STANDARD REFERENCE SAMPLES OF LOW ALLOY STEELS (CHIPS, 100 g BOTTLES)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% W	% Ti	% Al_{tot}	% $Al_{sol.}$	% As	% Sn	% Sb	% N
1.1/8	0.12	0.53	0.23	0.012	0.026	0.040	0.036	0.080										
~~**1.2/9**~~	~~0.41~~	~~0.66~~	~~0.24~~	~~0.025~~	~~0.029~~	~~0.18~~	~~0.071~~	~~0.11~~										
1.3/8	0.85	0.51	0.22	0.012	0.020	0.028	0.035	0.060										
1.4/4	1.21	0.23	0.23	0.013	0.024	0.090	0.049	0.049										
1.5/5	0.19	0.58	0.18	0.020	0.030	0.040	0.023	0.041										
1.6/4	0.146	1.03	0.30	0.112	0.114	0.060	0.062	0.129					0.041					
1.7/4*	0.017	0.13		0.013	0.032	0.004	0.012	0.016	0.0017				0.0040	0.0022	0.0045	0.0021		0.0044
1.8/4	0.35	0.99	1.31	0.020	0.018	1.18	0.16	0.11										
1.9/3	0.38	0.55	0.28	0.025	0.016	1.30	1.62	0.101	0.16									
1.10/2	0.39	0.48	0.24	0.020	0.013	1.46	0.17	0.076	0.20				0.82					
1.11/3	0.35	0.48	0.18	0.025	0.020	1.00	0.12	0.077	0.19									
1.12/4	0.084	1.47	0.30	0.040	0.013	17.41	10.14		1.96			0.52						
1.13/3	0.33	0.38	0.23	0.023	0.007	2.61	1.52	0.13		0.29	8.31							
1.14/4	0.83	0.33	0.35	0.028		4.09	0.16		0.49	1.23	17.30							
1.18/5	0.20	1.43	0.44	0.023	0.030	0.073	0.077	0.11					0.098	0.091				0.0051
~~**1.19/2**~~	~~0.20~~	~~1.00~~	~~0.30~~	~~0.020~~	~~0.017~~	~~1.10~~	~~0.096~~	~~0.11~~				~~0.084~~						
1.21/1	0.058	0.16	1.29	0.013	0.024	0.037	0.056	0.068					0.005	0.003	0.019	0.0067	0.0025	0.0030
1.22/1	0.090	0.24	2.02	0.019	0.026	0.045	0.039	0.071					0.014	0.011	0.020	0.0076	0.0028	0.0039
1.25/3	1.48	0.26	0.28	0.018	0.025	0.48				0.29	4.97							
1.26/2	0.31	0.48	0.29	0.021	0.009	1.87	4.05	0.14	0.11		1.70							

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% Ti	% Al_{tot}	% N
IMZ 195	0.17	1.18	0.29	0.010	0.0008	0.026	0.18	0.11	0.076	(0.005)	(0.012)	(0.017)	0.0061

STANDARD REFERENCE SAMPLES OF LOW ALLOY STEELS (CHIPS, 100 g BOTTLES)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% Ti	% $Al_{tot.}$	% $Al_{sol.}$	% Nb	Zr	% B	% Ce
1.30																0.0002	
1.31	0.14	0.81	0.31	0.022		0.55		0.33	0.50							0.0013	
1.32	0.12	0.80		0.018	0.016	0.55	0.83	0.37	0.53							0.0021	
1.33	0.14	0.69	0.26			0.52	0.88	0.43	0.51							0.0057	
1.34	0.11	0.84	0.31	0.014		0.73	0.65		0.39							0.0084	
1.71/1	0.19	0.50	0.21	0.017	0.024	0.032	0.077	0.041	0.039	0.0100		0.012	0.009				
1.72/1	0.12	0.56	0.55	0.019	0.030	0.45	0.041	0.88				0.032	0.026				
1.73/1	0.18	1.24	0.34	0.014	0.029	0.15	0.095	0.56	0.056	0.073		0.043	0.036	0.088			
1.74/1	0.11	1.95	0.20	0.030	0.024	0.25	0.055	0.31		0.094		0.014					
1.75/1	0.20	1.68	0.53	0.023	0.028	0.048	0.030	0.040		0.20							
1.76/1	0.13	1.39	0.28	0.022	0.032	0.11	0.33	0.058	0.101			0.042	0.036	0.068			
1.77/1	0.11	0.37	0.18	0.029	0.027	0.32	0.051	0.17		0.046	0.021	0.012					
1.81	0.10	0.28	0.28	0.043	0.012	0.58	0.069	0.32				0.017			0.005		
1.82	0.10	1.11	0.27	0.017	0.020	0.21	0.085	0.069	0.060	0.101		0.060		0.058			0.020
1.84	0.14	0.93	0.23	0.013	0.013	0.018	0.025			0.005		0.016	0.013		0.024		0.029
1.85	0.205	1.69	0.51	0.026	0.026	0.27	0.24	0.29	0.007	0.093		(0.064)	0.064		0.026		

STANDARD REFERENCE SAMPLES OF HIGH ALLOY STEELS (CHIPS, 100 g BOTTLES)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% Ti	% W	% Al	% Nb	% As	%Co
1.38	1.08	1.14	0.94	0.010	0.016	19.12	0.63	0.32		0.033					0.0023	0.021
1.39	0.23	1.75	1.96	0.022	0.009	15.57	35.23									
~~**1.40**~~	~~0.054~~	~~1.60~~	~~0.93~~	~~0.011~~	~~0.017~~	~~17.59~~	~~16.10~~	~~0.098~~	~~3.70~~		~~0.47~~					
1.41	0.046	0.48	0.39	0.030	(0.002)	22.62	0.50	0.100					5.09			
~~**1.42**~~	~~0.114~~	~~0.49~~	~~1.18~~	~~0.013~~	~~0.012~~	~~17.11~~	~~0.53~~	~~0.22~~			~~0.16~~		~~0.88~~			
1.43	0.14	0.66	0.60	(0.010)	0.013	10.83	1.06		0.82	0.69		0.92		(0.43)		
1.44	0.43	0.86	0.87	0.015	0.013	17.07	1.08	0.077	1.29							
1.45	0.34	0.84	2.67	0.028	0.012	27.89	5.23	0.038	0.59							

