0172
UG8/10		0.192	0.61	1.81	0.729	0.348		0.030	0.0034		0.198	0.082	(0.003)	(0.005)	0.0064	0.0052	0.0185
UG9/10		0.294	0.235	0.616	0.170	0.144	1.34	0.282	0.163	1.25	0.169	0.280		(0.003)		0.0017	0.015

UG17/6-UG21/6 (cylinders Ø 45-50mm, h 28-30mm)

CRM	Material	Composition. % (by weight)							
		C	Si	Mn	Cr	Ni	S	P	Cu
UG17/6	Carbon steel	0.097	0.37	0.106	0.127	0.105	(0.004)	(0.003)	(0.02)
UG18/6		0.242	0.20	0.213	0.237	0.273	(0.003)	(0.003)	0.063
UG19/6		0.34	0.136	0.274	0.227	0.262	(0.03)	(0.03)	0.148
UG20/6		0.58	0.229	0.473	0.396	0.360	(0.02)	(0.008)	0.249
UG21/6		0.83	0.312	0.74	0.50	0.47	(0.02)	(0.02)	0.346

UG22-2-UG27-2 (cylinders Ø 48-50mm, h 28-30mm)

CRM	Material	Composition. % (by weight)								
		Zr	C	Si	Mn	Cr	Ni	Cu	S	P
UG22-2	Steel	0.055	(0.2)	0.60	1.82	0.74	0.364	0.192	(0.005)	(0.01)
UG23-2		0.008	(0.2)	0.50	1.57	0.88	0.179	0.156	(0.005)	(0.01)
UG24-2		0.020	(0.2)	0.284	1.51	1.68	0.234	0.39	(0.005)	(0.01)
UG25-2		0.022	(0.2)	0.68	1.34	1.32	0.105	0.281	(0.005)	(0.01)
UG26-2		0.23	(0.2)	0.48	1.66	0.99	0.177	0.158	(0.005)	(0.01)
UG27-2		0.102	(0.2)	0.84	1.70	0.87	0.270	0.085	(0.005)	(0.01)

Steel

UG29/2-UG32/2 (cylinders Ø 45-50mm, h 28-30mm)

CRM	Material	Composition. % (by weight)								
		As	C	Si	Mn	Cr	Ni	Cu	S	P
UG29/2	Carbon steel	0.070	(0.3)	(0.2)	(0.5)	(0.2)	(0.2)	(0.2)	(0.02)	(0.02)
UG30/2		0.033	(0.1)	(0.1)	(0.6)	(0.2)	(0.2)	(0.2)	(0.01)	(0.01)
UG31/2		0.021	(0.1)	(0.1)	(0.5)	(0.2)	(0.2)	(0.2)	(0.01)	(0.01)
UG32/2		0.0037	(0.02)	(0.08)	(0.06)	(0.2)	(0.2)	(0.2)	(0.005)	(0.006)

UG33/2-UG37/2 (cylinders Ø 40-50mm, h 28-32mm)

CRM	Material	Composition. % (by weight)							
		C	Si	Mn	Cr	Ni	Mo	V	Cu
UG35/2	Alloy steel	0.301	0.94	0.109	2.63	0.84	0.65	0.108	0.178
UG36/2		0.324	0.234	0.206	0.94	4.32	0.140	0.215	0.067

UG45/1-UG48/1 (cylinders Ø 43-47mm, h 28-32mm)

CRM	Material	Composition. % (by weight)						
		B	Si	Mn	Cr	Ni	Ti	Cu
UG45/1	Alloy steel	0.0022	0.155	0.95	0.70	0.22	0.068	0.105

UG51/1-UG53/1 (cylinders Ø 45-50mm, h 28-32mm)

CRM	Material	Composition. % (by weight)									
		C	Si	Mn	Cr	Ni	Mo	Cu	Al	S	P
UG51/1	Alloy steel	(0.4)	0.209	0.141	1.41	0.423	0.289	0.182	1.03	(0.008)	(0.006)
UG52/1		(0.4)	0.73	0.437	1.54	0.243	0.134	0.233	0.464	(0.007)	(0.01)
UG53/1		(0.4)	0.449	0.645	1.81	0.240	0.042	0.233	0.84	(0.01)	(0.01)

UG60 (pressed powder cylinders Ø 38-42mm, h 23-27mm)

CRM	Material	Composition. % (by weight)													
		Ce	C	Si	Mn	Cr	Ni	Mo	Ti	Cu	Al	S	P	V	Nb
UG60	Steel	0.097	(0.005-0.01)	(0.1-0.15)	(0.3)	(0.04)	(0.07)	(0.05-0.1)	(0.002)	(0.07)	(0.02)	(0.02)	(0.01)	(0.001)	(0.02)

Steel

UG63 (cylinder Ø 45-50mm, h 28-32mm)

RM	Material	Composition. % (by weight)								
		C	Si	Mn	Cr	Ni	Cu	S	P	As
UG63	Carbon steel	(0.2)	0.02	0.13	0.12	0.2	0.1	(0.006)	(0.006)	(0.002)

UG68 (cylinders Ø 45-50mm, h 28-32mm)

