ARTUS 8

Aluminium Calibration Datasheet

Calibration Ranges for Aluminium Calibrations

Elements	Model	Al Global Al-8000		Low Alloy Al-8020		Al Cu Alloys Al-8120		Al Si Cu Alloys Al-8130		Al Si Alloys Al-8140		Al Mg Alloys Al-8150		Al Zn Alloys Al-8170	
		Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %
Si	● Δ □	0.003	33	0.003	2.4	0.002	7	0.002	33	0.002	33	0.001	8.2	0.001	15.5
Fe	● Δ □	0.004	3.2	0.002	3.2	0.004	3.2	0.004	3.2	0.004	3.2	0.006	3.2	0.002	3.2
Cu	● Δ □	0.002	34	0.001	1.8	0.001	34	0.001	34	0.001	4.8	0.003	8	0.003	5.8
Mn	● Δ □	0.001	2.1	0.0007	2	0.001	2.1	0.0008	2.1	0.0008	2.1	0.001	2.1	0.0005	2.1
Mg	● Δ □	0.0002	17	0.0001	1.3	0.0001	2.7	0.0001	2.7	0.0001	1.75	0.0002	17	0.0001	5.5
Cr	● Δ □	0.0005	0.6	0.0002	0.55	0.0004	0.55	0.0003	0.6	0.0003	0.6	0.0003	0.6	0.0004	0.6
Ni	● Δ □	0.007	3	0.001	0.5	0.002	3	0.003	3	0.003	3	0.004	3	0.0009	2.5
Zn	● Δ □	0.008	12.8	0.002	0.5	0.003	7	0.002	7	0.002	2.3	0.003	0.5	0.001	12.8
Pb	● Δ □	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	● Δ □	0.003	1.25	0.0007	1.25	0.001	0.25	0.001	0.45	0.001	0.45	0.001	0.45	0.0007	0.45
Ti	● Δ □	0.0001	0.4	0.0001	0.4	0.0001	0.4	0.0001	0.4	0.0001	0.4	0.0001	0.4	0.0001	0.4
V	● Δ □	0.0001	0.3	0.0001	0.15	0.0001	0.3	0.0001	0.3	0.0001	0.15	0.0001	0.3	0.0001	0.15
Zr	● Δ □	0.0003	0.3	0.0001	0.03	0.0003	0.3	0.0003	0.3	0.0003	0.3	0.0002	0.3	0.0001	0.3
Ga	● Δ □	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	● Δ □	0.001	0.7	0.0008	0.6	0.0008	0.7	0.0004	0.7	0.0004	0.7	0.0006	0.7	0.0005	0.7
Ag	● Δ □	0.0001	0.7	0.0001	0.26	0.0001	0.7	0.0001	0.7	0.0001	0.26	0.0001	0.7	0.0001	0.7
In	● Δ □	0.0002	0.1									0.0002	0.06	0.0005	0.06
Sb	● Δ □	0.001	0.65	0.001	0.06	0.001	0.65	0.002	0.65	0.002	0.65	0.001	0.65	0.001	0.45
Sr	● Δ □	0.0001	0.15					0.0001	0.15	0.0001	0.15	0.0001	0.15	0.0001	0.15
Ca	● Δ □	0.0002	0.05	0.0006	0.01	0.0003	0.01	0.0001	0.05	0.0001	0.05	0.0001	0.05	0.0001	0.05
Cd	● Δ □	0.0001	0.25	0.0001	0.03	0.0001	0.15	0.0001	0.25	0.0001	0.15	0.0001	0.25	0.0001	0.25
Be	● Δ □	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	● Δ □	0.0005	0.5	0.0005	0.08	0.0004	0.4	0.0006	0.4	0.0006	0.5	0.0004	0.25	0.0004	0.5
B	● Δ □	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	● Δ	0.0003	0.02					0.0003	0.02	0.0003	0.02			0.0004	0.02
Na	● Δ □	0.0001	0.035	0.0001	0.035	0.0001	0.035	0.0001	0.035	0.0001	0.035	0.0001	0.035	0.0001	0.035
Li	● Δ □	0.0001	0.04	0.0001	0.04	0.0001	0.04	0.0001	0.04	0.0001	0.04	0.0001	0.04	0.0001	0.04
Hg	● Δ	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	● Δ □	Balance		Balance		Balance		Balance		Balance		Balance		Balance	

● Ultimate Δ Standard □ 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 ARTUS 8 instrument, please note that detection limits of individual instruments may vary.

Calibrations can be extended using customer samples.

Al-8020 – Low Alloy Calibration

Precision Data

Elements	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Ti	Pb	Be	Sn	Bi	Cd	Sb	B	Co	V	Ga	Zr	Ag	Na	Li
Level %	Precision (PPM)																						
0.001					1						0									1		0	
0.002			2	1	1				1		1								1	1			
0.005			14		2	4			3							2		2					0
0.01			4	4	2	9	7	7	2	6	4	11	6	3	20			3	2		2		5
0.02	5	31	5	6	4	6	6	7	8	5		15	6	2	14	3	19	6	3	3		2	3
0.05	6	22	11	14	6	11	8	7	25				48		20		21				9		
0.1	20	32	50	5		12	92	17	48	35		34	41					102		23	23		
0.2	44	59	33	15	21	25	26		128														
0.3	100	102	57	11	32	50	78	40	75	16			21										
0.5	81	66		108	68			50															
1	401	243		1	176					173													
2																							
3			970																				
4																							
5	287																						
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-8020 calibration. Data measured using a production ARTUS 8 instrument.