STANDARD REFERENCE SAMPLES OF SLAGS (100 g BOTTLES)

No.	% MgO	% CaO	% SiO_2	% Al_2O_3	% Mn	% P	% S	% $Fe_{tot.}$	% Zn	% Na_2O	% K_2O	% TiO_2	% FeO	% Ca	% F
2.71	5.03	43.81	41.35	4.76	0.615	(0.011)	0.535	1.57	(0.036)	0.35	0.426	(0.19)			
2.72	5.26	43.85	41.80	4.74	0.608	0.010	0.534	(0.93)	(0.05)	(0.34)	(0.42)	(0.170)			
2.73	1.98	43.45	42.50	7.09	0.882	(0.010)	0.572	1.08	(0.0026)	0.620	0.674	0.258			
2.74	4.67	43.37	38.91	5.25	0.635	(0.011)	0.563	3.35	0.051	0.331	0.456	0.205			
2.75	5.18	44.35	40.99	4.71	0.598	(0.01)	0.368	0.548	(0.003)	(0.82)	1.01	0.160			
2.76	5.75	38.57	10.92	1.02	4.88	0.416	0.076	25.12	(0.009)	(0.017)		(0.17)	22.11		
2.77	6.39	35.65	16.32	1.61	4.04	0.392	0.065	23.63	(0.012)	(0.032)	(0.020)	(0.18)	(21.7)		
2.78	3.24	51.70	17.43	1.49	4.47	0.451	0.139	12.37	(0.003)	(0.026)	(0.013)	(0.18)	10.96		
EZP - 1	(0.85)		2.61	24.85										36.76	31.62
EZP - 2	16.89		5.81	41.38										24.03	(0.89)
EZP - 3	8.44		1.68	19.13										39.53	15.78

STANDARD REFERENCE SAMPLES OF IRON ORES (100 g BOTTLES)

No.	% Fe	% SiO_2	% CaO	% MgO	Al_2O_3	% Mn	% P	% S
2.61/1	67.54	3.16	0.30	1.37	0.59	0.16	(0.019)	0.08
2.62/1	59.73	12.34	0.41	(0.81)	0.71	0.044	(0.016)	(0.005)
2.63/1	52.10	22.78	0.17	0.17	1.14	0.045	(0.026)	0.036
2.64/1	44.25	33.56	0.23	0.22	1.14	0.043	0.025	0.055
2.65/1	37.74	37.02	1.50	0.53	3.10	0.056	0.039	0.045
2.66/1	29.04	44.94	3.42	0.95	3.13	0.078	0.030	0.10
2.67/1	19.57	53.72	4.73	1.22	4.05	0.16	0.030	0.17

No.	% Fe	% FeO	% SiO_2	% CaO	% Mn	% Al_2O_3	% TiO_2	% MgO	% V	% P	% Cr	% K_2O	% Na_2O
IMZ 3.40	61.45	3.40	4.20	1.22	0.15	2.37	2.45	2.43	0.30	(0.002)	(0.068)	(0.020)	0.066

No.	% Fe	% FeO	% Mn	% CaO	% SiO_2	% Al_2O_3	% TiO_2	% MgO	% Na_2O	% K_2O	% P	% S	% Zn	% C	% Cr	% Pb	% V	% LOI
IMZ 3.41	47.52		0.021	0.52	28.49	1.22	0.041	0.35	(0.09)	0.11	0.164	0.006		(0.037)				-1.1
IMZ 3.42	60.32	20.1	0.080	4.51	5.93	0.48	0.045	0.86	0.042	0.058	0.017	0.15	0.89		(0.008)	(0.03)	(0.003)	-0.46
IMZ 3.43	55.09	6.37	0.020	10.93	9.31	0.74	0.032	1.21	(0.040)	0.037	0.030	0.021	0.005		0.004			

STANDARD REFERENCE SAMPLES OF IRON ORES (100 g BOTTLES)

No.	% Fe	% FeO	% SiO_2	% CaO	% Mn	% Al_2O_3	% TiO_2	% MgO	% C	% P	% S	% K_2O	% Na_2O
PI 3.10	63.25	1.61	6.58	0.30	0.058	1.02	0.035	0.25	0.158	0.034	0.011	0.022	0.054
PI 3.11	58.65	0.78	13.58	0.048	0.018	1.03	0.039	0.06	0.015	0.049	0.015	0.065	0.23
PI 3.12	57.69	(0.72)	14.67	0.057	0.025	1.00	0.039	0.21	0.024	0.027	0.011	0.032	0.27
PI 3.13	55.85	0.68	17.29	0.079	0.030	1.13	0.044	0.31	0.031	0.031	0.0085	0.030	0.23
PI 3.20	67.76	27.37	5.30	0.13	0.029	0.12	0.016	0.30	0.033	0.022	0.012	0.049	0.037
~~**PI 3.21**~~	~~64.94~~	~~25.94~~	~~8.33~~	~~0.15~~	~~0.017~~	~~0.20~~	~~0.016~~	~~0.44~~	~~0.18~~	~~0.015~~	~~0.026~~	~~0.029~~	~~0.077~~
PI 3.22	65.50	26.82	7.56	0.26	0.026	0.095	0.012	0.46	0.14	0.015	0.047	0.058	0.069
PI 3.23	68.35	27.65	4.13	0.109	0.043	0.23	0.017	0.28	0.10	0.018	0.052	0.027	0.035
PI 3.24	68.93	28.27	3.96	0.107	0.026	0.11	0.028	0.24	0.052	0.014	0.044	0.026	(0.04)
PI 3.25	67.73	28.03	5.01	0.17	0.031	0.20	0.018	0.27	0.094	0.016	0.077	0.027	(0.03)
PI 3.30	63.09	1.19	8.26	1.04	0.012	0.13	0.010	0.23	0.016	0.013	0.003	0.18	0.073
PI 3.31	63.05	1.55	5.11	3.78	0.028	0.24	0.017	0.21		0.015	0.107	0.092	0.037
PI 3.32	62.10	1.61	9.63	0.39	0.026	0.32	0.027	0.71	0.012	0.010	0.003	0.117	0.050
PI 3.33	61.87	1.65	10.07	0.34	0.034	0.33	0.026	0.73	0.011	0.008	0.001	0.11	0.057

