

S1 TITAN 200-300, 500 Alloy Calibrations (P/N: 730.0093, 730.0160)



Low Alloy	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Nb	Mo	W	Pb
Analysis range, %	LLD - 0.25	0.05 - 1.8	0.02 - 18.1	0.1 - 2.0	69 - 100	LLD - 8	LLD - 9.6	LLD - 0.4	LLD - 0.14	LLD - 4.8	LLD - 6	LLD - 0.4
LLD (Fe pure)	160	162	90	133	N.A.	146	154	98	32	33	115	121
SEC %	0.02	0.01	0.03	0.03	1.5	0.25	0.03	0.01	0.002	0.01	0.02	0.009
Typical accuracy: ±%	0.03	0.02	0.03	0.05	0.4	0.03	0.06	0.03	0.02	0.04	0.04	

Tool Steel	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Nb	Mo	Sn	W	Pb
Analysis range, %	LLD - 0.01	0.05 - 9.5	0.02 - 8.7	0.1 - 2.0	69 - 100	LLD - 8	LLD - 3.3	LLD - 1.5	LLD - 0.14	LLD - 8.5	LLD - 350	LLD - 19	LLD - 0.4
LLD (AISI1045-200A)	160	157	100	176	N.A.	71	170	88	41	35	71	256	127
SEC %	0.002	0.04	0.05	0.05	1.2	0.09	0.02	0.02	32	0.02	0.006	0.03	0.009
Typical accuracy: ±%	0.03	0.02	0.03	0.05	0.4	0.2	0.06	0.03	0.02	0.04		0.04	

Stainless Steels	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Nb	Mo	Ta	W
Analysis range, %	0.05 - 2	0.05 - 0.3	0.02 - 26	0.1 - 2	30 - 95	0.25 - 18	0.1 - 36	0.05 - 5.7	0.02 - 0.65	0.02 - 6.2	LLD - 0.6	0.05 - 3.5
LLD (AISI1045-200A)	271	139	117	148	N.A.	132	165	72	32	34	74	290
SEC %	0.03	0.03	0.2	0.08	1.0	0.08	0.15	0.06	0.003	0.02	0.005	0.02
Typical accuracy: ±%	0.03	0.02	0.03	0.05	0.4	0.03	0.06	0.03	0.02	0.04		

Nickels	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zr	Nb	Mo	Hf	Ta	W
Analysis range, %	0.05 - 3.2	0.05 - .2	0.02 - 30	0.02 - 2	0.02 - 80	0.1 - 18	32 - 100	0.1 - 32.4	LLD - 0.6	0.02 - 5.2	0.02 - 28	0.05 - 1.5	0.05 - 4.5	0.1 - 13.5
LLD (pure Ni)	235	109	207	67	92	120	N.A.	84	10	38	45	252	200	331
SEC %	0.06	0.03	0.5	0.06	0.5	0.03	0.5	0.09	0.005	0.015	0.05	0.03	0.02	0.07
Typical accuracy: ±%	0.03	0.02	0.03	0.05	0.4	0.03	0.06	0.1		0.02	0.04			

Cobalts	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Nb	Mo	W	Pb
Analysis range, %	LLD - 0.9	LLD - 0.04	0.05 - 31	0.02 - 1.8	0.1 - 30	42 - 100	0.1 - 35	LLD - 0.25	LLD - 4.0	LLD - 10	0.1 - 15.1	LLD - 0.4
LLD (pure Co)	68	170	144	62	123	N.A.	96	25	54	34	295	90
SEC %	0.07	0.02	0.3	0.03	0.09	0.6	0.3	0.045	0.006	0.04	0.1	0.009
Typical accuracy: ±%	0.03	0.04	0.05	0.05	0.1	0.3	0.13		0.01	0.04	0.1	

Zincs	Al	Ti	Fe	Cu	Zn	Pb	Bi
Analysis range, %	up to 25%	LLD - 0.015	0.1 - .5	LLD - 2.5	68 - 100	LLD - 0.15	LLD - 0.03
LLD (pure Zn)	N.A.	50	128	200	N.A.	160	100
SEC %	N.A.	0.003	0.005	0.03	2	0.009	0.006
Typical accuracy: ±%	N.A.	0.006	0.01	0.05	1		

Coppers	Ti	Cr	Mn	Fe	Co	Ni	Cu	Zn	As (KB1)	Zr	Ag	Sn	Pb (LB1)	Bi
Analysis range, %	LLD - 0.26	0.05 - 2.2	0.02 - 5.2	0.02 - 4.5	LLD - 0.3	0.05 - 30	58 - 100	0.1 - 40	0.02 - 0.25	0.02 - 0.41	0.1 - 3.0	0.1 - 10	0.1 - 10	LLD - 0.05
LLD (pure Cu)	120	22	88	60	43	100	N.A.	59	546	44	150	225	178	100
SEC %	0.0096	0.05	89	0.05	0.01	0.04	0.8	0.2	0.02	0.01	0.009	0.08	0.17	0.01
Typical accuracy: ±%	0.01	0.02	0.03	0.06	0.02	0.06	1	0.2	0.03	0.02	0.02	0.1	0.2	0.03

