



MERLIN 4

Aluminium Calibration Datasheet

Calibration Ranges for Aluminium Calibrations

Elements	Model	Al Global Al-4000		Low Alloy Al-4020		Al Cu Alloys Al-4120		Al Si Cu Alloys Al-4130		Al Si Alloys Al-4140		Al Mg Alloys Al-4150		Al Zn Alloys Al-4170	
		Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %
Si	● □	0.003	33	0.003	2.4	0.002	2.4	0.002	33	0.002	33	0.001	8.2	0.001	15.5
Fe	● □	0.008	3.2	0.006	3.2	0.007	3.2	0.004	3.2	0.004	3.2	0.006	3.2	0.002	3.2
Cu	● □	0.002	34	0.001	1.8	0.001	1.8	0.006	34	0.006	4.8	0.003	8	0.003	5.8
Mn	● □	0.001	2.1	0.0007	2	0.001	2	0.0008	2.1	0.0008	2.1	0.001	2.1	0.0006	2.1
Mg	● □	0.0002	17	0.0001	1.3	0.0001	1.3	0.0001	2.7	0.0001	1.75	0.0002	17	0.0001	5.5
Cr	● □	0.0005	0.6	0.0006	0.55	0.0004	0.55	0.0003	0.6	0.0003	0.6	0.0005	0.6	0.0004	0.6
Ni	● □	0.007	3	0.006	0.5	0.002	0.5	0.003	3	0.003	3	0.004	3	0.004	2.5
Zn	● □	0.008	12.8	0.002	0.5	0.003	0.5	0.002	7	0.002	2.3	0.003	0.5	0.001	12.8
Pb	● □	0.001	1.3	0.001	1.3	0.001	1.3	0.001	1.3	0.001	0.5	0.001	1.3	0.003	1.3
Sn	● □	0.003	1.25	0.002	1.25	0.002	1.25	0.001	0.45	0.001	0.45	0.002	0.45	0.002	0.45
Ti	● □	0.0001	0.4	0.0001	0.4	0.0001	0.4	0.0002	0.4	0.0002	0.4	0.0001	0.4	0.0001	0.4
V	● □	0.0001	0.3	0.0001	0.15	0.0001	0.15	0.0001	0.3	0.0001	0.15	0.0001	0.3	0.0001	0.15
Zr	● □	0.0003	0.3	0.0003	0.03	0.0003	0.03	0.0005	0.3	0.0005	0.3	0.0004	0.3	0.0002	0.3
Ga	● □	0.0001	0.07	0.0001	0.07	0.0001	0.07	0.0001	0.07	0.0001	0.07	0.0001	0.07	0.0001	0.07
Bi	● □	0.001	0.7	0.0008	0.6	0.0008	0.6	0.0004	0.7	0.0004	0.7	0.001	0.7	0.0006	0.7
Ag	● □	0.0001	0.7	0.0001	0.26	0.0001	0.26	0.0001	0.7	0.0001	0.26	0.0001	0.7	0.0001	0.7
In	● □	0.0003	0.06									0.0002	0.06	0.0005	0.06
Sb	● □	0.004	0.65	0.001	0.06	0.002	0.06	0.002	0.65	0.002	0.65	0.002	0.65	0.001	0.45
Sr	● □	0.0001	0.15					0.0001	0.15	0.0001	0.15	0.0001	0.15	0.0003	0.15
Ca	● □	0.0002	0.05	0.0006	0.01	0.0003	0.01	0.0001	0.05	0.0001	0.05	0.0001	0.05	0.0004	0.05
Cd	● □	0.0001	0.25	0.0001	0.03	0.0001	0.03	0.0008	0.25	0.0008	0.15	0.0001	0.25	0.0001	0.25
Be	● □	0.0001	0.3	0.0001	0.02	0.0001	0.02	0.0001	0.3	0.0001	0.3	0.0001	0.02	0.0001	0.3
Co	● □	0.002	0.5	0.001	0.08	0.001	0.08	0.0006	0.5	0.001	0.5	0.0004	0.25	0.003	0.5
B	● □	0.0001	0.03	0.0001	0.03	0.0001	0.03	0.0001	0.03	0.0001	0.03	0.0001	0.03	0.0001	0.03
P	●	0.0003	0.02					0.001	0.02	0.001	0.02			0.001	0.02
Hg	●	0.0002	0.017	0.0002	0.017	0.0002	0.017	0.0002	0.017	0.0002	0.017	0.0002	0.017	0.0002	0.017
Al	● □	Balance		Balance		Balance		Balance		Balance		Balance		Balance	

● Ultra □ Visible

Calculation of detection limit according to DIN 32645:2008-11 with a confidence limit of 99.7% (3 sigma).