No.	% V	% Cr	% Co	% Ni	% Cu	% Zn	% As	% Pb	% Sn	% Ba	% Cl	% GOI/ LOI
PI 3.10	0.0015	0.005	0.003	0.002	0.0011	0.0019	0.005	0.0013		0.003	0.07	-1.20
PI 3.11	0.0014	0.004	(0.0006)	0.003	0.0012	0.0017	0.0006	0.0014		0.004	0.25	-0.98
PI 3.12	0.0019	0.006	0.0003	0.0022	0.0014	0.0022	(0.0007)	0.0011		0.0022	0.31	-1.20
PI 3.13	(0.001)	0.0067	0.0002	0.0024	0.0015	0.0028	(0.0008)	0.0009		0.0017	(0.29)	-1.31
PI 3.20	0.0015	0.003	(0.003)	(0.0013)	0.0015	0.002		0.0015		0.0019		+2.87
~~**PI 3.21**~~	~~0.0005~~	~~(0.002)~~	~~0.0009~~	~~0.0024~~		~~(0.003)~~				~~0.0019~~	~~0.083~~	~~+1.99~~
PI 3.22	0.0002	0.0019	0.0008	0.0014		0.0029		0.0011		0.0013	0.047	+2.25
PI 3.23	(0.002)	0.0020	0.0026	0.0002	0.0007	0.0021		0.0015		0.0020	0.027	+2.49
PI 3.24		0.0025	0.003	0.0013	0.0014	(0.003)		0.0002		0.0024		++2.91
PI 3.25	0.0018	0.0023	0.002		0.0010	(0.003)		0.0017		0.0021		2.53
PI 3.30		0.003		0.0017	0.0017	0.002		0.0016		(0.003)		-0.04
PI 3.31	0.003	0.0051	0.001	0.002	0.0016	0.003	(0.0004)	0.002	0.0011	0.0025		-0.22
PI 3.32	(0.001)	0.005		0.002	0.0021	0.0023		0.0016		0.0036		+0.11
PI 3.33	0.001	0.006		0.002	0.002	0.0014		0.0015		0.003		+0.13

STANDARD REFERENCE SAMPLES OF IRON ORES (100 g BOTTLES)

No.	% Fe	% Mn	% TiO_2	% CaO	% K_2O	% S	% P	% SiO_2	% Al_2O_3	% MgO	% Na_2O	% FeO
3.50	70.20	0.030	0.021	0.084	0.015	0.097	0.0067	2.51	0.077	0.19	0.033	30.06
3.51	67.55	0.0121	0.010	0.095	0.019	0.023	0.008	5.71	0.132	0.25	0.037	28.52
3.52	67.84	0.032	0.015	0.295	0.020	0.061	0.018	4.56	0.206	0.55	0.030	29.09
3.53	66.42	0.051	0.28	0.098	0.011	0.0049	0.018	4.07	0.40	0.054	0.012	1.41
3.54	62.76	0.390	0.68	1.31	0.145	0.0149	0.028	4.78	1.48	0.49	0.096	1.41
3.55	59.11	0.083	0.057	0.071	0.0072	0.013	0.090	10.06	1.92	(0.030)	0.011	3.86
3.56	64.41	0.765	0.101	0.035	0.021	0.0084	0.040	2.85	1.63	0.057	0.011	(0.47)
3.57	62.79	0.173	0.081	0.060	0.012	0.0064	0.058	7.08	1.07	0.047	0.0093	0.95
3.58	66.08	0.027	0.022	2.61	0.029	0.0103	0.0066	2.60	0.214	0.23	0.032	0.84
3.59	61.74	0.028	0.021	2.93	0.061	0.017	0.0078	7.75	0.25	0.86	0.079	3.17

No.	% Pb	% As	% Zn	% Cu	% Ni	% Co	% Cr	% V	% Cl	% Ba	% C	% GOI/LOI
3.50			(0.0017)	(0.0006)		(0.0024)	0.0031	0.0020		(0.0019)	0.024	+3.09
3.51	(0.0009)	(0.0009)	(0.0016)	0.0012		(0.0027)	0.0014	0.0009	0.043	(0.0019)	0.103	+2.64
3.52	(0.0012)		(0.0013)	(0.0005)			0.0011	0.0009	0.013	(0.0019)	0.124	+2.70
3.53	(0.0011)	(0.0007)	(0.0010)	0.0008	(0.0017)	(0.0018)	0.0045	0.005	(0.0039)		0.011	(-0.086)
3.54	(0.0009)		0.0017	0.0016	(0.0018)	(0.0023)	0.0064	0.013	(0.0046)	(0.0042)	0.251	-0.97
3.55	0.0013		0.0020	(0.0012)			0.0062	0.0013	(0.0043)		0.079	-3.20
3.56	0.0015		0.0066	0.0109		(0.0023)	0.0028	0.0052	0.0087	0.028	0.043	-2.37
3.57	(0.0014)	(0.0006)	0.0019	0.0014	(0.0019)		0.0039	0.0047		(0.0064)	0.054	-2.14
3.58	(0.0011)	(0.0008)	(0.0013)	0.0008	(0.0016)	(0.0016)	0.0034	0.0015			0.030	-0.051
3.59	(0.0010)		0.0018	(0.0006)		(0.0014)	0.0023	0.0009	0.018	(0.0016)	0.036	+0.13

STANDARD REFERENCE SAMPLES OF IRON ORES (100 g BOTTLES)

No.	Fe	Mn	TiO_2	CaO	K_2O	S	P	SiO_2	Al_2O_3	MgO	Na_2O	FeO
3.60	63.36	0.098	0.023	2.77	0.039	0.074	0.019	5.48	0.356	0.64	0.027	25.37
3.61	61.16	0.054	0.072	0.074	0.0059	0.015	0.082	5.60	2.60	0.027	(0.005)	3.45
3.62	65.81	0.0087	0.008	1.69	0.118	0.0021	0.0091	3.79	0.123	0.186	0.058	0.42
3.63	64.90	0.0301	0.032	0.372	0.040	0.004	0.0086	6.08	0.30	0.375	0.112	0.57