S1 TITAN 200-300, 500 Alloy Calibrations (P/N: 730.0093, 730.0160)



Al, Si Bronzes	Al	Si	Ti	Cr	Mn	Fe	Co	Ni	Cu	Zn	As (KB1)	Zr	Ag	Sn	Pb (LB1)	Bi
Analysis range, %	up to 10%	up to 4 %	LLD-0.26	0.05 - 2.2	0.02 - 5.2	0.02 - 4.5	LLD-0.3	0.05 - 30	58 - 100	0.1 - 40	0.02 - 0.25	0.02 - 0.41	0.1 - 3.0	0.1 - 10	0.1 - 10	LLD-0.05
LLD (pure Cu)	N.A.	N.A.	120	22	88	60	43	100	N.A.	59	546	44	150	225	178	100
SEC %	N.A.	N.A.	0.0096	0.05	0.018	0.065	0.01	0.04	0.8	0.2	0.03	0.01	0.009	0.08	0.17	0.01
Typical accuracy: ±%	N.A.	N.A.	0.01	0.02	0.03	0.06	0.02	0.06	1	0.2	0.03	0.02	0.02	0.1	0.2	0.03

Light Alloys - Titaniums	Al	Ti	V	Cr	Mn	Fe	Cu	Zr	Nb	Mo	Pd	Sn	Ta	W
Analysis range, %	up to 10%	68 - 100	0.04 -15.0	0.02 -13.0	0.02 - 1.5	0.02 - 1.9	0.02 - 3.9	0.02 - 5	0.02 - 2	0.02 -6	0.03 -0.15	0.02 -4	LLD-1	LLD-0.5
LLD (pure Ti)	N.A.	N.A.	296	347	141	103	40	16	16	18	75	150	90	65
SEC %	N.A.	1.45	0.1	0.09	0.029	0.05	0.02	0.05	0.01	0.07	0.004	0.07	0.006	0.01
Typical accuracy: ±%	N.A.	1.3	0.15	0.15	0.3	0.1	0.04	0.1	0.02	0.1	0.01	0.1	0.02	0.04

Light Alloys - Al/Mg	Al/Mg	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Zr	Sn	Pb	Bi
Analysis range, %	Balancee	0.04 -0.25	0.02 -0.05	0.02 -0.3	0.01 -0.88	0.02 -0.65	0.02 -0.45	0.02 - 2.5	0.02 - 5	0.02 -7	LLD-0.15	LLD-0.05	0.02 -0.05	LLD-0.05
LLD (pure Mg)	N.A.	131	34	52	35	19	15	9	8	6	7	44	17	12
SEC %	N.A.	0.01	0.007	0.006	0.005	0.021	0.001	0.005	0.02	0.03	0.001	0.007	0.002	0.004
Typical accuracy: ±%	N.A.	0.03	0.015	0.02	0.015	0.04	0.03	0.02	0.05	0.05	0.01	0.02	0.02	0.01

Full MultiMatrix FP	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	As	Se	Y	Zr	Nb	Mo	Ru
Analysis range, %	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%
SEC %	0.1	0.05	0.3	0.15	0.6	0.2	0.2	0.7	0.3	0.3	0.1	0.03	0.01	0.04	0.06	0.04
	Rh	Pd	Ag	Cd	In	Sn	Sb	Hf	Ta	W	Re	Ir	Pt	Au	Pb	Bi
Analysis range, %	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%	LLD-100%
SEC %	0.04	0.05	0.1	0.1	3.00%	0.3	0.07	0.1	0.2	0.7	0.4	0.13	0.1	0.6	0.2	0.1

Calibration: FP based (with empirical corrections), with normalization based on BRUKER Intensity scaling when sample is smaller than mask

Analysis range: Concentration range covered by reference samples in the calibration of the application. Can be extended by 15% with FP based calibrations. Empirical calibrations should only be used within the range.

Lower Limit of Detection (LLD): The smallest concentration which can be detected.

- a) In this document LLD is specified for a given matrix in three sigma 99.7% confidence level (3 sigma) and 60 second analysis time.
- b) Individual elemental LLD's improve as a function of the square root of the analysis time.

Actual lower limit of detection range depends on several factors such as matrix interferences, overlapping elements, level of statistical confidence and testing time. Measurement of concentration close to the low analysis range requires typically long measurement time > 60s

Standard Error of Calibration (SEC): Average error (deviation) between certified and XRF value of the samples used for the calibration expressed as an absolute value in weight %.

Typical accuracy: Typical average error within the analysis range when large set of reference samples are measured. Notice that error of the individual sample may differ significantly from this value. Measurement time: 10s or less.

S1 TITAN 200-300, 500 Alloy Calibration

P/N: 730.0093, 730.0160



H																He					
Li	Be															B	C	N	O	F	Ne
Na	Mg															Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr				
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe				
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn				
Fr	Ra	Ac																			

Phase 1: 40 kV, TiAl filter

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr