

## Muons in aluminum (Al)

Z	A [g/mol]	$\rho$ [g/cm <sup>3</sup> ]	I [eV]	a	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
13 (Al)	26.9815385(7)	2.699	166.0	0.08024	3.6345	0.1708	3.0127	4.2395	0.12

  

T	p	Ionization	Brems	Pair prod	Photonucl	Total	CSDA range
	[MeV/c]			[MeV cm <sup>2</sup> /g]			[g/cm <sup>2</sup> ]
10.0 MeV	$4.704 \times 10^1$	6.188				6.188	$9.023 \times 10^{-1}$
14.0 MeV	$5.616 \times 10^1$	4.849				4.849	$1.640 \times 10^0$
20.0 MeV	$6.802 \times 10^1$	3.802				3.802	$3.053 \times 10^0$
30.0 MeV	$8.509 \times 10^1$	2.960				2.961	$6.075 \times 10^0$
40.0 MeV	$1.003 \times 10^2$	2.533				2.533	$9.750 \times 10^0$
80.0 MeV	$1.527 \times 10^2$	1.908				1.908	$2.851 \times 10^1$
100. MeV	$1.764 \times 10^2$	1.797				1.798	$3.934 \times 10^1$
140. MeV	$2.218 \times 10^2$	1.688				1.688	$6.241 \times 10^1$
200. MeV	$2.868 \times 10^2$	1.629				1.630	$9.871 \times 10^1$
277. MeV	$3.683 \times 10^2$	1.615			0.000	1.615	<i>Minimum ionization</i>
300. MeV	$3.917 \times 10^2$	1.616			0.000	1.616	$1.605 \times 10^2$
400. MeV	$4.945 \times 10^2$	1.630			0.000	1.630	$2.222 \times 10^2$
800. MeV	$8.995 \times 10^2$	1.710	0.000		0.000	1.711	$4.616 \times 10^2$
1.00 GeV	$1.101 \times 10^3$	1.744	0.000		0.000	1.745	$5.773 \times 10^2$
1.40 GeV	$1.502 \times 10^3$	1.797	0.001	0.000	0.001	1.799	$8.029 \times 10^2$
2.00 GeV	$2.103 \times 10^3$	1.855	0.001	0.000	0.001	1.858	$1.131 \times 10^3$
3.00 GeV	$3.104 \times 10^3$	1.920	0.002	0.001	0.001	1.925	$1.659 \times 10^3$
4.00 GeV	$4.104 \times 10^3$	1.965	0.002	0.002	0.002	1.971	$2.172 \times 10^3$
8.00 GeV	$8.105 \times 10^3$	2.067	0.006	0.006	0.004	2.082	$4.140 \times 10^3$
10.0 GeV	$1.011 \times 10^4$	2.097	0.008	0.008	0.005	2.117	$5.092 \times 10^3$
14.0 GeV	$1.411 \times 10^4$	2.141	0.012	0.013	0.006	2.172	$6.956 \times 10^3$
20.0 GeV	$2.011 \times 10^4$	2.185	0.018	0.021	0.009	2.233	$9.678 \times 10^3$
30.0 GeV	$3.011 \times 10^4$	2.233	0.030	0.036	0.013	2.312	$1.408 \times 10^4$
40.0 GeV	$4.011 \times 10^4$	2.265	0.042	0.053	0.017	2.377	$1.834 \times 10^4$
80.0 GeV	$8.011 \times 10^4$	2.338	0.095	0.129	0.033	2.594	$3.442 \times 10^4$
100. GeV	$1.001 \times 10^5$	2.360	0.123	0.169	0.040	2.693	$4.199 \times 10^4$
140. GeV	$1.401 \times 10^5$	2.394	0.181	0.253	0.056	2.884	$5.634 \times 10^4$
200. GeV	$2.001 \times 10^5$	2.429	0.272	0.385	0.080	3.166	$7.618 \times 10^4$
300. GeV	$3.001 \times 10^5$	2.469	0.427	0.610	0.120	3.627	$1.057 \times 10^5$
400. GeV	$4.001 \times 10^5$	2.498	0.588	0.845	0.160	4.091	$1.316 \times 10^5$
612. GeV	$6.124 \times 10^5$	2.540	0.940	1.355	0.245	5.080	<i>Muon critical energy</i>
800. GeV	$8.001 \times 10^5$	2.567	1.257	1.813	0.323	5.960	$2.122 \times 10^5$
1.00 TeV	$1.000 \times 10^6$	2.589	1.602	2.312	0.405	6.909	$2.433 \times 10^5$
1.40 TeV	$1.400 \times 10^6$	2.623	2.295	3.304	0.575	8.797	$2.945 \times 10^5$
2.00 TeV	$2.000 \times 10^6$	2.660	3.357	4.823	0.832	11.672	$3.535 \times 10^5$
3.00 TeV	$3.000 \times 10^6$	2.702	5.135	7.347	1.274	16.458	$4.254 \times 10^5$
4.00 TeV	$4.000 \times 10^6$	2.732	6.941	9.902	1.723	21.299	$4.786 \times 10^5$
8.00 TeV	$8.000 \times 10^6$	2.807	14.238	20.187	3.590	40.823	$6.120 \times 10^5$
10.0 TeV	$1.000 \times 10^7$	2.832	17.923	25.362	4.551	50.668	$6.559 \times 10^5$
14.0 TeV	$1.400 \times 10^7$	2.869	25.280	35.679	6.528	70.356	$7.226 \times 10^5$
20.0 TeV	$2.000 \times 10^7$	2.910	36.398	51.230	9.562	100.100	$7.937 \times 10^5$
30.0 TeV	$3.000 \times 10^7$	2.956	54.885	77.116	14.821	149.779	$8.749 \times 10^5$
40.0 TeV	$4.000 \times 10^7$	2.990	73.453	103.077	20.213	199.734	$9.325 \times 10^5$
80.0 TeV	$8.000 \times 10^7$	3.073	147.903	207.008	42.793	400.778	$1.071 \times 10^6$
100. TeV	$1.000 \times 10^8$	3.100	185.220	259.030	54.480	501.831	$1.116 \times 10^6$