CRM	Material	Composition. % (by weight)														
		N	C	Si	Mn	Cr	Ni	Mo	Ti	Cu	Al	W	V	Nb	S	P
UG68		0.021	(0.6)	(1.2)	(0.8)	(0.07)	(0.05)	(0.06)	(0.045)	(0.01)	(0.02)	(0.01)	(0.07)	(0.08)	(0.03)	(0.02)

UG69/1-UG74/1 (cylinders Ø 45-50mm, h 28-32mm)

Индекс СО	Material	Массовая доля элементов. %							
		C	Si	Mn	Cr	Ni	Cu	S	P
UG69/1	Carbon Steel	(0.62)	(0.32)	(0.56)	(0.36)	(0.33)	(0.24)	0.0030	0.0047
UG70/1		(0.10)	(0.2)	(0.9)	(0.1)	(0.054)	(0.05)	0.096	0.089
UG71/1		(0.60)	(1.25)	(1.2)	(0.25)	(0.5)	(0.025)	0.022	0.025
UG73/1		(0.23)	(0.24)	(0.13)	(0.2)	(0.25)	(0.25)	0.016	0.064
UG74/1		(0.2)	(0.3)	(0.1)	(0.2)	(0.2)	(0.2)	0.126	(0.01)

UG75-UG79 (cylinder Ø 40-50mm, h 26-32mm)

CRM	Material	Composition. % (by weight)													
		C	Si	Mn	Cr	Ni	Mo	W	Ti	Al	Nb	V	Cu	S	P
UG75	Alloy steel	0.98	0.248	0.286	1.43	0.201	(0.01)	(0.02)	(0.001)	(0.03)	(0.01)	(0.006)	0.111	0.0089	0.0127
UG76		0.93	0.79	0.99	0.76	0.97	(0.05)	(0.8)	(0.3)	(0.1)	(0.2)	(0.5)	0.103	0.0040	0.030
UG79		0.387	0.451	0.65	1.82	0.24	(0.04)	(0.01)	(0.2)	(0.8)	(0.01)	(0.02)	0.230	0.0077	0.0102

Steel

UG81-UG86 (cylinder Ø 40-50mm, h 28-32mm)

CRM		Composition. % (by weight)									
		C	Si	Mn	Cr	Ni	Mo	V	Cu	S	P
UG82	Alloy steel	0.046	0.334	1.83	0.59	0.201	0.93	0.56	0.056	(0.004)	(0.003)
UG83		(0.4)	0.85	0.78	1.24	0.60	0.081	(0.004)	0.143	(0.004)	(0.005)
UG84		(0.2)	0.272	0.436	1.02	3.92	0.152	0.161	0.139	(0.005)	(0.004)
UG86		0.129	(0.3)	0.217	1.52	1.94	0.311	0.327	0.62	(0.007)	(0.005)

UG87-UG92 (cylinder Ø 45-50mm, h 28-32mm)

CRM	Material	Composition. % (by weight)																
		C	Si	Mn	Cr	Ni	Mo	Ti	V	Cu	Al $_{total}$	Al $_{solub.}$	Nb	S	P	As	Pb	Sb	N
UG87	Alloy steel	0.59	1.25	1.18	0.260	0.50	0.044	0.103	0.0038	0.030	0.024	0.020		0.022	0.026	0.116	0.00008	0.0012	0.010
UG88		0.62	1.22	1.26	0.474	0.52	0.104	0.107	0.117	0.171	0.010	0.009	0.059	0.0043	0.0026	0.0007	0.00015	0.0003	0.020
UG89		0.92	0.385	0.76	0.420	0.51	0.044	0.012	0.021	0.373	0.010	0.007	0.0043	0.010	0.0085	0.0043	0.00030	0.0011	0.017
UG90		0.34	0.221	0.286	0.261	0.265	0.046	0.039		0.200	0.037	0.032		0.012	0.0079	0.0044		0.0011	0.015
UG91		0.49	2.23		0.064	0.039	0.058	0.038	0.049	0.057	0.048	0.048	0.097	0.0021	0.0038	0.0004	0.00006	0.00009	0.010
UG92		0.69	1.98	0.79	0.200	0.155	0.119	0.022	0.024	0.111	0.091	0.080	0.034	0.0029	0.050	0.0027	0.00017	0.0005	0.016

UG93-UG97 (cylinder Ø 45-50mm, h 28-32mm)

CRM	Material	Composition. % (by weight)											
		C	Si	Mn	Cr	Ni	Mo	Ti	V	Cu	Al	S	P
UG93	Alloy steel	0.100	0.48	0.140	0.137	0.126	0.0008	0.075	0.0008	0.028	0.15	0.0024	0.0033
UG94		0.26	0.101	0.186	0.206	0.178	0.0005	0.053	(0.001)	0.088	0.017	0.0026	0.0037
UG95		(0.35)	0.172	0.31	0.297	0.233	0.0044	0.0025	0.0023	0.168	0.033	0.0032	0.0041
UG96		0.60	0.290	0.52	0.399	0.396	0.0042	0.0025	0.0030	0.256	0.031	0.0029	0.0046
UG97		0.041	0.194	0.59	0.0080	0.0048	0.019	0.154	(0.001)	0.0040	0.51	0.0025	0.0036

Steel

UG98-UG101 (cylinder Ø 40-50mm, h 25-30mm)

CRM	Material	Composition. % (by weight)																		
		Ca	C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	Nb	S	P	As	Pb	Sb	Sn	N
UG98	Carbon steel	0.0047	(0.14)	(0.24)	(0.51)	(1.05)	(4.03)	(<0.01)	(0.10)	(0.002)	(0.01)	(0.13)	(0.02)	(0.004)	(0.02)	(0.02)	(0.007)			(0.009)	(0.014)
UG99		0.0016	(0.42)	(0.95)	(0.35)	(4.9)	(0.08)		(1.3)	(0.005)	(0.96)	(0.09)	(0.01)	(0.005)	(0.004)	(0.01)				(0.007)	
UG101		0.0005	(0.5)	(2.2)	(0.8)	(0.06)	(0.04)	(0.05)	(0.06)	(0.04)	(0.05)	(0.06)	(0.05)	(0.1)	(0.002)	(0.0040)	(0.0004)	(<0.001)	(<0.001)		(0.01)

UG108-UG114 (cylinder Ø 45-50mm, h 25-35mm)

CRM	Material	Composition. % (by weight)													
		C	Si	Mn	Cr	Ni	Mo	Ti	W	V	Cu	Al	Zr	S	P
UG108	Carbon and alloy steel	0.074		0.104		0.0092		0.071	0.074		0.0087			0.0082	0.050
UG109		0.161	0.151	0.353	0.048	0.0053		0.071			0.082	0.093		0.0037	0.020
UG110		0.91	0.342	0.86	0.47	0.491	0.0052	0.0015	0.004		0.377	0.006		0.0050	0.0063
UG111		0.52	1.64	0.625	0.058	0.036	0.039	0.025	0.056	0.058	0.065	0.049		0.0035	0.0028
UG112		0.186	0.60	1.63	0.98	0.185	0.021	0.0028	0.005	0.014	0.157	0.026	0.0047	0.0050	0.0065
UG113		0.189	0.59	1.55	1.12	0.186	0.010	0.006	0.007	0.0040	0.185	0.263	0.169	0.0070	0.0087
UG114		0.190	0.59	1.65	1.03	0.345	0.016	0.006		0.0031	0.173	0.146	0.065	0.0074	0.010

UG115-UG119 (cylinder Ø 45-50mm, h 25-35mm)

CRM	Material	Composition. % (by weight)											
		C	Si	Mn	Cr	Ni	Mo	Ti	Cu	Al	S	P	N
UG115	Alloy steel	0.115	0.227	0.43	0.81	1.63	0.0126	0.0014	0.173	0.024	0.012	0.0084	0.013
UG116		0.41	0.246	0.59	0.89	1.13	0.044	0.0022	0.221	0.026	0.027	0.012	0.0089
UG117		0.064	0.60	1.41	0.129	0.072	(0.005)	0.018	0.214	0.018	0.021	0.012	0.0085
UG118		(0.4)	1.26	0.86	1.19	0.088	0.0100	0.0080	0.213	0.024	0.0072	0.011	0.0086
UG119		0.55	1.63	0.70	0.195	0.142	0.0113	0.0030	0.207	0.039	(0.02)	0.012	0.0047

Steel

UG120-UG124 (cylinder Ø 38-48mm, h 20-30mm)

CRM	Material	Composition. % (by weight)										
		C	Si	Mn	Cr	Ni	V	Cu	Al	S	P	N
UG120	Carbon and alloy steel	0.096	0.96	0.685	0.75	0.634	0.0078	0.447	0.011	(0.02)	0.027	(0.008)
UG121		(0.3)	0.244	0.55	0.126	0.078	0.0018	0.180	0.023	0.027	0.014	0.0068
UG122		(0.1)	0.396	0.433	0.72	0.378	0.0040	0.288		(0.02)	(0.02)	0.0038
UG123		0.45	0.216	0.552	0.111	0.084	0.0019	0.196	0.024	0.026	0.016	0.0078
UG124		0.165	0.384	1.41	0.035	0.015	0.0043	0.020	0.039	0.032	0.019	0.0072

UG125 (cylinder Ø 38-48mm, h 20-30mm)

CRM	Material	Composition. % (by weight)										
		C	Si	Mn	Cr	Ni	V	Cu	Al	S	P	N
UG125	Carbon and alloy steel	0.086	0.554	1.147	0.102	0.230	0.035	0.147		0.0021	0.0044	0.0112

LG12/4-LG20/4 (cylinders Ø 45-50mm, h 28-30mm)