Calibrations created using Certified Reference Samples (CRMs) only. These values are taken from a production MERLIN 4 instrument, please note that detection limits of individual instruments may vary.

Calibrations can be extended using customer samples.

Al-4020 – Low Alloy Calibration

Sample Data – 614-05

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti
Run1	98.2	0.640	0.244	0.0305	0.0505	0.6200	0.0213	0.00926	0.0499	0.00577	0.00464	0.0312
Run2	98.2	0.637	0.250	0.0284	0.0500	0.6220	0.0211	0.00968	0.0507	0.00581	0.00471	0.0316
Run3	98.2	0.643	0.256	0.0300	0.0507	0.6230	0.0214	0.0106	0.0514	0.00557	0.00513	0.0312
Run4	98.2	0.632	0.248	0.0293	0.0500	0.6120	0.0212	0.00948	0.0527	0.00520	0.00519	0.0312
Run5	98.2	0.634	0.254	0.0289	0.0500	0.6150	0.0212	0.0105	0.0512	0.00511	0.00454	0.0319
Run6	98.2	0.670	0.252	0.0322	0.0503	0.6300	0.0214	0.0105	0.0546	0.00631	0.00511	0.0322
Run7	98.2	0.640	0.250	0.0284	0.0498	0.6140	0.0212	0.0102	0.0529	0.00541	0.00484	0.0316
Run8	98.2	0.641	0.260	0.0322	0.0499	0.6150	0.0211	0.0139	0.0546	0.00526	0.00474	0.0312
Run9	98.2	0.643	0.251	0.0292	0.0497	0.6140	0.0213	0.0103	0.0529	0.00531	0.00455	0.0314
Run10	98.2	0.642	0.259	0.0291	0.0499	0.6190	0.0217	0.0119	0.0530	0.00560	0.00490	0.0312
Avg	98.2	0.642	0.253	0.0298	0.0501	0.618	0.0213	0.0106	0.0524	0.00553	0.00483	0.0315
CRM		0.63	0.246	0.0299	0.0518	0.616	0.0209	0.0095	0.0523	0.0052	0.0055	0.0303
SD (PPM)		104	49.9	14	3.16	53.7	1.74	13.6	15.8	3.61	2.4	3.52

ID	V	Zr	Ga	Bi	Ag	Sb	Ca	Cd	Be	Co	B	Hg
Run1	0.0163	0.00116	0.00095	0.00795	<0.0001	0.00753	0.00119	0.00210	<0.0001	0.00957	0.00124	0.00223
Run2	0.0165	0.00117	0.00101	0.00779	<0.0001	0.00843	0.00214	0.00222	<0.0001	0.00940	0.00148	0.00245
Run3	0.0163	0.00119	0.00093	0.00776	<0.0001	0.00827	0.00145	0.00215	<0.0001	0.00979	0.00117	0.00261
Run4	0.0165	0.00120	0.00089	0.00743	<0.0001	0.00706	0.00209	0.00219	<0.0001	0.0102	0.00123	0.00265
Run5	0.0167	0.00120	0.00095	0.00769	<0.0001	0.00979	0.00276	0.00216	<0.0001	0.0104	0.00178	0.00248
Run6	0.0165	0.00120	0.00110	0.00755	<0.0001	0.01310	0.00248	0.00252	<0.0001	0.00774	0.00146	0.00226
Run7	0.0165	0.00115	0.00104	0.00773	<0.0001	0.00874	0.00217	0.00212	<0.0001	0.0101	0.00147	0.00277
Run8	0.0163	0.00124	0.00099	0.00811	<0.0001	0.00987	0.00330	0.00214	<0.0001	0.0111	0.00129	0.00278
Run9	0.0164	0.00115	0.00101	0.00747	<0.0001	0.00902	0.00330	0.00228	<0.0001	0.0103	0.00133	0.00262
Run10	0.0163	0.00118	0.00107	0.00761	<0.0001	0.00943	0.00307	0.00215	<0.0001	0.0105	0.00129	0.00295
Avg	0.0164	0.00118	0.00100	0.00771	<0.0001	0.00913	0.00239	0.00220	<0.0001	0.00991	0.00138	0.00258
CRM	0.0166	0.0016		0.0078		0.0035	0.0014	0.0016		0.0041		0.0033
SD (PPM)	1.36	0.27	0.66	2.09	0.16	16.7	7.28	1.22	0.05	9.09	1.78	2.29

Analysis results obtained from **Certified Reference Sample 614-05** using the **Al-4020** calibration for low alloy aluminium samples on a production MERLIN 4 instrument. Results given in mass-%.