Al-8020 – Low Alloy Calibration

Sample Data – 614-05

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V
Run1	98.2	0.636	0.242	0.0250	0.0538	0.603	0.0209	0.00796	0.0535	0.00574	0.00502	0.0294	0.0166
Run2	98.2	0.630	0.242	0.0259	0.0537	0.598	0.0210	0.00862	0.0533	0.00550	0.00496	0.0292	0.0164
Run3	98.2	0.619	0.237	0.0221	0.0533	0.597	0.0207	0.00770	0.0523	0.00535	0.00521	0.0290	0.0166
Run4	98.2	0.632	0.241	0.0258	0.0533	0.600	0.0208	0.00836	0.0539	0.00583	0.00507	0.0290	0.0165
Run5	98.2	0.629	0.239	0.0241	0.0532	0.601	0.0208	0.00832	0.0527	0.00584	0.00529	0.0291	0.0165
Run6	98.2	0.625	0.238	0.0247	0.0533	0.599	0.0208	0.00773	0.0524	0.00537	0.00500	0.0292	0.0165
Run7	98.2	0.631	0.240	0.0241	0.0534	0.606	0.0208	0.00775	0.0532	0.00538	0.00541	0.0291	0.0165
Run8	98.2	0.628	0.239	0.0245	0.0535	0.601	0.0208	0.00851	0.0532	0.00587	0.00490	0.0292	0.0166
Run9	98.2	0.631	0.242	0.0248	0.0535	0.602	0.0208	0.00984	0.0530	0.00575	0.00511	0.0290	0.0164
Run10	98.2	0.637	0.252	0.0277	0.0535	0.603	0.0216	0.00832	0.0539	0.00584	0.00508	0.0291	0.0166
Avg	**98.2**	**0.630**	**0.241**	**0.0249**	**0.0535**	**0.601**	**0.0209**	**0.00831**	**0.0531**	**0.00565**	**0.00510**	**0.0291**	**0.0165**
CRM		**0.63**	**0.246**	**0.0299**	**0.0518**	**0.616**	**0.0209**	**0.0095**	**0.0523**	**0.0052**	**0.0055**	**0.0303**	**0.0166**
SD (PPM)		**51.1**	**42.5**	**14.5**	**1.79**	**24.9**	**2.6**	**6.34**	**5.69**	**2.19**	**1.56**	**1.18**	**0.69**

ID	Zr	Ga	Bi	Ag	Sb	Ca	Cd	Be	Co	B	Na	Li	Hg
Run1	0.00105	0.00130	0.00708	<0.0001	0.00609	0.00333	0.00229	<0.0001	0.00491	0.00176	0.000878	0.000313	0.00272
Run2	0.00106	0.00130	0.00696	<0.0001	0.00551	0.00345	0.00236	<0.0001	0.00466	0.00176	0.000861	0.000315	0.00293
Run3	0.00105	0.00133	0.00694	<0.0001	0.00342	0.00160	0.00227	<0.0001	0.00472	0.00188	0.000784	0.000305	0.00292
Run4	0.00105	0.00136	0.00716	<0.0001	0.00519	0.00365	0.00233	<0.0001	0.00462	0.00171	0.000842	0.000313	0.00301
Run5	0.00105	0.00131	0.00713	<0.0001	0.00634	0.00374	0.00232	<0.0001	0.00476	0.00172	0.000856	0.000306	0.00294
Run6	0.00106	0.00129	0.00704	<0.0001	0.00558	0.00321	0.00234	<0.0001	0.00473	0.00169	0.000822	0.000314	0.00304
Run7	0.00105	0.00127	0.00703	<0.0001	0.00582	0.00406	0.00230	<0.0001	0.00475	0.00175	0.000825	0.000317	0.00305
Run8	0.00105	0.00129	0.00707	<0.0001	0.00549	0.00359	0.00230	<0.0001	0.00455	0.00176	0.000837	0.000316	0.00301
Run9	0.00105	0.00132	0.00675	<0.0001	0.00571	0.00331	0.00233	<0.0001	0.00524	0.00171	0.000860	0.000312	0.00308
Run10	0.00105	0.00134	0.00704	<0.0001	0.00690	0.00449	0.00240	<0.0001	0.00519	0.00183	0.000987	0.000322	0.00317
Avg	**0.00105**	**0.00131**	**0.00702**	**<0.0001**	**0.00561**	**0.00344**	**0.00232**	**<0.0001**	**0.00481**	**0.00176**	**0.000855**	**0.000313**	**0.00299**
CRM	**0.0016**		**0.0078**		**0.0035**	**0.0014**	**0.0016**		**0.0041**		**0.0007-0.0011**	**0.0003**	**0.0033**
SD (PPM)	**0.03**	**0.26**	**1.16**	**0.2**	**9.12**	**7.55**	**0.36**	**0.03**	**2.31**	**0.57**	**0.53**	**0.05**	**1.19**

Analysis results obtained from **Certified Reference Sample 614-05** using the **Al-8020** calibration for low alloy aluminium samples on a production ARTUS 8 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 ARTUS 8 performance, individual instrument performance may vary.

Al-8120 – Al Cu Alloy Calibration

Precision Data

Elements	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V	Zr	Ga	Bi	Cd	Co	Sb	Ag	Na	Li
Level %	Precision (PPM)																				
0.001						6							1							0	
0.002						4							1							2	0
0.005					1	6	1		6		2									2	
0.01					2	7	3	7	3	9	1	1		1	10						
0.02	11		3		3	5	4	5	3	10	8	1		1							3
0.05	8	20		6			13	6	9	11	8	6	7								
0.1	27	35		7	23	17		21	11	17	8	9	7								
0.2	27	43	21	112	18		10	29	24		7		10								
0.3	29	45		21	36		23		89				221						33		
0.5	41	107	70	17	85			45							103						
1	310			38	222			121													
2							248	164													
3			465																		
4			240					106													
5	618		710					158													
10			1119																		
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-8120 calibration. Data measured using a production ARTUS 8 instrument.

Al-8120 – Al Cu Alloy Calibration

Sample Data – 246-01

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V
Run1	91.8	0.145	0.310	6.70	0.350	0.0237	0.0234	0.0201	0.101	0.00328	0.0178	0.0984	0.0933
Run2	91.9	0.144	0.306	6.64	0.348	0.0226	0.0235	0.0200	0.100	0.00255	0.0175	0.101	0.0947
Run3	91.9	0.147	0.306	6.65	0.349	0.0222	0.0234	0.0203	0.101	0.00189	0.0179	0.0994	0.0947
Run4	91.8	0.144	0.307	6.69	0.349	0.0217	0.0233	0.0199	0.0999	0.00150	0.0179	0.0989	0.0938
Run5	91.9	0.143	0.296	6.60	0.346	0.0215	0.0234	0.0199	0.0996	0.00175	0.0178	0.104	0.0969
Run6	91.8	0.144	0.306	6.69	0.349	0.0217	0.0234	0.0199	0.0986	0.00173	0.0177	0.0987	0.0933
Run7	91.9	0.144	0.299	6.68	0.347	0.0219	0.0232	0.0201	0.0996	0.00147	0.0176	0.100	0.0949
Run8	91.8	0.144	0.298	6.71	0.348	0.0215	0.0232	0.0200	0.0993	0.00148	0.0175	0.0999	0.0939
Run9	91.9	0.144	0.300	6.67	0.346	0.0219	0.0233	0.0199	0.100	0.00170	0.0179	0.102	0.0954
Run10	91.9	0.143	0.301	6.64	0.347	0.0214	0.0233	0.0199	0.0989	0.00165	0.0174	0.103	0.0958
Avg	**91.9**	**0.144**	**0.303**	**6.66**	**0.348**	**0.0220**	**0.0234**	**0.0200**	**0.0998**	**0.0019**	**0.0177***	**0.101**	**0.0947**
CRM		**0.145**	**0.312**	**6.7**	**0.35**	**0.024**	**0.02**	**0.02**	**0.1**			**0.12**	**0.095**
SD (PPM)		**12.2**	**44.9**	**331**	**12.9**	**6.99**	**1.12**	**1.38**	**7.1**	**5.78**	**1.73**	**18.7**	**11.4**

ID	Zr	Ga	Bi	Ag	Sb	Ca	Cd	Be	Co	B	Na	Li	Hg
Run1	0.225	0.0122	0.00158	0.00523	0.0181	0.00176	0.000257	<0.0001	<0.0004	0.00209	<0.0001	<0.0001	<0.0002
Run2	0.226	0.0123	0.00165	0.00525	0.0179	0.00199	0.000236	<0.0001	<0.0004	0.00210	<0.0001	<0.0001	<0.0002
Run3	0.226	0.0122	0.00151	0.00524	0.0184	0.00205	0.000190	<0.0001	<0.0004	0.00205	<0.0001	<0.0001	<0.0002
Run4	0.223	0.0122	0.00149	0.00523	0.0177	0.00146	0.000177	<0.0001	<0.0004	0.00213	<0.0001	<0.0001	<0.0002
Run5	0.225	0.0123	0.00170	0.00524	0.0177	0.000904	0.000165	<0.0001	<0.0004	0.00201	0.000108	<0.0001	<0.0002
Run6	0.224	0.0123	0.00144	0.00522	0.0173	0.00125	0.000164	<0.0001	<0.0004	0.00209	<0.0001	<0.0001	<0.0002
Run7	0.226	0.0123	0.00161	0.00523	0.0173	0.00147	0.000182	<0.0001	<0.0004	0.00201	<0.0001	<0.0001	<0.0002
Run8	0.225	0.0123	0.00142	0.00523	0.0172	0.000995	0.000145	<0.0001	<0.0004	0.00199	<0.0001	<0.0001	<0.0002
Run9	0.226	0.0124	0.00174	0.00524	0.0179	0.00188	0.000206	<0.0001	<0.0004	0.00204	0.000131	<0.0001	<0.0002
Run10	0.226	0.0124	0.00154	0.00523	0.0177	0.00148	0.000143	<0.0001	<0.0004	0.00204	<0.0001	<0.0001	<0.0002
Avg	**0.225**	**0.0123***	**0.00157**	**0.00523**	**0.0177***	**0.00152**	**0.000186**	**<0.0001**	**<0.0004**	**0.00206**	**<0.0001**	**<0.0001**	**<0.0002**
CRM	**0.21**												
SD (PPM)	**8.1**	**0.64**	**1.11**	**0.06**	**3.73**	**3.96**	**0.37**	**0.02**	**1.75**	**0.47**	**0.17**	**0.06**	**1.34**