CRM	Material	Composition. % (by weight)												
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	S	P
LG12/4	Alloy steel	0.090	2.02	0.230	(13.88)	0.273	0.083	0.035	0.092	0.030	0.106	0.073	0.016	(0.014)
LG13/4		0.153	0.90	0.66	(14.44)	0.264	0.051	0.057	0.088	0.060	0.171	0.085	0.021	(0.014)
LG14/4		0.177	0.360	0.358	(14.64)	0.314	0.098	0.098	0.31	0.059	0.296	0.37	0.013	(0.014)
LG15/4		0.154	(0.3)	0.207	(13.97)	1.50	0.065	0.065	0.083	0.077	0.53	0.83	(0.015)	(0.021)
LG16/4		0.118	0.088	0.086	(14.30)	0.87	0.113	0.064		0.189	0.99		0.084	(0.021)
LG17/4		0.128	0.205	1.12	(14.68)	0.406	0.179	0.97	0.072	0.128	0.303	0.171	0.062	(0.024)
LG18/4		0.146	0.338	0.331	(13.97)	0.215	0.37	0.437	0.72	0.234	0.102	0.097	0.025	(0.029)
LG19/4		0.156	0.376	0.277	(13.70)	0.236	1.02	0.280	0.56	0.65	0.184	0.061	0.020	(0.015)
LG20/4		0.131	0.163	0.145	(13.40)	0.060	2.18	0.086	(0.006)	0.041	0.063	(0.01)	0.032	(0.021)

Steel

LG21/3-LG26/3 (cylinders Ø 45-50mm, h 28-32mm)

CRM	Material	Composition. % (by weight)													
		C	Si	Mn	Cr	Ni	Mo	Co	Cu	Al	V	W	S	P	Sn
LG21/3	Alloy steel	(0.74)	0.68	1.02	4.29	(0.22)	(0.07)	0.106	0.084	0.041	(0.38)	(9.4)	(0.007)	(0.015)	(0.01)
LG22/3		(0.74)	0.38	0.30	3.87	0.165	0.149	0.98	(0.14)	0.24	(0.40)	(9.4)	(0.009)	(0.012)	(0.01)
LG23/3		(0.75)	1.24	0.78	(3.2)	0.372	(0.1)	0.50	0.317	0.15	0.51	(9.4)	(0.013)	(0.016)	(0.01)
LG24/3		(0.74)	0.18	0.167	3.12	0.69	0.62	0.181	0.505	(0.08)	1.02	(9.4)	(0.007)	(0.015)	(0.005)
LG25/3		(0.75)	(0.49)	(0.35)	(3.3)	(0.42)	1.57	(0.12)	(0.17)	(0.09)	1.57	(9.3)	(0.013)	(0.015)	(0.01)
LG26/3		(0.76)	(0.46)	(0.37)	(3.3)	(0.42)	0.310	(0.48)	(0.28)	(0.09)	2.56	(9.2)	(0.009)	(0.014)	(0.01)

LG27/2-LG31/2 (cylinders Ø 38-42mm, h 28-30mm)

CRM	Material	Composition. % (by weight)
		B
LG27/2	Alloy steel	0.0036
LG28/2		0.0047
LG29/2		0.0062
LG30/2		0.018
LG31/2		0.025

LG32/5-LG36/5 (cylinders Ø 38-42mm, h 25-35mm)

CRM	Material	Composition. % (by weight)												
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	S	P
LG32/5	Alloy steel	0.138	0.185	0.54	19.75	7.10	0.205	0.110	0.92	0.317	0.019	0.156	0.039	0.0057
LG33/5		0.018	0.44	1.32	16.26	10.40	0.158	0.045	0.21	0.101	0.167	0.024	0.016	0.025
LG34/5		0.222	0.80	0.362	17.32	9.54	0.33	0.266	0.138	0.195	0.269	0.029	0.019	0.010
LG35/5		0.078	1.01	0.81	18.44	8.23	0.107	0.39	0.73	0.041	0.366	0.087	0.0094	0.042
LG36/5		0.060	0.70	1.97	14.95	12.6	0.056	0.197	0.39	0.156	0.085	0.080	0.027	0.017

Steel

LG37/1-LG43/1 (cylinders Ø 45-50mm, h28-32mm)

CRM	Material	Composition. % (by weight)									
		C	Si	Mn	Cr	Ni	Mo	V	S	P	Cu
LG37/1	Alloy steel	0.121	0.360	0.444	10.10	0.704	0.66	0.385	(0.01)*	(0.02)	(0.13)
LG38/1		0.255	0.81	0.73	11.75	0.551	0.344	0.190	(0.01)	(0.02)	(0.16)
LG39/1		0.406	0.94	0.64	13.11	0.42	0.136	0.135	(0.007)	(0.02)	(0.12)
LG40/1		0.66	0.289	0.318	13.67	0.271	0.039	0.038	(0.006)	(0.02)	(0.15)
LG41/1		0.200	0.64	0.91	15.90	1.53	0.277	0.303	(0.008)	(0.02)	(0.12)
LG42/1		0.124	0.46	0.41	5.08	0.37	0.52	0.020	(0.008)	(0.02)	(0.16)
LG43/1		0.132	0.57	0.44	7.46	0.44	0.023	0.49	(0.01)	(0.01)	(0.11)

LG44-LG48 (cylinders Ø 45-50mm, h 28-30mm)

CRM	Material	Composition. % (by weight)												
		C	Si	Mn	Cr	Ni	W	Mo	V	Cu	Al	Co	S	P
LG44	Alloy steel	(0.9)	0.549	0.294	4.47	0.79	8.6	1.13	2.79	0.133	0.076	5.80	(0.01)	(0.02)
LG45		(0.9)	0.414	0.380	3.71	0.205	(9.0)	0.262	1.92	0.239	0.056	5.44	(0.03)	(0.02)
LG46		(0.9)	0.238	0.502	3.26	0.46	10.1	0.612	2.12	0.106	0.175	5.08	(0.01)	(0.02)
LG47		(0.9)	0.199	0.31	4.00	0.147	9.7	0.110	2.58	0.36	0.039	6.29	(0.015)	(0.025)
LG48		(0.9)	0.42	0.52	3.95	0.174	5.91	4.91	2.12	0.165	0.24	0.30	(0.02)	(0.02)

LG56-LG64 (cylinders Ø 38-42mm, h 25-35mm)

CRM	Material	Composition. % (by weight)													
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	S	P	Nb
LG57	Alloy steel	0.016	0.56	0.52	13.70	25.2	4.24	0.401	1.81	0.65	0.080	0.151	0.0023	0.011	
LG58		0.48	0.292	0.99	23.4	4.26	0.21	2.41	0.039	0.264	0.388		0.0280	0.0135	0.214
LG59		0.073	0.63	1.15	15.81	35.1	3.08	0.094	1.12	0.273	0.083	0.079	0.0083	0.011	0.106
LG60		0.020	0.289	2.31	21.8	19.86	0.115	3.62	0.265	0.229	0.027	0.040	0.0205	0.028	0.83
LG61		0.307	0.83	1.51	18.8	9.18	1.11	1.05	0.40	0.197	0.065	0.033	0.0107	0.0133	0.47
LG63		0.068	0.285	0.356	10.13	22.15	0.43	1.65	2.98	0.086	0.024	0.45	0.0050	0.010	0.113
LG64		0.049	0.76	0.75	24.7	28.3	0.013	2.89	0.64	0.094	2.88	0.189	0.0032	0.017	0.048

Steel

LG65-LG68 (cylinder Ø 38-40mm, h 15-23mm)

CRM	Material	Composition. % (by weight)											
		C	Si	Mn	Cr	Ni	Mo	V	Cu	Al	S	P	Nb
LG65	Alloy steel	1.19	0.49	12.2	0.19	0.11			0.119	0.006	0.0033	0.080	
LG66		0.44	0.41	16.1	0.30	0.059			0.104	2.6	0.010	0.031	
LG67		0.39	0.31	20.9	0.19	0.11		1.09	0.090	2.88	0.007	0.020	
LG68		0.89		28.8	0.13	0.20	0.46		0.11	8.6	0.003	(0.02)	0.46

LG70-LG75 (cylinder Ø 40-50mm, h 25-32mm)

CRM	Material	Composition. % (by weight)													
		C	Si	Mn	Cr	Ni	W	Mo	Ti	Cu	Al	Co	S	P	N
LG70	Alloy steel	0.042	0.382	0.834	17.10	9.17	0.0053	0.096	0.305	0.062	0.029	0.209	0.0020	0.042	0.0134
LG71		0.064	0.602	1.33	17.63	10.40	0.048	0.161	0.473	0.204	0.072	0.188	0.0072	0.032	-
LG72		0.072	0.334	1.32	16.36	12.4	0.077	2.07	0.57	0.306	0.089	0.090	0.0050	-	0.0073
LG73		0.098	0.570	1.26	22.60	17.74	0.102	0.061	0.0022	0.140		0.247	0.0073	0.019	0.0319
LG74		0.373	2.49	0.962	18.30	23.66	0.052	0.104	0.030	0.093	0.035	0.031	0.0049	0.024	0.030
LG75		0.027	0.298	0.728	14.80	24.5	4.14	0.052	1.76	0.029	0.113	0.190	0.0026	0.0046	0.0044

LG76-LG82 (cylinder Ø 40-50mm, h 25-32mm)

RM	Material	Composition. % (by weight)														
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	Nb	S	P	N
LG76	Alloy steel	0.445	0.455	0.342	13.77	13.39	2.38	0.263	0.020	0.041	0.098	0.034	-	0.0076	0.021	0.031
LG77		0.101	0.44	0.34	15.67	4.32	0.006	0.020	-	0.022	0.116	-	0.109	0.0021	0.0149	0.054
LG78		0.074	0.58	1.60	14.71	35.4	3.16	0.061	1.31	0.020	0.053	0.15	0.004	0.0017	0.017	0.0062
LG79		0.313	0.703	1.28	19.23	8.72	1.16	1.18	-	0.049	0.065	0.059	0.47	0.0036	0.017	-
LG80		0.097	2.15	0.709	24.7	19.38	0.029	0.086	0.015	0.032	0.166	0.025	-	0.0029	0.025	0.064
LG81		0.104	0.231	0.29	11.51	22.5	0.012	1.22	2.93	0.040	0.088	0.409	0.004	0.0014	0.0121	-
LG82		0.056	0.69	0.308	23.2	27.3	0.116	2.95	0.85	0.050	2.89	0.076	0.037	0.0027	0.023	0.0076

Steel

RG10-RG18 (cylinders Ø 40-50mm, h 28-32mm)

RM	Material	Composition. % (by weight)													
		C	Si	Mn	Cr	Ni	W	Mo	V	Co	Nb	Cu	Al	S	P
RG10	Alloy steel	(0.85)	0.43	0.44	3.85	0.364	6.4	5.31	2.20	4.88	0.265	0.125	(0.016)	(0.013)	(0.016)
RG11		(1.04)	0.43	0.36	2.75	0.57	(9.1)	3.84	2.57	9.68	0.007	0.099	(0.015)	(0.015)	(0.018)
RG12		(1.25)	0.29	0.356	4.88	0.123	13.9	0.361	4.10	0.62	(0.004)	0.080	(0.026)	(0.016)	0.018
RG13		(1.54)	0.36	0.50	4.07	0.188	10.4	0.254	4.35	0.27	(0.003)	0.126	(0.063)	0.011	0.020
RG14		(0.62)	0.133	0.544	5.27	0.41	4.53	2.22	3.29	0.025	(0.003)	0.075	(0.008)	0.035	0.014
RG15		(0.85)	0.28	0.228	2.51	0.159	6.22	5.74	1.46	0.47	(0.003)	0.050	(0.021)	(0.013)	0.012
RG16		(0.71)	0.35	0.271	3.97	0.196	8.9	0.43	0.44	1.00	(0.002)	0.119	(0.21)	0.003	(0.015)
RG17		(1.42)	0.34	0.66	5.27	0.69	7.6	0.43	6.17	0.127	0.30	0.164	(0.14)	0.007	(0.022)
RG18		(0.72)	0.16	0.156	4.30	0.062	19.0	1.15	0.52	0.148	(0.004)	0.038	(0.061)	0.018	0.018

RG19/1-LG23/1 (cylinders Ø 40-50mm, h 28-32mm)

CRM	Material	Composition. % (by weight)												
		C	Si	Mn	Cr	Ni	Mo	V	Ti	W	Cu	Nb	S	P
RG19/1	Alloy steel	0.064	0.90	5.63	24.5	17.73	0.166	0.407	0.14	0.206	(0.2)	0.108	(0.009)	(0.02)
RG20/1		0.064	0.81	15.77	14.35	0.673	0.089	0.166	0.093	0.007	0.265	0.175	(0.01)	(0.02)
RG21/1		0.169	1.95	6.39	15.53	7.52	0.88	1.71	0.18	(0.2)	0.170	0.48	(0.008)	(0.02)
RG22/1		0.054	0.63	13.41	13.25	3.94	0.121	0.125	0.33	0.137	0.358	0.38	(0.008)	(0.02)
RG23/1		0.045	0.49	8.74	18.5	1.98	0.401	0.69	0.21	0.30	0.099	0.24	(0.004)	(0.02)

РГ25-РГ31 (cylinders Ø40-50мм, h 25-35мм)

CRM	Material	Composition. % (by weight)														
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	S	P	Co	Nb
RG25	Material	0,167	0,084	0,131	0,057	0,046	-	0,0028	0,039	-	-	0,015	-	0,014	-	-
RG26		0,028	0,173	0,75	0,025	-	0,0058	0,015	0,121	-	0,011	0,30	-	0,0037	-	-
RG27		0,30	0,42	0,97	1,53	0,135	0,170	0,222	-	0,064	0,188	0,88	0,0032	0,054	0,071	-
RG28		0,70	1,161	0,84	0,135	0,154	0,006	0,090	0,0041	0,022	0,050	0,066	-	0,031	-	0,029
RG29		-	0,128	0,346	0,92	4,80	063	1,11	0,027	0,39	1,19	0,005	-	-	0,126	0,059
RG30		0,38	0,45	0,357	3,06	0,62	0,91	0,62	-	0,63	0,161	-	0,013	-	0,50	0,139
RG31		0,0035	0,009	0,0010	0,0016	0,0046	-	0,0003	-	-	0,010	-	-	0,0015	0,0007	-

Steel

RG24/1-RG31/1 (cylinders Ø 40-50mm, h 25-35mm)

CRM	Material	Composition. % (by weight)														
		C	Si	Mn	Cr	Ni	W	Mo	Ti	V	Cu	Al	S	P	Co	Nb
RG24/1	Alloy and carbon steel	0.0022	0.017	0.015	0.037	0.037	-	0.0013	0.0010	-	0.011	-	0.0069	0.0027	0.012	-
RG25/1		0.196	0.100	0.29	0.060	0.037	-	0.010	0.055	0.0110	0.065	0.067	0.0088	0.019	0.012	0.016
RG26/1		0.034	0.046	0.058	0.024	0.074	-	0.045	0.100	0.0113	0.007	0.73	0.0076	0.006	0.021	0.0056
RG27/1		0.290	0.28	0.74	1.83	0.142	0.170	0.191	0.110	0.072	0.208	1.07	0.0043	0.044	0.025	-
RG28/1		0.68	2.36	0.91	0.194	0.168	0.0041	0.104	0.022	0.035	0.040	0.068	0.0071	0.031	0.072	0.041
RG29/1		0.202	0.22	0.29	0.89	4.71	0.62	1.01	0.020	0.40	1.25	0.0050	0.0090	-	0.115	0.044
RG30/1		0.388	0.61	0.425	3.13	0.74	0.89	0.58	0.037	0.70	0.090	0.089	0.022	-	0.355	0.103
RG31/1		0.200	0.28	0.191	1.28	2.12	0.39	0.30	0.21	0.200	0.39	0.30	0.0058	0.0039	0.273	-

Nickel alloys

NG1/3-NG7/3 (cylinders Ø 40-50mm, h 25-35mm)

CRM	Material	Composition. % (by weight)												
		Si	Mn	Cr	V	Mo	Nb	Ti	Cu	Al	Fe	C	S	P
NG1/3	Nickel alloy	0.25	1.23	17.3	0.46	0.16	0.41	0.31	0.068	1.73	1.32	0.051	0.0014	(0.002-0.007)
NG2/3		(0.3)	2.22	17.0	0.11	0.120	(0.1)	1.84	0.148	0.106	0.42	0.040	0.0021	(0.002-0.007)
NG3/3		1.00	0.28	17.8	0.059	0.100	(0.1)	1.18	0.094	0.116	1.86	0.009	0.0020	(0.002-0.007)
NG4/3		0.38	0.40	18.5	0.019	0.120	0.62	0.86	0.043	0.38	0.93	0.011	0.0017	(0.002-0.007)
NG5/3		0.65	0.23	17.3	0.30	0.36	(0.1)	0.46	0.243	0.93	2.10	0.013	0.0016	(0.002-0.007)
NG6/3		0.25	0.23	15.4	0.97	2.22	1.53	0.47	0.092	0.30	2.77	0.026	(0.002)	(0.002-0.007)
NG7/3		0.37	0.42	15.3	1.66	0.42	1.08	0.214	0.151	0.14	3.40	0.027	0.0022	(0.002-0.007)

NG15/2-NG17/2 (cylinders Ø 38-40mm, h18-20mm)

CRM	Material	Composition. % (by weight)								
		C	Si	Mn	Cr	Ni	Co	Cu	S	P
NG15/2	Nickel steel	0.0024	0.177	0.40	0.016	27.7	18.6	0.282	0.012	0.017
NG16/2		0.018	0.27	0.15	0.14	33.2	16.5	0.044	0.0037	0.0023
NG17/2		0.0031	0.018	0.276	0.23	29.6	14.0	0.47	0.012	0.020

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Irons

ChG1/9-ChG6/9 (truncated cone h 35-40mm, Ø of top base – 34-38mm, of bottom base – 36-40mm)

CRM	Material	Composition. % (by weight)									
		C	Si	Mn	Cr	V	Ti	Cu	S	P	As
ChG1/9	Pig iron	3.61	1.13	1.12	0.017	0.006	0.014	0.041	0.038	0.184	(0.002-0.004)
ChG2/9		3.93	0.387	0.456	0.060	0.049	0.080	0.082	0.078	0.513	(0.002-0.004)
ChG3/9		3.54	0.516	0.387	0.100	0.096	0.125	0.123	0.053	0.037	(0.002-0.004)
ChG4/9		3.24	0.455	1.42	0.155	0.169	0.10	0.199	0.024	0.030	(0.002-0.004)
ChG5/9		3.51	0.84	0.60	0.307	0.441	(0.1)	0.037	0.036	0.104	(0.002-0.004)
ChG6/9		2.65	0.53	0.83	0.241	0.130	0.028	0.34	0.027	0.54	(0.002-0.004)

ChG8/5-ChG11/5 (truncated cone h 38-42mm, Ø of top base – 36-40mm, of bottom base – 38-42mm)

CRM	Material	Composition. % (by weight)							
		C	Si	Mn	Cr	V	S	P	As
ChG8/5	Cast iron and pig iron		3,60	1,43			0,009	0,046	
ChG9/5			0,66	0,082			0,063	0,46	
ChG11/5			1,49	0,30			0,047	0,216	

ChG8/6-ChG11/6 (truncated cone h 38-42mm, Ø of top base – 36-40mm, of bottom base – 38-42mm)

CRM	Material	Composition. % (by weight)							
		C	Si	Mn	Cr	V	S	P	As
ChG8/6	Cast iron and pig iron	(2.7)	3.93	1.51	(0.2)	(0.3)	0.013	0.040	(0.003-0.006)
ChG9/6			0.80	0.155			0.071	0.38	
ChG10/6			2.86	0.86			0.0072	0.103	
ChG11/6			1.79	0.312			0.039	0.23	

ChG24-ChG28 (truncated tetrahedral pyramid h 20-26mm, side of working surface – 35-40 mm)

RM	Material	Composition. % (by weight)														
		C	Si	Mn	S	P	Cr	Ni	V	Mo	Ti	Cu	Al	Mg	Sb	Sn
ChG24	Alloy cast iron	3.05	2.50	0.245	0.0048	0.260	0.031	0.87	0.0067	0.031	0.060	0.100	0.007	0.015	0.009	0.077
ChG25		3.74	1.46	0.68	0.0035	0.0090	0.25	0.38	0.086	0.253	0.017	0.79	0.009	0.037	0.052	0.017
ChG26		(2.9)	2.98	0.126	0.0041	0.123	0.050	1.52	0.040	0.075	0.0026	0.014	0.038	0.044	(0.004)	0.031
ChG27		3.53	1.82	1.21	0.029	0.044	0.162	0.022	0.160	0.147	0.056	0.348	0.008	(<0.0005)	0.029	0.115
ChG28		3.29	2.22	0.414	0.015	0.025	0.127	0.166	0.0020	0.0024	0.0041	1.29	0.015	0.010	0.015	0.0017