Data set includes data from 10 burns, the average composition values for the data set, the certified composition values for the CRM used, and the standard deviation of the data for each element expressed in Parts Per Million (PPM).

Data provided is a typical representation of MERLIN 4 performance, individual instrument performance may vary. MM00090 - MERLIN 4 Datasheet – Aluminium Calibrations v1.1

Al-4120 – Al Cu Alloy Calibration

Sample Data – 233-03

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti
Run1	91.4	0.298	0.410	4.45	0.511	1.21	0.0524	0.0122	0.200	1.09	0.00894	0.0248
Run2	91.3	0.299	0.412	4.50	0.512	1.21	0.0517	0.0125	0.202	1.11	0.00904	0.0248
Run3	91.3	0.299	0.410	4.49	0.511	1.21	0.0519	0.0125	0.200	1.10	0.00870	0.0248
Run4	91.3	0.297	0.405	4.47	0.511	1.22	0.0519	0.0126	0.202	1.10	0.00874	0.0249
Run5	91.3	0.298	0.407	4.46	0.513	1.22	0.0520	0.0127	0.201	1.11	0.00880	0.0250
Run6	91.3	0.298	0.406	4.51	0.509	1.22	0.0517	0.0122	0.205	1.11	0.00916	0.0246
Run7	91.3	0.300	0.416	4.50	0.511	1.22	0.0519	0.0127	0.205	1.12	0.00884	0.0249
Run8	91.1	0.308	0.411	4.61	0.509	1.24	0.0522	0.0136	0.208	1.16	0.00866	0.0253
Run9	91.2	0.305	0.420	4.57	0.507	1.24	0.0517	0.0147	0.210	1.12	0.00889	0.0247
Run10	91.2	0.300	0.415	4.56	0.506	1.25	0.0514	0.0148	0.209	1.12	0.00900	0.0249
Avg	91.3	0.300	0.411	4.51	0.510	1.22	0.0519	0.0130	0.204	1.11	0.00888	0.0249
CRM		0.3	0.41	4.32	0.51	1.19	0.052	0.013	0.21	1.1		0.029
SD (PPM)		33.9	47.4	520	20.9	140	2.86	9.62	37.5	183	1.6	1.91

ID	V	Zr	Ga	Bi	Ag	Sb	Ca	Cd	Be	Co	B	Hg
Run1	0.0120	0.0230	0.0116	0.204	0.00568	0.0169	<0.0003	0.0627	<0.0001	0.00354	0.00190	<0.0002
Run2	0.0119	0.0235	0.0116	0.210	0.00567	0.0172	0.000949	0.0622	<0.0001	0.00376	0.00187	<0.0002
Run3	0.0119	0.0235	0.0116	0.207	0.00568	0.0172	0.00142	0.0615	<0.0001	0.00358	0.00185	<0.0002
Run4	0.0119	0.0235	0.0117	0.207	0.00568	0.0171	0.00169	0.0617	<0.0001	0.00286	0.00182	<0.0002
Run5	0.0119	0.0236	0.0116	0.207	0.00569	0.0184	0.00121	0.0618	<0.0001	0.00352	0.00176	<0.0002
Run6	0.0120	0.0235	0.0116	0.211	0.00570	0.0161	0.00219	0.0627	<0.0001	0.00278	0.00185	<0.0002
Run7	0.0119	0.0239	0.0117	0.214	0.00568	0.0173	0.00151	0.0622	<0.0001	0.00268	0.00187	<0.0002
Run8	0.0119	0.0242	0.0120	0.221	0.00568	0.0184	0.00211	0.0650	<0.0001	0.00151	0.00177	<0.0002
Run9	0.0118	0.0243	0.0119	0.214	0.00565	0.0178	0.00253	0.0628	<0.0001	0.00294	0.00187	<0.0002
Run10	0.0119	0.0244	0.0119	0.214	0.00569	0.0156	0.00254	0.0629	<0.0001	0.00354	0.00186	<0.0002
Avg	0.0119	0.0237	0.0117*	0.211	0.00568	0.0172*	0.00163	0.0625	<0.0001	0.00307	0.00184	<0.0002
CRM	0.013	0.01		0.21				0.048				0.00007
SD (PPM)	0.37	4.28	1.45	50.5	0.12	8.87	7.51	9.9	0.06	6.77	0.46	1.28

Analysis results obtained from **Certified Reference Sample 233-03** using the **Al-4120** calibration for aluminium-copper alloy samples on a production MERLIN 4 instrument. Results given in mass-%.