No.	Pb	Zn	Cu	Ni	Co	Cr	V	Ba	C	GOI/LOI
3.60	0.011	0.28	0.007	0.0041	(0.0011)	0.0077	(0.0013)	0.0033	0.69	(+0.30)
3.61	0.0015	0.0031	(0.0013)	0.0013	(0.0005)	0.0031	(0.0013)	0.003	0.288	-4.37
3.62	0.0017	0.0010	0.0011	0.0010	0.0005	0.0020	-	(0.003)	(0.016)	-0.13
3.63	(0.0016)	0.0011	(0.0011)	0.0012	(0.0007)	0.0032	-	(0.0011)	(0.013)	(0.073)

STANDARD REFERENCE SAMPLES OF LOW ALLOY STEELS (ø40 mm × 40 mm)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% Ti	% Al	% Nb	% B	% Co	% N	% Sn	% Sb
51/1	0.40	1.53	0.29	0.023	(0.009)	0.62	0.15	0.45	1.50	(0.013)								
52/1	0.41	0.25	1.38	0.012	(0.009)	0.12	2.35	0.094	(0.041)									
53/1	0.41	0.60	0.104	0.018	0.011	2.85	0.28	0.17	0.13	0.28								
54/1	0.43	0.14	0.17	(0.009)	0.010	0.12	4.01	(0.034)	(0.007)	0.19								
55/1A*	0.401	0.490	0.406	0.019	0.0053	0.998	0.570	0.112	0.247	0.107	0.012	0.006	0.010	0.0018	0.0039	0.0023	0.017	0.0051
56/1	0.41	0.25	1.69	0.011	0.007	0.43	0.69	0.41	0.66	0.19								
57/1	0.46	1.05	0.58	0.028	0.012	1.67	0.15	0.14	0.48	0.34								
58/1	0.40	1.81	0.35	0.026	0.012	0.20	1.44	0.31	0.21	0.079								

* 55/1A – ø38 x 20 mm

STANDARD REFERENCE SAMPLES OF CARBON STEELS (ø40 mm × 40 mm)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% N	% V	% Al	% Ti	% Co	% Sn	% As	% Sb
63/2	0.40	0.63	0.16	0.017	0.009	0.16	0.13	0.14								
64/2	0.75	0.47	0.22	0.012		0.090	0.081	0.12			0.020					
65/2	1.19	0.27	0.13	0.013	0.007	0.079	0.067	0.059			0.030					
68*	0.102	0.346	0.13	0.028	0.015	0.33	0.049	0.166	0.0086	0.046		0.0033	0.008	0.0066	0.0057	0.0020

*IMZ68 – approx ø40 x 20 mm only

STANDARD REFERENCE SAMPLES OF LOW ALLOY STEELS (ø40 mm × 40 mm)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% Ti
71A**	0.126	0.493	0.494	0.0126	0.0075	0.505	0.036	0.90	0.018	0.055	0.0041
~~**72**~~	~~0.081~~	~~0.31~~	~~0.34~~	~~0.092~~	~~0.012~~	~~0.52~~	~~0.039~~	~~0.27~~	~~0.006~~	~~0.002~~	~~0.021~~
73	0.097	0.68	0.12	0.019	0.013	0.079	0.13	0.17	0.013	0.022	
~~**74A***~~	~~0.179~~	~~1.19~~	~~0.34~~	~~0.008~~	~~0.010~~	~~0.197~~	~~0.130~~	~~0.209~~	~~0.047~~	~~0.072~~	~~0.022~~
75A***	0.112	0.394	0.618	0.080	0.016	0.401	0.041	0.428	0.018	0.013	0.023
76	0.129	1.37	0.24	0.022	0.011	0.12	0.033	0.057	0.101		

No.	% Al	% Nb	% B	% Zr	% Co	% W	% N	% Sn	% As	% Sb	Ca
71A**	0.019	0.0100	0.0009	0.0065	0.025	0.023	0.0065	0.015	0.016	0.013	
~~**72**~~	~~0.013~~										
73	0.010										
~~**74A***~~	~~0.012~~	~~0.041~~	~~(0.002)~~		~~0.0043~~		~~0.0118~~				
75A***	0.009	0.024	0.0021		0.0037		0.0024	0.023			
76	0.011	0.068									

* ~~74A – ø43 x 30 mm only~~
** 71A – ø35 x 20 mm only
*** 75A – ø38 x 20 mm only

STANDARD REFERENCE SAMPLES OF LOW ALLOY STEELS (ø40 mm × 40 mm)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% Ti	% Al	% Nb	% B	% Zr	% Co	% Sn
101/2	0.033	1.97	(0.092)	0.010	0.007	0.035	2.06	0.46	0.010	0.30		0.036					
102/3	1.11	0.15	1.06	0.014	(0.0045)	1.59	0.021	0.13	0.43	(0.012)		0.017					
~~**103A**~~	~~0.49~~	~~0.78~~	~~0.42~~	~~0.066~~	~~0.051~~	~~0.58~~	~~0.57~~	~~0.27~~	~~0.18~~	~~0.17~~	~~0.17~~	~~0.026~~	~~0.040~~	~~0.006~~		~~0.002~~	~~(0.005)~~