Irons

ChG30-ChG34 (truncated tetrahedral pyramid h 20-26mm, side of working surface – 35-40 mm)

RM	Material	Composition. % (by weight)											
		C	Si	Mn	S	P	Cr	Ni	V	Mo	Ti	Cu	Sn
ChG30	Alloy cast iron	3.06	1.97	2.10	0.035	0.090	0.24	0.082	0.0074	0.0061	0.012	0.576	0.015
ChG31		3.19	1.60	0.97	0.043	0.047	0.156	0.068	0.0035	0.0069	0.0063	0.281	0.013
ChG32		3.74	0.60	1.90	0.018	0.061	0.031	0.361	0.294	0.113	0.040	0.171	0.060
ChG34		2.87	1.20	0.54	0.086	0.230	1.22	0.223	0.115	0.201	0.030	0.140	0.29

ChG35-ChG40 (truncated cone h 35-40mm, Ø of top base – 32-36mm, of bottom base – 35-40mm)

CRM	Material	Composition. % (by weight)										
		C	Si	Mn	S	P	Cr	Ni	V	Mo	Ti	Cu
ChG35	Alloy cast iron	3.34	0.617	1.23	0.021	0.102	0.233	2.15	0.043	0.027	0.022	0.090
ChG36		2.94	1.50	0.454	0.036	0.232	0.476	0.542	0.086	0.406	0.027	0.70
ChG37		2.49	2.03	0.92	0.046	0.038	0.82	0.90	0.227	0.55	0.092	0.512
ChG38		2.43	2.30	0.302	0.084	0.386	1.98	0.162	0.119	0.046	0.105	1.20
ChG39		3.01	1.45	0.82	0.088	0.304	1.08	1.09	0.274	0.113	0.168	0.414
ChG40		2.59	1.60	1.56	0.019	0.059	1.47	1.61	0.325	0.229	0.18	0.98

ChG45 (h 15-20mm, side of bottom base – 32-36mm)

CRM	Material	Composition. % (by weight)										
		C	Mn	Si	P	S	Cu	Ni	Cr	Mo	V	Ti
ChG45		(2.7)	1.01	2.96	0.096	0.047	0.040	0.60	32.65	0.198	0.111	0.011

Irons

ChL1/1-ChL4/1 (truncated cone h 38-42mm, Ø of top base – 36-40mm, of bottom base – 38-42mm)

RM	Material	Composition. % (by weight)											
		C	Si	Mn	S	P	Cr	Ni	V	Mo	Ti	Cu	Co
ChL1/1	Alloy cast iron	3.39	1.32	0.53	0.029	0.048	0.264	0.410	0.073	0.036	0.061	0.344	0.017
ChL2/1		2.38	0.55	1.03	0.023	0.054	0.077	0.114	0.050	0.012	0.009	0.97	0.013
ChL3/1		3.04	2.39	0.250	0.024	0.067	0.533	1.08	0.103	0.262	0.043	0.60	0.016
ChL4/1		2.69	1.99	1.37	0.027	0.054	0.92	0.725	0.258	0.116	0.11	0.161	0.017

ChM5-ChM8 (truncated cone h 38-42mm, Ø of top base – 36-40mm, of bottom base – 38-42mm)

CRM	Material	Composition, % (by weight)						
		Si	Mn	Mg	Al	S	C	P
ChM5	Cast Iron magnesium	1.60	1.27	0.031	0.0051	0.023	(2.7)	(0.05)
ChM6		1.20	0.39	0.051	0.011	0.020	(2.7)	(0.05)
ChM7		2.77	0.53	0.073	0.028	0.0048	(2.7)	(0.05)

ChM5/1-ChM8/1 (truncated cone h 38-42mm, Ø of top base – 36-40mm, of bottom base – 38-42mm)

CRM	Material	Composition. % (by weight)						
		C	Si	Mn	S	P	Mg	Al
ChM5/1	Cast Iron with magne-sium	3.04	1.37	0.311	0.016	0.056	0.045	0.013
ChM6/1		3.03	2.75	0.540	0.0074	0.055	0.072	0.022
ChM7/1		-	3.34	0.618	0.0036	0.057	0.102	0.040
ChM8/1		3.02	3.39	0.83	0.0034	0.055	0.105	0.041

ChM9-ChM13 (truncated cone h 38-42mm, Ø of top base – 36-40mm, of bottom base – 38-42mm)

RM	Material	Composition. % (by weight)											
		C	Si	Mn	Cr	Ni	V	Mg	Ti	Cu	Al	S	P
ChM9	Alloy cast iron	2.61	1.59	1.28	0.083	0.38	0.068	0.011	0.027	0.095	0.016	0.021	0.075
ChM10		2.89	1.13	0.43	0.067	0.85	0.079	0.024	0.028	0.082	0.005	0.017	0.067
ChM11		2.26	2.32	0.77	0.122	1.75	0.0044	0.066	0.014	0.067	0.035	0.011	0.032
ChM12		3.17	3.10	1.00	0.039	1.65	0.0027	(0.08)	0.013	0.062	0.050	0.007	0.030
ChM13		2.96	2.98	1.05	0.273	1.85	0.0096	0.09	0.018	0.062	0.065	0.009	0.043