Data set includes data from 10 burns, the average composition values for the data set, the certified composition values for the CRM used, and the standard deviation of the data for each element expressed in Parts Per Million (PPM).

Data provided is a typical representation of MERLIN 4 performance, individual instrument performance may vary.

Al-4130 – Al Si Cu Alloy Calibration

Precision Data

Elements	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V	Zr	Ga	Bi	Ag	In	Sb	Sr	Ca	Cd	Be	Co	B	P
Level %	Precision (PPM)																								
0.001													1	1	2	1	16	7	1	1	1		2	1	
0.002				2		1			2	2	1	1	1		2		15	7	1	1	2	2	6		4
0.005				3		3	5	14	2	4	1	3	1	2	4		10	8		3	4		2	2	3
0.01	4				10	2	4	14	2	3	2	2	3	3	4	2		7	3	2	2		6		3
0.02			10	3	6	2	5	12	12	5	4	6	9	3	11		41	20	5	5			6	2	
0.05	16	34	13	5	5	12	5	10	23	14	18	17				20	39	8	42			14	4		
0.1	11	79	12	22	23	24	30	9	29	22	15	29	12		29	45	67	24	29				13		
0.2	40	59		38	67	96	34	48	81	46	95							20				14			
0.3		115	35	182	55	86	76	72	114	200			73			22		15					84		
0.5	103	131	150	56	74		68	57	98						61		93								
1	492	207	301	123	183		115	125	131																
2		205	534				449	122																	
3			575		219			165																	
4			411					854																	
5	860		397					1010																	
10	1748																								
20	3197																								
30																									
40																									

Precision of analysis results within the listed %-mass content ranges given in Parts Per Million (PPM) for elements analysed in the Al-4130 calibration. Data measured using a production MERLIN 4 instrument.

Al-4130 – Al Si Cu Alloy Calibration

Sample Data – AlCu25-A

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti
Run1	62.6	5.78	0.414	25.2	0.00358	<0.0001	0.00135	<0.003	5.90	0.00132	0.0242	0.00443
Run2	62.7	5.89	0.421	25.0	0.00352	<0.0001	0.00112	<0.003	5.91	0.00139	0.0243	0.00454
Run3	62.2	5.92	0.419	25.5	0.00337	<0.0001	0.00119	<0.003	5.93	0.00160	0.0242	0.00439
Run4	62.1	5.94	0.411	25.5	0.00339	<0.0001	0.00115	<0.003	5.93	0.00179	0.0240	0.00438
Run5	62.1	5.95	0.410	25.6	0.00323	<0.0001	0.00141	<0.003	5.88	0.00131	0.0241	0.00443
Run6	62.2	5.93	0.411	25.5	0.00337	0.000325	0.00132	<0.003	5.89	0.00138	0.0241	0.00469
Run7	62.6	5.93	0.416	25.1	0.00356	<0.0001	0.00122	<0.003	5.90	0.00140	0.0242	0.00433
Run8	62.5	5.91	0.414	25.2	0.00344	<0.0001	0.00132	<0.003	5.96	0.00118	0.0242	0.00447
Run9	62.4	5.92	0.410	25.2	0.00337	<0.0001	0.00115	<0.003	5.93	0.00125	0.0243	0.00430
Run10	63	5.86	0.421	24.7	0.00317	<0.0001	0.00112	<0.003	5.92	0.00102	0.0243	0.00433
Avg	62.4	5.90	0.415	25.2	0.00340	<0.0001	0.00124	<0.003	5.91	0.00136	0.0242	0.00443
CRM		5.8	0.42	25.08	0.0035	0.0012		0.0017	5.89		0.0024	
SD (PPM)		508	44.2	2730	1.33	2.51	1.06	0.92	235	2.12	0.89	1.17