STANDARD REFERENCE SAMPLES OF LOW ALLOY STEELS (ø40 mm × 40 mm, CHIPS – 100 g BOTTLES)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% Ti	% Nb	% B	% Al
IMZ 110A*	0.0034	0.067		0.0051	0.0045	0.027	0.021	0.021	0.0035	(0.0014)	(0.0006)			(0.001)
IMZ 111	0.106	0.31	0.56	0.010	0.039	0.072	0.23	0.036	0.084	0.022				(0.017)
IMZ 112A**	0.212	0.471	0.257	0.0055	0.0188	0.099	0.055	0.068	0.054	0.043	0.0138	0.0123	0.0010	0.017
IMZ 112B	0.195	0.43	0.27	0.022	0.016	0.034	0.046	0.055	0.043	0.045	0.010	0.013		(0.03)
IMZ 113	0.24	0.50	0.10	0.022	0.025	1.25	0.13	0.11	0.050	0.039				0.007
IMZ 114A**	0.358	1.156	0.328	0.0235	0.0220	0.423	0.098	0.492	0.112	0.096	0.0088	0.015	0.0019	0.027
IMZ 115	0.36	0.65	0.043	0.045	0.024	0.27	0.35	0.25	0.070	(0.063)		0.009		(0.015)
IMZ 116	0.64	0.94	0.25	0.025	0.035	0.72	0.022	0.33	0.074	0.076	(0.0008)			0.025
IMZ 117	0.49	0.77	0.34	0.038	0.015	0.94	0.29	0.41	0.024	0.087	(0.0014)	0.041		0.023
IMZ 118	0.69	1.72	0.30	0.026	(0.049)	0.14	0.19	0.18	0.058	0.059				(0.014)
IMZ 119	0.93	1.15	0.16	0.018	0.006	0.062	0.049	0.042		0.006	(0.0007)			0.010

No.	% Alsol	% Sn	% Sb	% Pb	% Co	% Ca	% W	% As	% Zn	% N
IMZ 110A*					0.0031					0.0037
IMZ 111	0.007					0.0003				0.0133
IMZ 112A		0.162	0.021	0.023	0.008	0.080	0.072	0.023	0.0020	0.0058
IMZ 112B		0.15								0.0100
IMZ 113	0.004									0.0154
IMZ 114A**	**W** (0.007)	0.014	0.018	0.021	0.0057	**As** 0.0035				0.0029
IMZ 115	(0.006)									0.0087
IMZ 116	0.012									0.0130
IMZ 117	0.013					(0.0002)				0.0154
IMZ 118	(0.004)	0.22				(0.0002)				0.0120
IMZ 119	0.007					(0.0002)				0.0086

* 110A – ø43 x 30 mm only

** 112A, 114A – ø38 x 20 mm only

STANDARD REFERENCE SAMPLES OF FREE CUTTING STEELS (ø40 mm × 40 mm, CHIPS – 100 g BOTTLES)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Sn	% Pb	% As	% Sb	% Al	% N
IMZ 120	0.60	0.40	0.34	(0.049)	0.026	0.20	0.085	0.10	0.008	0.077	0.065	0.031	0.033	0.0115
IMZ 121	0.39	1.18	(0.056)	0.057	0.097	0.036	0.029	0.032	0.059	0.011	0.002	0.017	0.016	0.0125
IMZ 122	0.27	1.33	0.43	0.073	0.21	0.19	0.25	0.25	0.12	(0.020)	0.007	0.019	(0.027)	0.0110
IMZ 123	0.25	1.57	0.23	0.030	0.38	0.16	0.057	0.093	(0.007)	0.030	0.033	0.030	0.032	0.0171
IMZ 124	0.10	0.60	(0.019)	0.082	0.28	0.11	0.046	0.060	0.009	(0.002)	0.004	0.002	0.005	0.0059
IMZ 125	0.029	0.95	0.15	(0.018)	(0.057)	0.18	0.023	0.044	0.002		0.065	0.014	(0.007)	

STANDARD REFERENCE SAMPLES OF LOW ALLOY STEELS (ø40 mm × 40 mm, CHIPS 100 G BOTTLES)

No.	% N	% Al	% Ca
IMZ 130	0.0153	0.0046	0.0024
IMZ 131	0.0333	0.0043	
IMZ 132	0.0097	0.0021	0.0002
IMZ 133	0.0360		
IMZ 134		0.0124	0.0005
IMZ 135	0.0238	0.0274	0.0008
IMZ 136		0.0034	0.00031
IMZ 137	0.0083	0.0017	0.00025
IMZ 138	0.0063	0.0022	
IMZ 139	0.0113	(0.029)	0.0031
IMZ 140	0.0083	0.0307	0.0015
IMZ 141	0.0154	0.0071	

STANDARD REFERENCE SAMPLES OF HIGH-ALLOY AND CONSTRUCTIONAL STEELS (ø40 mm × 40 mm, CHIPS – 100 g BOTTLES)

No.	% C	% Mn	% Si	% P	% S	% Cr	% Ni	% Cu	% Mo	% V	% Ti	% Nb	% B	% Al	% W	% Co	% N	% Sn	% As
IMZ 150A	0.048	1.35	0.59	0.0064	0.0095	18.89	12.75	0.090	0.12	(0.027)	0.021	0.0026		0.022	0.11	0.125			
IMZ 152	0.065	1.42	0.52	0.010	0.0025	18.04	9.48	0.061	0.017	0.030									
IMZ 152A*	0.065	1.38	0.55	0.0115	0.0072	17.10	8.47	0.065	0.010	0.013	(0.003)	(0.003)	0.0022	(0.004)	(0.004)	(0.006)	0.083	(0.001)	(0.002)
IMZ 153A*	0.037	1.49	0.73	0.021	0.0073	16.45	13.57	0.102	2.61	0.020	0.036	0.034	(0.0005)	0.036	(0.01)	0.015	0.107	(0.003)	(0.003)
IMZ 154	0.076	2.18	0.89	0.040	0.16	17.71	9.86	0.33	2.58	0.073	1.00			(0.16)		0.105			
IMZ 155	0.077	0.84	0.49	0.018	0.012	11.07	0.77	0.084	0.056	0.045	0.19				(0.095)				
IMZ 156	0.101	0.84	1.11	0.031	0.008	16.96	0.64	0.071	0.035	0.073									
IMZ 157	0.096	0.63	0.59	0.015	0.010	9.51	0.50	0.066	0.71	0.26	0.044			0.26			0.051		
IMZ 158	0.092	1.34	2.24	0.015	0.007	25.51	0.21	0.097	0.025	0.078	0.12			1.56					
IMZ 159	0.076	0.39	0.33	0.022	0.005	2.64	0.31	0.42	0.98	0.10				0.024	0.26				
IMZ 160	0.077	0.38	0.34	0.023	0.004	2.64	0.30	0.42	0.98	0.10				0.031	0.26				
IMZ 161	0.074	0.29	0.65	0.023	0.023	12.90	0.55	0.56	1.10	0.33	(0.005)			(0.015)	1.05				
IMZ 162	0.19	1.31	0.59	0.021	0.014	0.91	1.64	0.077	0.52	0.045	0.12			(0.040)					
IMZ 300*	0.020	0.78	0.71	0.032	0.0071	17.20	0.311	0.159	(0.010)	(0.008)	0.165	0.36	(0.0005)	0.012	0.011	(0.004)	0.008	0.007	(0.004)
IMZ 303**	0.105	1.23	0.74	0.038	0.011	19.56	8.26	0.018		0.037	0.60			0.100		0.017	0.0113		