Analysis results obtained from **Certified Reference Sample 246-01** using the **Al-8120** calibration for aluminium-copper alloy samples on a production ARTUS 8 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 ARTUS 8 performance, individual instrument performance may vary.

*Verified - spectrum peak visible

Al-8130 – 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	Na	Li
Level %	Precision (PPM)																										
0.001																			0						0	0	
0.002				4	4	3	7			8	2	1	1						1	1				2	1		
0.005			8			3				6		2								2				2	8	2	
0.01			2	3	2	4	3		4	16	2	1	1	1					2	1		4		6	5		
0.02				5	4	5	7	5	4	9	3			1	6		39	16	9					4			3
0.05	65	17	7	10		90	8	6	5	15	6						65					9				
0.1	10	65	16	7	12		31		11	13	14				71			38	30								
0.2		17		46	26	93	14	34	74	114	42							36									
0.3		69	20	132	46		20	47	99	113								181									
0.5	26	96	63	103	86		82		86						99												
1	154	235	265		214		118	86																			
2		186	138					89																			
3			298					192																			
4			291					102																			
5	484							885																			
10	1649																										
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-8130 calibration. Data measured using a production ARTUS 8 instrument.

Al-8130 – Al Si Cu Alloy Calibration

Sample Data – 472-02

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V	Zr
Run1	74.9	17.7	1.44	4.04	0.319	0.345	0.0351	0.493	0.323	0.131	0.0949	0.105	0.0467	0.0162
Run2	74.8	17.7	1.45	4.01	0.320	0.349	0.0348	0.496	0.314	0.132	0.0945	0.105	0.0466	0.0162
Run3	74.9	17.7	1.45	3.99	0.320	0.350	0.0351	0.494	0.312	0.132	0.0945	0.105	0.0466	0.0162
Run4	75.0	17.7	1.44	3.96	0.321	0.352	0.0348	0.491	0.310	0.132	0.0952	0.105	0.0465	0.0161
Run5	75.0	17.6	1.44	3.97	0.320	0.349	0.0348	0.489	0.311	0.133	0.0939	0.104	0.0465	0.0161
Run6	74.9	17.7	1.44	3.98	0.319	0.351	0.0346	0.494	0.311	0.133	0.0952	0.104	0.0462	0.0163
Run7	74.9	17.7	1.45	4.00	0.320	0.351	0.0347	0.497	0.312	0.134	0.0948	0.105	0.0464	0.0160
Run8	75.0	17.7	1.44	3.97	0.320	0.348	0.0348	0.495	0.310	0.132	0.0951	0.105	0.0464	0.0162
Run9	74.9	17.7	1.44	3.98	0.320	0.351	0.0348	0.493	0.310	0.132	0.0948	0.105	0.0465	0.0161
Run10	74.8	17.8	1.47	4.00	0.318	0.353	0.0348	0.495	0.311	0.133	0.0945	0.104	0.0463	0.0162
Avg	**74.9**	**17.7**	**1.45**	**3.99**	**0.320**	**0.350**	**0.0348**	**0.494**	**0.312**	**0.132**	**0.0947**	**0.105**	**0.0465**	**0.0162**
CRM		**17.7**	**1.43**	**4.02**	**0.321**	**0.344**	**0.035**	**0.498**	**0.321**	**0.117**	**0.0940**	**0.103**	**0.057**	**0.0192**
SD (PPM)		**410**	**89**	**227**	**7.77**	**22.9**	**1.44**	**22.1**	**38.5**	**7.75**	**4.12**	**3.6**	**1.43**	**0.73**

ID	Ga	Bi	Ag	Sb	Sr	Ca	Cd	Be	Co	B	P	Na	Li	Hg
Run1	0.0134	0.00188	0.00316	0.0101	<0.0001	0.00775	0.000512	0.000379	0.00110	0.00877	0.00212	0.000416	<0.0001	<0.0002
Run2	0.0134	0.00167	0.00316	0.0099	<0.0001	0.00722	0.000499	0.000380	0.00141	0.00873	0.00212	0.000385	<0.0001	<0.0002
Run3	0.0134	0.00177	0.00316	0.0102	<0.0001	0.00756	0.000511	0.000379	0.00123	0.00880	0.00206	0.000386	<0.0001	<0.0002
Run4	0.0135	0.00185	0.00317	0.0105	<0.0001	0.00761	0.000515	0.000378	0.00140	0.00873	0.00220	0.000389	<0.0001	<0.0002
Run5	0.0134	0.00197	0.00315	0.0104	<0.0001	0.00774	0.000511	0.000378	0.00132	0.00882	0.00224	0.000400	<0.0001	<0.0002
Run6	0.0135	0.00176	0.00316	0.0107	<0.0001	0.00751	0.000507	0.000377	0.00105	0.00871	0.00208	0.000407	<0.0001	<0.0002
Run7	0.0134	0.00137	0.00315	0.0104	<0.0001	0.00788	0.000522	0.000380	0.00159	0.00877	0.00222	0.000394	<0.0001	<0.0002
Run8	0.0135	0.00189	0.00315	0.0112	<0.0001	0.00792	0.000516	0.000379	0.00106	0.00878	0.00226	0.000397	<0.0001	<0.0002
Run9	0.0134	0.00189	0.00316	0.0099	<0.0001	0.00738	0.000508	0.000380	0.00151	0.00878	0.00219	0.000410	<0.0001	<0.0002
Run10	0.0135	0.00158	0.00315	0.0108	<0.0001	0.00758	0.000491	0.000377	0.00158	0.00868	0.00223	0.000391	<0.0001	<0.0002
Avg	**0.0134**	**0.00176**	**0.00316**	**0.0104**	**<0.0001**	**0.00762**	**0.000509**	**0.000379**	**0.00132**	**0.00876**	**0.00217**	**0.000398**	**<0.0001**	**<0.0002**
CRM	**0.0113**					**0.007**					**0.0022**			
SD (PPM)	**0.59**	**1.79**	**0.08**	**4.24**	**0.1**	**2.16**	**0.09**	**0.01**	**2.1**	**0.43**	**0.7**	**0.11**	**0.07**	**0.11**

Analysis results obtained from **Certified Reference Sample 472-02** using the **Al-8130** calibration for aluminium-silicon-copper alloy samples on a production ARTUS 8 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 ARTUS 8 performance, individual instrument performance may vary.

Al-8140 – Al Si Alloy Calibration

Sample Data – 472-02

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V	Zr
Run1	74.9	17.6	1.44	4.04	0.322	0.341	0.0330	0.497	0.323	0.114	0.0935	0.102	0.0470	0.0162
Run2	74.9	17.6	1.45	4.06	0.321	0.342	0.0331	0.499	0.325	0.115	0.0943	0.102	0.0468	0.0159
Run3	74.8	17.7	1.45	4.09	0.321	0.345	0.0329	0.501	0.325	0.115	0.0940	0.102	0.0470	0.0160
Run4	74.7	17.8	1.46	4.09	0.320	0.339	0.0330	0.503	0.328	0.116	0.0944	0.102	0.0471	0.0160
Run5	74.8	17.7	1.44	4.07	0.320	0.341	0.0330	0.498	0.328	0.115	0.0938	0.101	0.0471	0.0161
Run6	74.8	17.7	1.45	4.08	0.320	0.340	0.0327	0.502	0.327	0.116	0.0942	0.102	0.0472	0.0162
Run7	74.7	17.8	1.46	4.09	0.319	0.345	0.0329	0.501	0.328	0.116	0.0944	0.101	0.0470	0.0159
Run8	74.8	17.7	1.46	4.07	0.320	0.341	0.0329	0.501	0.326	0.115	0.0949	0.102	0.0471	0.0158
Run9	74.7	17.8	1.47	4.11	0.319	0.344	0.0328	0.502	0.332	0.117	0.0946	0.102	0.0470	0.0161
Run10	74.8	17.7	1.46	4.09	0.318	0.343	0.0328	0.502	0.329	0.115	0.0942	0.101	0.0466	0.0158
Avg	**74.8**	**17.7**	**1.46**	**4.08**	**0.320**	**0.342**	**0.0329**	**0.500**	**0.327**	**0.115**	**0.0942**	**0.102**	**0.0470**	**0.0160**
CRM		**17.7**	**1.43**	**4.02**	**0.321**	**0.344**	**0.035**	**0.498**	**0.321**	**0.117**	**0.094**	**0.103**	**0.057**	**0.0192**
SD (PPM)		**582**	**109**	**183**	**11.4**	**20**	**1.23**	**19.5**	**23.3**	**5.96**	**3.95**	**2.89**	**1.67**	**1.39**

ID	Ga	Bi	Ag	Sb	Sr	Ca	Cd	Be	Co	B	P	Na	Li	Hg
Run1	0.0134	0.00128	0.000477	0.0109	<0.0001	0.00694	<0.0001	0.000380	0.00149	0.00876	0.00322	0.000402	<0.0001	<0.0002
Run2	0.0134	0.00081	0.000469	0.0106	<0.0001	0.00722	<0.0001	0.000380	0.00159	0.00875	0.00340	0.000414	<0.0001	<0.0002
Run3	0.0134	0.00101	0.000457	0.0112	<0.0001	0.00709	<0.0001	0.000378	0.00193	0.00871	0.00328	0.000418	<0.0001	<0.0002
Run4	0.0134	0.00108	0.000448	0.0112	<0.0001	0.00673	<0.0001	0.000378	0.00177	0.00868	0.00318	0.000413	<0.0001	<0.0002
Run5	0.0134	0.00109	0.000462	0.0101	<0.0001	0.00647	<0.0001	0.000377	0.00129	0.00876	0.00318	0.000402	<0.0001	<0.0002
Run6	0.0135	0.00092	0.000439	0.0099	<0.0001	0.00709	<0.0001	0.000378	0.00149	0.00861	0.00332	0.000417	<0.0001	<0.0002
Run7	0.0134	0.00054	0.000464	0.0106	<0.0001	0.00716	<0.0001	0.000378	0.00177	0.00866	0.00322	0.000411	<0.0001	<0.0002
Run8	0.0136	0.00121	0.000475	0.0112	<0.0001	0.00769	<0.0001	0.000378	0.00142	0.00870	0.00329	0.000410	<0.0001	<0.0002
Run9	0.0134	0.00106	0.000469	0.0108	<0.0001	0.00770	<0.0001	0.000379	0.00179	0.00864	0.00322	0.000423	<0.0001	<0.0002
Run10	0.0134	0.00094	0.000444	0.0111	<0.0001	0.00769	<0.0001	0.000380	0.00145	0.00870	0.00328	0.000426	<0.0001	<0.0002
Avg	**0.0134**	**0.00099**	**0.000460**	**0.0108**	**<0.0001**	**0.00718**	**<0.0001**	**0.000379**	**0.00160**	**0.00870**	**0.00326**	**0.000414**	**<0.0001**	**<0.0002**
CRM	**0.0113**					**0.007**					**0.0022**			
SD (PPM)	**0.54**	**2.1**	**0.13**	**4.66**	**0.13**	**4.18**	**0.21**	**0.01**	**2.05**	**0.51**	**0.7**	**0.08**	**0.08**	**0.16**

Analysis results obtained from **Certified Reference Sample 472-02** using the **Al-8140** calibration for aluminium-silicon alloy samples on a production ARTUS 8 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 ARTUS 8 performance, individual instrument performance may vary.

Al-8150 – Al Mg Alloy Calibration

Precision Data

Elements	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V	Zr	Be	Bi	Cd	Co	Ga	Na	Li
Level %	Precision (PPM)																			
0.001													1	0		1			1	
0.002						4							2	0					1	
0.005					5	6	7	7				1								
0.01			4			7	9	4	3	9	3	1		1				2	2	
0.02		34	5	7	4	5	7	8	5	10	5	1			7			2		3
0.05	8	18	11	4	7	19		10			21									
0.1	20	30	28	4		13		19			66									
0.2	48	42		9	18	59		22			131									
0.3	39	62	20	19	25				83											
0.5	80	83	97	73	88		118								118					
1	597	116		23	101			42												
2			332		128			74												
3					684															
4																				
5					525															
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-8150 calibration. Data measured using a production ARTUS 8 instrument.

Al-8150 – Al Mg Alloy Calibration

Sample Data – 574-02

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V	Zr
Run1	89.7	0.1010	0.105	0.0460	0.0257	9.84	0.00420	0.00452	0.0242	0.0165	0.0161	0.0960	0.0124	<0.0002
Run2	89.7	0.0995	0.102	0.0450	0.0258	9.77	0.00417	0.00442	0.0237	0.0163	0.0155	0.0970	0.0124	<0.0002
Run3	89.7	0.0991	0.102	0.0459	0.0256	9.81	0.00425	0.00440	0.0244	0.0164	0.0158	0.0964	0.0125	<0.0002
Run4	89.7	0.0971	0.099	0.0453	0.0251	9.78	0.00415	0.00450	0.0245	0.0161	0.0161	0.0958	0.0125	<0.0002
Run5	89.7	0.0961	0.099	0.0459	0.0253	9.84	0.00404	0.00417	0.0244	0.0166	0.0159	0.0965	0.0125	<0.0002
Run6	89.7	0.0947	0.099	0.0467	0.0251	9.81	0.00393	0.00414	0.0240	0.0167	0.0160	0.0962	0.0124	<0.0002
Run7	89.7	0.0917	0.097	0.0425	0.0250	9.82	0.00403	0.00418	0.0236	0.0164	0.0158	0.0970	0.0125	<0.0002
Run8	89.7	0.0946	0.099	0.0441	0.0253	9.82	0.00408	0.00423	0.0239	0.0165	0.0161	0.0964	0.0124	<0.0002
Run9	89.6	0.0955	0.100	0.0446	0.0252	9.89	0.00412	0.00430	0.0240	0.0163	0.0161	0.0964	0.0124	<0.0002
Run10	89.6	0.0948	0.101	0.0450	0.0251	9.95	0.00423	0.00458	0.0239	0.0167	0.0158	0.0966	0.0124	<0.0002
Avg	**89.7**	**0.0964**	**0.100**	**0.0451**	**0.0253**	**9.83**	**0.00412**	**0.00435**	**0.0241**	**0.0165**	**0.0159**	**0.0964**	**0.0124**	**<0.0002**
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)		**28.4**	**23.1**	**12**	**2.62**	**529**	**1.01**	**1.6**	**3.17**	**1.9**	**1.99**	**3.8**	**0.42**	**0.9**

ID	Ga	Bi	Ag	In	Sb	Sr	Ca	Cd	Be	Co	B	Na	Li	Hg
Run1	0.0124	<0.0006	0.00480	<0.0002	0.0109	<0.0001	0.00174	<0.0001	0.0109	<0.0004	0.000551	0.000600	0.000174	<0.0002
Run2	0.0123	<0.0006	0.00480	<0.0002	0.0108	<0.0001	0.00138	<0.0001	0.0109	<0.0004	0.000480	0.000593	0.000179	<0.0002
Run3	0.0123	<0.0006	0.00480	<0.0002	0.0108	<0.0001	0.00212	<0.0001	0.0109	<0.0004	0.000531	0.000590	0.000169	<0.0002
Run4	0.0123	0.000606	0.00480	<0.0002	0.0104	<0.0001	0.00159	<0.0001	0.0109	<0.0004	0.000494	0.000593	0.000174	<0.0002
Run5	0.0124	<0.0006	0.00479	<0.0002	0.0104	<0.0001	0.00167	<0.0001	0.0110	<0.0004	0.000529	0.000595	0.000163	<0.0002
Run6	0.0124	0.000722	0.00480	<0.0002	0.0105	<0.0001	0.00186	<0.0001	0.0109	<0.0004	0.000467	0.000580	0.000171	<0.0002
Run7	0.0122	<0.0006	0.00480	<0.0002	0.0119	<0.0001	0.00209	<0.0001	0.0107	<0.0004	0.000481	0.000605	0.000168	<0.0002
Run8	0.0124	<0.0006	0.00480	<0.0002	0.0118	<0.0001	0.00222	<0.0001	0.0109	<0.0004	0.000474	0.000650	0.000169	<0.0002
Run9	0.0123	0.000697	0.00481	<0.0002	0.0115	<0.0001	0.00210	<0.0001	0.0109	<0.0004	0.000490	0.000622	0.000170	<0.0002
Run10	0.0123	<0.0006	0.00479	<0.0002	0.0106	<0.0001	0.00215	<0.0001	0.0109	<0.0004	0.000468	0.000609	0.000171	<0.0002
Avg	**0.0123***	**<0.0006**	**0.00480**	**<0.0002**	**0.0110**	**<0.0001**	**0.00189**	**<0.0001**	**0.0109**	**<0.0004**	**0.000497**	**0.000604**	**0.000171**	**<0.0002**
CRM									**0.01**					
SD (PPM)	**0.49**	**1.31**	**0.05**	**1.55**	**5.63**	**0.07**	**2.86**	**0.16**	**0.6**	**1.96**	**0.3**	**0.2**	**0.04**	**0.88**

Analysis results obtained from **Certified Reference Sample 574-02** using the **Al-8150** calibration for aluminium-magnesium alloy samples on a production ARTUS 8 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 ARTUS 8 performance, individual instrument performance may vary.

*Verified - spectrum peak visible

Al-8170 – Al Zn Alloy Calibration

Precision Data

Elements	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Sn	Ti	V	Zr	Co	Pb	Bi	Cd	Ga	In	Na	Li
Level %	Precision (PPM)																			
0.001																				0
0.002				4		7					1	3				1			1	1
0.005						8	6				2						1	25	4	
0.01						6			15	2	2	4		5	8	4	1		2	
0.02			7	3		4	4		8	5	4			5	8		1	43	4	3
0.05	42	76	7	4	19			4	13	5		8						73		
0.1	16	91	11	9	10	16	8		20	13		8		11						
0.2	58	42	20	10	19	27	11													
0.3		35		33		67	19								144					
0.5	38	120	56		71									86						
1	532	196	121		134		156	87												
2			133		219			102												
3			269		301			783												
4			111					214												
5	365							1156												
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-8170 calibration. Data measured using a production ARTUS 8 instrument.

Al-8170 – Al Zn Alloy Calibration

Sample Data – 3433-2

ID	Al	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Pb	Sn	Ti	V	Zr
Run1	87.8	0.647	0.460	3.02	0.514	0.242	0.00332	0.459	6.45	0.296	0.0497	0.0119	0.00491	0.0475
Run2	87.7	0.650	0.468	3.02	0.517	0.229	0.00316	0.465	6.45	0.301	0.0496	0.0118	0.00485	0.0473
Run3	87.6	0.653	0.467	3.04	0.514	0.226	0.00312	0.469	6.53	0.296	0.0501	0.0119	0.00515	0.0571
Run4	87.7	0.652	0.466	3.02	0.516	0.225	0.00325	0.464	6.47	0.295	0.0497	0.0118	0.00487	0.0474
Run5	87.7	0.652	0.471	3.04	0.516	0.227	0.00322	0.464	6.49	0.299	0.0497	0.0117	0.00484	0.0474
Run6	87.6	0.652	0.460	3.05	0.513	0.227	0.00315	0.463	6.54	0.296	0.0499	0.0117	0.00484	0.0473
Run7	87.6	0.656	0.475	3.05	0.518	0.226	0.00314	0.465	6.51	0.300	0.0503	0.0117	0.00483	0.0472
Run8	87.6	0.654	0.468	3.05	0.516	0.225	0.00316	0.468	6.56	0.300	0.0505	0.0117	0.00483	0.0476
Run9	87.7	0.656	0.466	3.04	0.515	0.232	0.00308	0.468	6.50	0.300	0.0508	0.0118	0.00489	0.0475
Run10	87.7	0.650	0.463	3.05	0.514	0.226	0.00307	0.469	6.49	0.299	0.0504	0.0116	0.00484	0.0469
Avg	**87.7**	**0.652**	**0.466**	**3.04**	**0.515**	**0.228**	**0.00317**	**0.465**	**6.50**	**0.298**	**0.0501**	**0.0118**	**0.00489**	**0.0483***
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)		**28.4**	**46.7**	**114**	**16.8**	**51.2**	**0.78**	**32.7**	**364**	**22.8**	**4.04**	**1.14**	**0.97**	**31**

ID	Bi	Ag	In	Sb	Sr	Ca	Cd	Be	Co	B	P	Na	Li	Hg
Run1	<0.0005	0.00397	<0.0005	0.0162	<0.0001	0.00154	0.000533	0.000525	<0.0004	0.00292	<0.0004	0.000147	<0.0001	<0.0002
Run2	<0.0005	0.00397	<0.0005	0.0154	<0.0001	0.00119	0.000548	0.000515	<0.0004	0.00294	<0.0004	0.000165	<0.0001	<0.0002
Run3	<0.0005	0.00398	<0.0005	0.0159	<0.0001	0.00199	0.000519	0.000512	<0.0004	0.00288	<0.0004	0.000162	<0.0001	<0.0002
Run4	<0.0005	0.00397	<0.0005	0.0165	<0.0001	0.00160	0.000527	0.000511	<0.0004	0.00294	<0.0004	0.000143	<0.0001	<0.0002
Run5	<0.0005	0.00399	<0.0005	0.0163	<0.0001	0.00173	0.000522	0.000511	<0.0004	0.00302	<0.0004	0.000144	<0.0001	<0.0002
Run6	<0.0005	0.00396	<0.0005	0.0169	<0.0001	0.00141	0.000539	0.000511	<0.0004	0.00295	<0.0004	0.000148	<0.0001	<0.0002
Run7	<0.0005	0.00398	<0.0005	0.0160	<0.0001	0.00164	0.000549	0.000511	<0.0004	0.00298	<0.0004	0.000145	<0.0001	<0.0002
Run8	<0.0005	0.00399	<0.0005	0.0169	<0.0001	0.00190	0.000540	0.000509	<0.0004	0.00295	<0.0004	0.000144	<0.0001	<0.0002
Run9	<0.0005	0.00397	<0.0005	0.0166	<0.0001	0.00162	0.000557	0.000510	<0.0004	0.00295	<0.0004	0.000152	<0.0001	<0.0002
Run10	<0.0005	0.00397	<0.0005	0.0162	<0.0001	0.00134	0.000562	0.000512	<0.0004	0.00293	<0.0004	0.000141	<0.0001	<0.0002
Avg	**<0.0005**	**0.00398**	**<0.0005**	**0.0163***	**<0.0001**	**0.00160**	**0.000540**	**0.000513**	**<0.0004**	**0.00295**	**<0.0004**	**0.000149**	**<0.0001**	**<0.0002**
CRM						**0.0005**								
SD (PPM)	**1.8**	**0.09**	**0.85**	**4.59**	**0.13**	**2.46**	**0.15**	**0.05**	**0.81**	**0.36**	**0.67**	**0.08**	**0.05**	**0.57**

Analysis results obtained from **Certified Reference Sample 3433-2** using the **Al-8170** calibration for aluminium-zinc alloy samples on a production ARTUS 8 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 ARTUS 8 performance, individual instrument performance may vary.

*Verified - spectrum peak visible

ARUN Technology Limited
16 The Brunel Centre
Newton Road
Crawley
West Sussex
RH10 9TU
United Kingdom

Tel: +44 (0) 1293 513123
Email: technicalsupport@aruntechnology.com