ID	Zr	Ga	Bi	Ag	Sb	Sr	Ca	Cd	Be	Co	B	P
Run1	0.00304	0.000528	<0.0004	0.00380	0.0179	<0.0001	0.00145	0.000277	0.000313	0.00160	0.00197	0.000372
Run2	0.00320	0.000474	<0.0004	0.00382	0.0182	<0.0001	0.00116	0.000277	0.000317	0.00170	0.00191	<0.0003
Run3	0.00294	0.000440	<0.0004	0.00378	0.0212	<0.0001	0.00088	0.000248	0.000312	0.00171	0.00191	<0.0003
Run4	0.00291	0.000470	<0.0004	0.00377	0.0189	<0.0001	0.00105	0.000241	0.000313	0.00145	0.00191	<0.0003
Run5	0.00302	0.000541	<0.0004	0.00380	0.0193	<0.0001	0.000713	0.000287	0.000317	0.00163	0.00190	0.000695
Run6	0.00302	0.000490	<0.0004	0.00381	0.0196	<0.0001	0.00135	0.000294	0.000311	0.00213	0.00192	0.000676
Run7	0.00286	0.000495	<0.0004	0.00379	0.0183	<0.0001	0.00208	0.000284	0.000309	0.00169	0.00189	<0.0003
Run8	0.00284	0.000498	<0.0004	0.00382	0.0191	<0.0001	0.00124	0.000237	0.000310	0.00179	0.00194	<0.0003
Run9	0.00290	0.000512	<0.0004	0.00379	0.0173	<0.0001	0.00153	0.000299	0.000311	0.00168	0.00182	<0.0003
Run10	0.00282	0.000424	<0.0004	0.00382	0.0178	<0.0001	0.00123	0.000229	0.000313	0.00203	0.00191	<0.0003
Avg	0.00295	0.000487	<0.0004	0.00380	0.0188	<0.0001	0.00127	0.000267	0.000313	0.00174	0.00191	0.000335
CRM												
SD (PPM)	1.18	0.37	1.47	0.16	11.2	0.06	3.8	0.26	0.03	2	0.38	1.92

Analysis results obtained from **Certified Reference Sample AlCu25-A** using the **Al-4130** calibration for aluminium-silicon-copper alloy samples on a production MERLIN 4 instrument. Results given in mass-%.

Data set includes data from 10 burns, the average composition values for the data set, the certified composition values for the CRM used, and the standard deviation of the data for each element expressed in Parts Per Million (PPM).

Data provided is a typical representation of MERLIN 4 performance, individual instrument performance may vary. MM00090 - MERLIN 4 Datasheet – Aluminium Calibrations v1.1

Al-4140 – Al Si Alloy Calibration

Sample Data – 472-02

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti
Run1	75.0	17.6	1.40	4.00	0.320	0.345	0.0331	0.502	0.321	0.119	0.0935	0.102
Run2	74.9	17.7	1.42	4.02	0.320	0.344	0.0332	0.502	0.325	0.119	0.0939	0.102
Run3	74.8	17.8	1.41	4.03	0.320	0.346	0.0329	0.506	0.320	0.118	0.0938	0.103
Run4	74.9	17.7	1.39	4.01	0.321	0.350	0.0333	0.503	0.320	0.120	0.0938	0.103
Run5	74.9	17.7	1.41	4.02	0.321	0.355	0.0336	0.503	0.323	0.120	0.0939	0.102
Run6	74.8	17.7	1.40	4.05	0.320	0.341	0.0331	0.505	0.325	0.122	0.0943	0.102
Run7	74.9	17.7	1.42	4.02	0.320	0.341	0.0330	0.503	0.324	0.120	0.0938	0.102
Run8	74.9	17.6	1.45	4.04	0.318	0.348	0.0331	0.499	0.328	0.122	0.0949	0.101
Run9	75	17.6	1.47	4.02	0.319	0.342	0.0332	0.497	0.327	0.118	0.0942	0.102
Run10	74.8	17.7	1.46	4.04	0.318	0.340	0.0330	0.500	0.324	0.120	0.0945	0.102
Avg	74.9	17.7	1.42	4.03	0.320	0.345	0.0331	0.502	0.324	0.120	0.0941	0.102
CRM		17.7	1.43	4.02	0.321	0.344	0.035	0.498	0.321	0.117	0.094	0.103
SD (PPM)		642	263	148	10.8	48.1	1.82	25.7	26.9	13.7	4.11	5.3

ID	Zr	Ga	Bi	Ag	Sb	Sr	Ca	Cd	Be	Co	B	P
Run1	0.0237	0.0136	<0.0004	0.000379	0.0142	<0.0001	0.00678	0.000239	0.000399	<0.0006	0.00577	0.00320
Run2	0.0235	0.0137	<0.0004	0.000359	0.0140	<0.0001	0.00808	0.000178	0.000393	<0.0006	0.00573	0.00262
Run3	0.0236	0.0137	<0.0004	0.000417	0.0146	<0.0001	0.00711	0.000159	0.000399	<0.0006	0.00569	0.00331
Run4	0.0234	0.0136	<0.0004	0.000333	0.0156	<0.0001	0.00667	0.000225	0.000399	<0.0006	0.00570	0.00276
Run5	0.0236	0.0136	<0.0004	0.000345	0.0147	<0.0001	0.00737	0.000212	0.000393	<0.0006	0.00579	0.00302
Run6	0.0235	0.0136	<0.0004	0.000421	0.0149	<0.0001	0.00689	0.000210	0.000395	<0.0006	0.00569	0.00306
Run7	0.0234	0.0137	<0.0004	0.000365	0.0150	<0.0001	0.00725	0.000222	0.000390	<0.0006	0.00568	0.00314
Run8	0.0236	0.0139	<0.0004	0.000413	0.0138	<0.0001	0.00776	0.000162	0.000394	<0.0006	0.00573	0.00289
Run9	0.0238	0.0138	<0.0004	0.000364	0.0136	<0.0001	0.00818	0.000245	0.000387	<0.0006	0.00581	0.00299
Run10	0.0236	0.0138	<0.0004	0.000355	0.0141	<0.0001	0.00704	0.000120	0.000393	<0.0006	0.00577	0.00294
Avg	0.0236	0.0137	<0.0004	0.000375	0.0145	<0.0001	0.00731	0.000197	0.000394	<0.0006	0.00574	0.00299
CRM	0.0192	0.0113					0.007					0.0022
SD (PPM)	1.14	1.1	1.75	0.31	6.36	0.09	5.33	0.41	0.04	1.41	0.47	2.05

Analysis results obtained from **Certified Reference Sample 472-02** using the **Al-4140** calibration for aluminium-silicon alloy samples on a production MERLIN 4 instrument. Results given in mass-%.

Data set includes data from 10 burns, the average composition values for the data set, the certified composition values for the CRM used, and the standard deviation of the data for each element expressed in Parts Per Million (PPM).

Data provided is a typical representation of MERLIN 4 performance, individual instrument performance may vary. MM00090 - MERLIN 4 Datasheet – Aluminium Calibrations v1.1

Al-4150 – Al Mg Alloy Calibration

Precision Data

Elements	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V	Zr	Ga	Bi	Ag	In	Sb	Sr	Ca	Cd	Be	Co	B	P
Level %	Precision (PPM)																								
0.001							6			3	1	1			3						1				
0.002					3	2	4		2	5		1	1	2							1				
0.005						3		1	2		2	2		2	3						2	2	3		
0.01	4		4		2	2	3	6	3	3	2	2		2	3						1	3	2		
0.02			13	2	4	4	6	12	3	4	6	2	2	3	3						2		9		
0.05	14	23	33	4	12	4	11	15		18	11												5		
0.1	20	73	39	5	24	6	22	26	39	23	47	10	19		32										
0.2	12	40	35	9	51	40	30		34		62														
0.3	43	38	32		34	42	74	35		51	46		22												
0.5	117	71	77	52	61		78	104	96						89										
1	183	189	33	67	171			101	97																
2	708		678		458			155																	
3			826																						
4																									
5			1171		312																				
10																									
20																									
30																									
40																									

Precision of analysis results within the listed %-mass content ranges given in Parts Per Million (PPM) for elements analysed in the Al-4150 calibration. Data measured using a production MERLIN 4 instrument.