* IMZ 152A, 153A, 300 – ø38 mm × 20 mm, chips not available
**IMZ 303 – ø40 mm × 37 mm, chips not available

STANDARD REFERENCE SAMPLES OF HIGH ALLOY STEEL (ø37 mm × 30 mm)

No.	% C	% Si	% Mn	% P	% S	% Cr	% Ni	% Mo	% Cu	% Al	% V	% B	% W	% N	% Co	% Nb
IMZ 196	0.179	0.46	0.42	0.018	0.012	11.04	0.44	0.65	0.080	0.029	0.34	0.065	1.54	0.058	1.55	0.074

STANDARD REFERENCE SAMPLES OF HIGH-ALLOY AND CONSTRUCTIONAL STEELS (ø40 mm × 40 mm, CHIPS – 100 g BOTTLES)

	~~IMZ 163A*~~	IMZ 164	IMZ 165	IMZ 166A	IMZ 167	IMZ 168	IMZ 169	IMZ 170	IMZ 171
C	~~0.058~~	0.100	0.082	0.108	0.175	0.24	0.099	0.155	0.195
Si	~~0.39~~	0.82	1.42	2.51	0.755	1.12	0.35	0.32	0.21
Mn	~~1.38~~	1.77	0.98	1.99	1.16	1.36	0.54	0.50	0.42
P	~~0.018~~	0.019	0.017	0.019	0.016	0.019	0.015	0.018	0.020
S	~~0.010~~	0.002	0.007	0.005	0.0025	0.012	0.0155	0.014	0.014
Cr	~~22.62~~	20.96	23.28	25.53	13.07	13.91	2.20	8.82	11.44
Mo	~~2.40~~	3.48	0.025	(0.025)	0.024	0.026	1.03	0.88	1.23
Ni	~~4.59~~	6.75	19.01	21.93	0.16	0.17	0.073	0.63	0.59
V	~~0.029~~	0.053	0.042	0.038	0.054	0.053	(0.016)	0.24	0.26
W	~~(0.016)~~	(0.025)						(0.19)	
Cu	~~0.061~~	0.26	0.040	0.025	0.106	0.093	0.128	0.285	0.116
Nb	~~0.13~~	0.049					(0.0045)	0.087	
Ti	~~(0.002)~~	(0.003)	(0.002)	0.003	(0.002)	(0.0035)	0.001	(0.002)	(0.001)
Al	~~0.018~~	0.040	0.038	0.036	(0.018)	(0.004)	0.075	0.11	0.036
Sn	~~(0.003)~~	(0.003)	0.003	(0.0035)	0.009	0.009	0.062	0.007	0.008
Co	~~(0.020)~~	0.035	0.029	0.030	(0.021)	(0.019)	0.012	(0.022)	0.024
N	~~0.221~~	0.249	0.105	0.077	0.053	(0.057)	0.0193	0.065	0.057
As	~~(0.0035)~~	(0.005)	(0.003)	(0.0026)					
Pb	~~(0.001)~~	(0.002)	(0.0008)				(0.001)		
Sb								(0.002)	(0.003)

* ø36 x 40 mm

STANDARD REFERENCE SAMPLES TOOL AND CONSTRUCTIONAL STEELS (ø40 mm × 40 mm, CHIPS 100 g BOTTLES)

	IMZ 172	IMZ 173	IMZ 174	IMZ 175	IMZ 176A	IMZ 177	IMZ 178	IMZ 179
C	1.03	0.30	0.33	0.099	0.150	0.076	0.29	0.114
Si	0.21	1.15	0.93	0.22	0.35	0.24	0.28	0.375
Mn	0.71	0.43	0.32	0.25	0.75	0.32	0.65	0.83
P	0.018	0.029	0.029	0.016	0.018	0.013	0.016	0.016
S	0.047	0.020	0.023	0.0039	0.0032	0.0029	0.0034	0.0028
Cr	4.47	5.52	5.10	0.515	0.41	0.18	1.26	0.20
Mo	0.96	1.50	1.24	0.025	0.027	0.022	0.20	0.12
Ni	0.12	0.42	0.13	3.12	3.62	8.33	2.09	9.98
V	0.20	0.47	0.98	0.014	0.061	0.010	0.011	0.023
W	(0.011)	0.10	0.021	(0.019)	(0.015)		0.017	(0.023)
Cu	0.128	0.32	0.17	0.130	0.103	0.110	0.140	0.164
Nb							0.105	(0.004)
Ti	(0.002)	(0.002)						(0.001)
Al	0.062	0.060	0.080	0.043	(0.058)	0.043	0.051	0.061
Sn	0.010	0.012	0.010	0.011	0.0090	0.008	0.011	0.010
Co	(0.012)	(0.013)	0.011		(0.010)	(0.017)	0.015	0.016
N	0.0188	0.034	0.0288	0.0099	0.0129	0.0089	0.0160	0.0108
As								(0.007)

STANDARD REFERENCE MATERIALS OF HIGH ALUMINIUM AND HIGH ALUMINIUM-MANGANESE STEELS (BULK SAMPLES)

No.	% Mn	% Al	% C	% Si	% P	% S	% Cr	% Mo	% Ni	% Cu	% Ti	% V	% Nb	% B	% Sn	% N	% Co	% As
IMZ 197	0.45	8.45	0.130	0.47	0.021	0.007	0.20	(0.011)	0.053	0.11	0.025	0.025	(0.011)	(0.007)	0.015			
IMZ 198	16.10	2.80	0.44	0.423	0.031	0.0094	0.30	(0.008)	0.058	0.104	(0.005)							
IMZ 199	28.74	8.65	0.90	0.294	0.022	(0.0006)	0.134	0.43	0.20	0.110	(0.004)	0.026	0.43	(0.001)				
IMZ 204	0.36	4.21	0.085	0.40	0.014	0.008	0.111	(0.007)	0.034	0.075	0.035					(0.0052)		
IMZ 301	17.12		0.45	0.56	0.013	0.013	0.14		0.244	0.021	0.0015	0.006				0.028	0.009	0.0030

The sizes of samples:
IMZ 197 – Discs 37 mm in diameter and 15 mm high
IMZ 198 – Discs 56 mm in diameter and 15 mm high
IMZ 199 – Discs 50 mm in diameter and 15 mm high
IMZ 204 – Discs 36 mm in diameter and 20 mm high
IMZ 301 – Discs 44 mm in diameter and 35 mm high

STANDARD REFERENCE SAMPLES OF MARAGING STEELS (BULK SAMPLES, ø38 mm × 20 mm)

No.	% C	%Si	% Mn	% P	% S	% Co	% Cr	% Ni	% Mo	% V	% W	% Cu	% Ti	% Nb
IMZ 520	0.011	0.094	0.070	0.0043	0.019	17.66	0.242	10.10	4.92	4.03	4.90	0.080		
IMZ 521	0.015	0.072	0.039	0.0031	0.0058	20.25	0.040	8.63	4.84	3.97	5.22	0.027		
IMZ 522	0.009	0.048	0.032		0.0043	18.72	0.022	11.47	6.45	2.21	2.26	0.019	0.54	
IMZ 523	0.010	0.043	0.051		0.0039	14.44	0.048	15.94	6.67	2.01	1.87	0.059	0.70	
IMZ 524	0.012	0.13	0.68		0.004	12.25	0.085	13.75	4.95	3.02	1.85	0.024	0.85	(0.007)

No.	% N	% Sn	%As	% B
IMZ 520	0.0105			
IMZ 521	0.0113			
IMZ 522	0.0045			
IMZ 523	0.0037			
IMZ 524	0.0038			

STANDARD REFERENCE MATERIALS OF NICKEL AND COBALT ALLOYS (BULK SAMPLES)

No.	% C	% Al	% Co	% Cr	% Fe	% Mn	% Mo	% Nb	% Ta	% Ti	% W	% Zr	% Hf
IMZ 180	0.107	6.00	9.95	7.98	0.073		5.93	0.024	4.26	1.02	(0.05)	0.075	
~~**IMZ 202**~~	~~0.152~~	~~5.67~~	~~10.02~~	~~8.39~~	~~(0.024)~~		~~0.63~~	~~0.028~~	~~3.25~~	~~1.01~~	~~10.04~~	~~0.031~~	~~1.42~~
IMZ 182	0.169	5.69	13.52	8.63	(0.04)		3.10			4.69		0.031	
IMZ 183A	0.107	3.45	8.23	15.99	0.063		1.63	0.747	1.56	3.39	2.62	0.033	0.020
IMZ 184	0.086	4.37	14.32	14.16			4.30	(0.032)		3.43		(0.012)	
IMZ 185	0.152	5.56	4.47	9.91	(0.022)		3.92			2.73	5.12	(0.014)	
IMZ 186	0.59	0.28	rest	23.14	0.10				3.78	0.19	7.17	0.40	
~~**IMZ 187**~~	~~0.109~~	~~4.90~~	~~9.70~~	~~8.78~~	~~0.053~~	~~(0.0005)~~	~~1.82~~	~~0.004~~	~~3.79~~	~~2.31~~	~~6.93~~	~~0.029~~	~~1.50~~
IMZ 188	0.526	(0.005)	51.64	26.44	1.14	0.68	0.42	0.045	(0.011)	(0.007)	7.46	(0.0004)	
IMZ 203	0.061	6.13	(0.024)	11.80	0.032		4.32	2.04		0.62		0.059	
IMZ 205	0.040	4.97	5.35	10.07	0.013	0.0020	0.015	0.013	11.92	1.34	4.13	0.003	0.007
IMZ 206	0.035	4.99	5.37	9.78	0.036	(0.002)	0.064	0.023	11.95	1.36	4.08	0.004	0.36

The sizes of Ni/Co samples:

IMZ 180 – 1/4 section of 80 mm cylinder and 30 mm high
~~IMZ 202 – 1/4 section of 90 mm cylinder and 20 mm high~~
IMZ 182 – 1/4 section of 64 mm cylinder and 45 mm high
IMZ 183A – 1/4 section of 88 mm cylinder and 20 mm high
IMZ 184 – 1/4 section of 80 mm cylinder and 30 mm high
IMZ 185 – 1/4 section of 64 mm cylinder and 45 mm high
IMZ 186 – 1/4 section of 78 mm cylinder and 30 mm high
~~IMZ 187 – 1/4 section of 90 mm cylinder and 20 mm high~~
IMZ 188 – 1/4 section of 75 mm cylinder and 20 mm high
IMZ 203 – 1/4 section of 90 mm cylinder and 20 mm high
IMZ 205 – 1/4 section of 88 mm cylinder and 20 mm high
IMZ 206 – 1/4 section of 88 mm cylinder and 20 mm high

STANDARD REFERENCE MATERIALS OF NICKEL AND COBALT ALLOYS (BULK SAMPLES) cont.

No.	% B	% Ni	% Pt	% Re	% V	% Si	% P	% S	% Cu	% Mg
IMZ 180	(0.017)	rest				(0.026)	(0.003)			
~~**IMZ 202**~~	~~0.0152~~	~~(59.7)~~				~~(0.016)~~				
IMZ 182	0.013	rest			0.81					
IMZ 183A	0.0108	rest				0.021				0.0013
IMZ 184	0.016	rest				(0.018)	(0.001)			
IMZ 185	0.015	rest								
IMZ 186	(0.007)	10.22								
~~**IMZ 187**~~	~~0.0159~~	~~60.11~~				~~(0.011)~~	~~(0.0006)~~	~~(0.0002)~~	~~(0.001)~~	
IMZ 188	0.0009	10.76			(0.011)	0.69	0.011	(0.0002)		
IMZ 203	0.0077					(0.019)		(0.0006)		
IMZ 205	(0.0006)	(62.44)				0.009	(0.0006)	(0.0003)	(0.0007)	(0.0007)
IMZ 206	(0.001)	(62.24)				0.028	0.0007	(0.0003)	(0.0003)	(0.0003)

The sizes of Ni/Co samples:
IMZ 180 – 1/4 section of 80 mm cylinder and 30 mm high
~~IMZ 202 – 1/4 section of 90 mm cylinder and 20 mm high~~
IMZ 182 – 1/4 section of 64 mm cylinder and 45 mm high
IMZ 183A – 1/4 section of 88 mm cylinder and 20 mm high
IMZ 184 – 1/4 section of 80 mm cylinder and 30 mm high
IMZ 185 – 1/4 section of 64 mm cylinder and 45 mm high
IMZ 186 – 1/4 section of 78 mm cylinder and 30 mm high
~~IMZ 187 – 1/4 section of 90 mm cylinder and 20 mm high~~
IMZ 188 – 1/4 section of 75 mm cylinder and 20 mm high
IMZ 203 – 1/4 section of 90 mm cylinder and 20 mm high
IMZ 205 – 1/4 section of 88 mm cylinder and 20 mm high
IMZ 206 – 1/4 section of 88 mm cylinder and 20 mm high

SET-UP SAMPLES OF STEELS (BULK SAMPLES)

% m/m	IMZ S 04	IMZ S 06A	~~IMZ S 07~~	IMZ S 10	IMZ S 11	~~IMZ S 13~~	IMZ S 15	IMZ S 16	IMZ S 21	IMZ S 22	IMZ S 24
C	0.5	0.2	~~0.18~~	0.12	0.095	~~0.14~~	0.32	0.10	0.26	1.1	0.13
Mn	0.8	1.4	~~0.23~~	0.65	0.35	~~0.6~~	0.7	0.65	0.50	1.1	0.7
Si	0.2	0.4	~~1.7~~	0.32	1.8	~~0.6~~	2.0	1.3	0.44	0.94	0.95
P	0.03	0.01	~~0.06~~	0.01	0.01	~~0.01~~	0.01	0.015	0.02	0.01	0.01
S	(0.2)	0.01	~~0.1~~	0.01	0.015	~~0.01~~	0.01	0.01	0.02	0.02	0.02
Cr	4.3	10.8	~~2.1~~	28	6.5	~~10.8~~	11.9	14.3	18.3	19.1	26.8
Ni	0.53	20	~~2.0~~	1.1	0.66	~~1.1~~	7.3	0.59	2.2	0.63	0.76
V	1.5		~~0.15~~			~~0.7~~			0.25	0.033	
Mo	6.5	0.5	~~0.12~~			~~0.8~~			0.4		
Ti			~~0.02~~	1.4		~~0.02~~		0.20	0.12	0.02	
Cu		0.04	~~0.17~~	2.4		~~0.05~~		0.12	0.30	0.03	
Al								0.5			
W		0.4	~~2.3~~			~~0.9~~			0.4		
Co	10.6		~~0.02~~							0.02	
Nb		1.5		0.6		~~0.45~~					
As										0.002	
B										0.001	
Zr								0.01			
sample size	ø 43 mm, 35 mm high	ø 45 mm, 20–30 mm high	~~ø 40 mm, 30 mm high~~	ø 45 mm, 30 mm high	ø 40 mm, 20–30 mm high	~~ø 40 mm, 23–35 mm high~~	ø 40 mm, 23 mm high	ø 40 mm, 30 mm high	ø 40 mm, 30 mm high	ø 45 mm, 23–35 mm high	ø 40 mm, 30 mm high

SET-UP SAMPLES OF STEELS (BULK SAMPLES)

% m/m	~~IMZ S 25~~	~~IMZ S 27~~	IMZ S 28	IMZ S 30	IMZ S 31	~~IMZ S 33~~	IMZ S 34	~~IMZ S 36~~	IMZ S 501	IMZ S 502	IMZ S 503	IMZ S 504
C	~~0.2~~	~~0.23~~	0.03	0.20	0.03	~~0.10~~	0.11	~~0.06~~	0.15	0.31	0.14	0.03
Mn	~~1.1~~	~~1.7~~	1.6	1.6	1.5	~~1.2~~	1.7	~~2.0~~	0.32	0.47	0.47	1.43
Si	~~2.5~~	~~2.0~~	0.75	0.93	0.30	~~0.75~~	0.62	~~0.9~~	0.40	2.8	0.37	0.56
P	~~0.03~~	~~0.02~~	0.01	0.02	0.01	~~0.03~~	0.015	~~0.01~~	0.02	0.02	0.03	0.02
S	~~0.01~~	~~0.01~~	0.01	0.01	0.01	~~0.01~~	0.01	~~0.01~~	< 0.005	< 0.005	< 0.005	0.01
Cr	~~28~~	~~15.5~~	16.3	18.7	17.6	~~19.6~~	20.8	~~25.5~~	13.2	12.8	11.4	18.2
Ni	~~4.5~~	~~35~~	14.3	12.6	11.0	~~8.3~~	9.1	~~29.0~~	0.11	6.7	0.19	11.1
V	~~0.18~~							0.05			0.30	
Mo	~~0.6~~		2.25				1.6	~~3.1~~			0.62	
Ti						~~0.6~~	0.5	~~0.8~~				
Cu	~~0.04~~							~~3.0~~				
Al						~~0.1~~						
W	~~0.5~~						0.5					
Co								~~0.03~~				
Nb				1.0								
Zr			0.005									
B			0.005		0.005							
N												0.17
sample size	~~ø 45 mm, 25–45 mm high~~	~~ø 40 mm, 20–25 mm high~~	ø 40 mm, 30 mm high	ø 40 mm, 23 mm high	ø 40 mm, 30 mm high	~~ø 40 mm, 35 mm high~~	ø 40 mm, 30 mm high	~~ø 40 mm, 35 mm high~~	ø 47 mm, 23 mm high	ø 47 mm, 25 mm high	ø 47 mm, 25 mm high	ø 50 mm, 23 mm high