Al-4150 – Al Mg Alloy Calibration

Sample Data – 574-02

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V
Run1	89.7	0.1050	0.107	0.0466	0.0262	9.82	0.00441	0.00452	0.0243	0.0176	0.0161	0.0970	0.00988
Run2	89.8	0.0953	0.105	0.0457	0.0259	9.75	0.00419	0.00453	0.0250	0.0178	0.0158	0.0968	0.00980
Run3	89.7	0.0964	0.112	0.0476	0.0258	9.82	0.00412	0.00489	0.0251	0.0180	0.0158	0.0981	0.00978
Run4	89.7	0.0923	0.105	0.0452	0.0258	9.83	0.00408	0.00447	0.0238	0.0179	0.0155	0.0981	0.00985
Run5	89.6	0.0914	0.105	0.0442	0.0258	9.93	0.00384	0.00423	0.0245	0.0179	0.0158	0.0967	0.00970
Run6	89.6	0.0897	0.103	0.0442	0.0253	9.96	0.00407	0.00408	0.0241	0.0180	0.0156	0.0969	0.00978
Run7	89.6	0.0914	0.101	0.0456	0.0258	9.90	0.00397	0.00437	0.0264	0.0179	0.0155	0.0996	0.00975
Run8	89.5	0.0899	0.103	0.0432	0.0253	10.0	0.00394	0.00437	0.0239	0.0182	0.0157	0.0978	0.00968
Run9	89.6	0.0900	0.103	0.0447	0.0256	9.91	0.00393	0.00445	0.0240	0.0176	0.0156	0.0935	0.00943
Run10	89.4	0.0902	0.103	0.0435	0.0253	10.1	0.00400	0.00441	0.0246	0.0183	0.0158	0.0974	0.00974
Avg	89.6	0.0932	0.105	0.0451	0.0257	9.91	0.00405	0.00443	0.0246	0.0179	0.0157	0.0972	0.00974
CRM		0.096	0.106	0.046	0.026	9.88	0.0043	0.0044	0.024	0.014	0.016	0.097	0.007
SD (PPM)		47.9	31.5	13.9	3.13	1130	1.61	2.12	7.82	2.3	1.85	15.5	1.24

ID	Zr	Ga	Bi	Ag	In	Sb	Sr	Ca	Cd	Be	Co	B	Hg
Run1	<0.0002	0.0110	<0.0006	0.00548	<0.0002	0.00942	0.000102	0.00164	<0.0001	0.0109	<0.0004	0.000389	<0.0002
Run2	<0.0002	0.0111	<0.0006	0.00547	<0.0002	0.00861	0.000102	0.00126	<0.0001	0.0110	<0.0004	0.000333	<0.0002
Run3	<0.0002	0.0110	<0.0006	0.00547	<0.0002	0.00917	0.000104	0.00135	<0.0001	0.0110	<0.0004	0.000362	<0.0002
Run4	<0.0002	0.0111	<0.0006	0.00547	<0.0002	0.00927	<0.0001	0.00107	<0.0001	0.0110	<0.0004	0.000301	<0.0002
Run5	<0.0002	0.0111	<0.0006	0.00547	<0.0002	0.00715	0.000102	0.00131	<0.0001	0.0109	<0.0004	0.000371	<0.0002
Run6	<0.0002	0.0112	<0.0006	0.00547	<0.0002	0.00938	<0.0001	0.00132	<0.0001	0.0109	<0.0004	0.000328	<0.0002
Run7	<0.0002	0.0110	<0.0006	0.00547	<0.0002	0.0114	0.000110	0.00197	<0.0001	0.0105	<0.0004	0.000337	<0.0002
Run8	<0.0002	0.0110	<0.0006	0.00546	<0.0002	0.0101	<0.0001	0.00141	<0.0001	0.0108	<0.0004	0.000327	<0.0002
Run9	<0.0002	0.0109	<0.0006	0.00547	<0.0002	0.00888	<0.0001	0.00187	<0.0001	0.0106	<0.0004	0.000305	<0.0002
Run10	<0.0002	0.0110	<0.0006	0.00545	<0.0002	0.00892	<0.0001	0.00152	<0.0001	0.0110	<0.0004	0.000447	<0.0002
Avg	<0.0002	0.0110*	<0.0006	0.00547	<0.0002	0.00923	<0.0001	0.00147	<0.0001	0.0109	<0.0004	0.000350	<0.0002
CRM										0.01			
SD (PPM)	1.15	0.68	1.49	0.08	0.91	10.8	0.08	2.81	0.59	1.79	4.72	0.44	1.12

Analysis results obtained from **Certified Reference Sample 574-02** using the **Al-4150** calibration for aluminium-magnesium alloy samples on a production MERLIN 4 instrument. Results given in mass-%.

Data set includes data from 10 burns, the average composition values for the data set, the certified composition values for the CRM used, and the standard deviation of the data for each element expressed in Parts Per Million (PPM).

Data provided is a typical representation of MERLIN 4 performance, individual instrument performance may vary.

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MM00090 - MERLIN 4 Datasheet – Aluminium Calibrations v1.1

*Verified - spectrum peak visible

Al-4170 – Al Zn Alloy Calibration

Sample Data – 3433-2

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V
Run1	87.8	0.641	0.468	3.00	0.513	0.244	0.00319	0.463	6.40	0.309	0.0486	0.0120	0.00483
Run2	87.7	0.644	0.465	3.03	0.512	0.232	0.00317	0.470	6.45	0.315	0.0492	0.0118	0.00483
Run3	87.9	0.642	0.474	3.00	0.516	0.236	0.00310	0.469	6.32	0.311	0.0484	0.0117	0.00482
Run4	87.7	0.646	0.471	3.02	0.516	0.231	0.00313	0.471	6.51	0.316	0.0487	0.0119	0.00483
Run5	87.8	0.644	0.471	3.02	0.514	0.230	0.00302	0.473	6.39	0.316	0.0489	0.0119	0.00479
Run6	87.9	0.632	0.453	2.98	0.510	0.227	0.00312	0.460	6.39	0.312	0.0482	0.0118	0.00479
Run7	87.8	0.642	0.470	3.02	0.514	0.225	0.00335	0.469	6.36	0.312	0.0481	0.0118	0.00486
Run8	87.8	0.641	0.473	3.01	0.514	0.228	0.00338	0.465	6.36	0.313	0.0489	0.0119	0.00482
Run9	87.8	0.634	0.465	2.99	0.513	0.222	0.00315	0.459	6.43	0.308	0.0481	0.0118	0.00480
Run10	87.8	0.636	0.461	3.00	0.513	0.228	0.00317	0.460	6.39	0.310	0.0481	0.0118	0.00480
Avg	87.8	0.640	0.467	3.01	0.514	0.230	0.00318	0.466	6.40	0.312	0.0485	0.0118	0.00482
CRM		0.645	0.465	3.01	0.51	0.235	0.0032	0.469	6.45	0.272	0.049	0.0118	
SD (PPM)		46.1	64.1	158	17	61.2	1.09	50.6	517	28.4	4	0.77	0.22

ID	Zr	Ga	Bi	Ag	In	Sb	Sr	Ca	Cd	Be	Co	B	P
Run1	0.0459	0.0107	<0.0005	0.00451	<0.0005	0.0201	<0.0001	0.00123	<0.0001	0.000508	0.00197	0.00200	<0.0004
Run2	0.0457	0.0108	<0.0005	0.00451	<0.0005	0.0197	<0.0001	0.00102	<0.0001	0.000497	0.00146	0.00202	<0.0004
Run3	0.0462	0.0107	<0.0005	0.00450	<0.0005	0.0203	<0.0001	0.000880	<0.0001	0.000495	0.00197	0.00212	<0.0004
Run4	0.0463	0.0107	<0.0005	0.00457	<0.0005	0.0206	<0.0001	0.00132	<0.0001	0.000492	0.00134	0.00204	<0.0004
Run5	0.0461	0.0108	<0.0005	0.00457	<0.0005	0.0192	<0.0001	0.00100	<0.0001	0.000493	0.000894	0.00209	<0.0004
Run6	0.0457	0.0108	<0.0005	0.00450	<0.0005	0.0192	<0.0001	0.000792	<0.0001	0.000487	0.00178	0.00199	<0.0004
Run7	0.0457	0.0107	<0.0005	0.00448	<0.0005	0.0215	<0.0001	0.00153	<0.0001	0.000486	0.00131	0.00212	<0.0004
Run8	0.0464	0.0108	<0.0005	0.00452	<0.0005	0.0197	<0.0001	0.00155	<0.0001	0.000484	0.00193	0.00210	<0.0004
Run9	0.0467	0.0108	<0.0005	0.00449	<0.0005	0.0204	<0.0001	0.00139	<0.0001	0.000491	0.00191	0.00203	<0.0004
Run10	0.0463	0.0107	<0.0005	0.00452	<0.0005	0.0201	<0.0001	0.000924	<0.0001	0.000495	0.00180	0.00207	<0.0004
Avg	0.0461*	0.0108	<0.0005	0.00452	<0.0005	0.0201*	<0.0001	0.00116	<0.0001	0.000493	0.00164	0.00206	<0.0004
CRM								0.0005					
SD (PPM)	3.49	0.35	1.71	0.3	0.8	6.89	0.05	2.76	0.36	0.07	3.67	0.48	2.35

Analysis results obtained from **Certified Reference Sample 3433-2** using the **Al-4170** calibration for aluminium-zinc alloy samples on a production MERLIN 4 instrument. Results given in mass-%.

Data set includes data from 10 burns, the average composition values for the data set, the certified composition values for the CRM used, and the standard deviation of the data for each element expressed in Parts Per Million (PPM).

Data provided is a typical representation of MERLIN 4 performance, individual instrument performance may vary.

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*Verified - spectrum peak visible



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