

## Muons in ms20 tissue substitute

	$\langle Z/A \rangle$	$\rho$ [g/cm <sup>3</sup> ]	$I$ [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
	0.53886	1.000	75.1	0.08294	3.6061	0.1997	2.8033	3.5341	0.00
$T$	$p$ [MeV/c]	Ionization	Brems	Pair prod	Photonucl	Total	CSDA range [g/cm <sup>2</sup> ]		
10.0 MeV	$4.704 \times 10^1$	7.731				7.731	$7.149 \times 10^{-1}$		
14.0 MeV	$5.616 \times 10^1$	6.030				6.030	$1.307 \times 10^0$		
20.0 MeV	$6.802 \times 10^1$	4.709				4.710	$2.446 \times 10^0$		
30.0 MeV	$8.509 \times 10^1$	3.654				3.654	$4.890 \times 10^0$		
40.0 MeV	$1.003 \times 10^2$	3.120				3.120	$7.872 \times 10^0$		
80.0 MeV	$1.527 \times 10^2$	2.342				2.342	$2.314 \times 10^1$		
100. MeV	$1.764 \times 10^2$	2.200				2.201	$3.197 \times 10^1$		
140. MeV	$2.218 \times 10^2$	2.051				2.052	$5.088 \times 10^1$		
200. MeV	$2.868 \times 10^2$	1.966				1.966	$8.087 \times 10^1$		
300. MeV	$3.917 \times 10^2$	1.935			0.000	1.935	$1.323 \times 10^2$		
313. MeV	$4.055 \times 10^2$	1.934			0.000	1.935	<i>Minimum ionization</i>		
400. MeV	$4.945 \times 10^2$	1.942			0.000	1.942	$1.839 \times 10^2$		
800. MeV	$8.995 \times 10^2$	2.016	0.000		0.000	2.017	$3.861 \times 10^2$		
1.00 GeV	$1.101 \times 10^3$	2.050	0.000		0.000	2.051	$4.844 \times 10^2$		
1.40 GeV	$1.502 \times 10^3$	2.105	0.000		0.001	2.106	$6.767 \times 10^2$		
2.00 GeV	$2.103 \times 10^3$	2.165	0.001	0.000	0.001	2.167	$9.574 \times 10^2$		
3.00 GeV	$3.104 \times 10^3$	2.234	0.001	0.001	0.001	2.237	$1.411 \times 10^3$		
4.00 GeV	$4.104 \times 10^3$	2.281	0.001	0.001	0.002	2.285	$1.853 \times 10^3$		
8.00 GeV	$8.105 \times 10^3$	2.389	0.003	0.003	0.004	2.400	$3.556 \times 10^3$		
10.0 GeV	$1.011 \times 10^4$	2.422	0.005	0.004	0.005	2.436	$4.383 \times 10^3$		
14.0 GeV	$1.411 \times 10^4$	2.470	0.007	0.007	0.007	2.491	$6.005 \times 10^3$		
20.0 GeV	$2.011 \times 10^4$	2.518	0.011	0.012	0.009	2.551	$8.384 \times 10^3$		
30.0 GeV	$3.011 \times 10^4$	2.570	0.018	0.021	0.014	2.623	$1.225 \times 10^4$		
40.0 GeV	$4.011 \times 10^4$	2.606	0.025	0.031	0.018	2.680	$1.602 \times 10^4$		
80.0 GeV	$8.011 \times 10^4$	2.687	0.057	0.076	0.034	2.855	$3.045 \times 10^4$		
100. GeV	$1.001 \times 10^5$	2.713	0.074	0.100	0.042	2.929	$3.737 \times 10^4$		
140. GeV	$1.401 \times 10^5$	2.750	0.108	0.151	0.059	3.069	$5.071 \times 10^4$		
200. GeV	$2.001 \times 10^5$	2.790	0.163	0.231	0.084	3.268	$6.964 \times 10^4$		
300. GeV	$3.001 \times 10^5$	2.835	0.258	0.367	0.125	3.585	$9.884 \times 10^4$		
400. GeV	$4.001 \times 10^5$	2.866	0.356	0.509	0.167	3.899	$1.256 \times 10^5$		
800. GeV	$8.001 \times 10^5$	2.943	0.764	1.100	0.338	5.146	$2.146 \times 10^5$		
1.00 TeV	$1.000 \times 10^6$	2.968	0.975	1.406	0.424	5.774	$2.513 \times 10^5$		
1.06 TeV	$1.057 \times 10^6$	2.975	1.035	1.491	0.449	5.950	<i>Muon critical energy</i>		
1.40 TeV	$1.400 \times 10^6$	3.007	1.400	2.013	0.602	7.022	$3.140 \times 10^5$		
2.00 TeV	$2.000 \times 10^6$	3.048	2.054	2.945	0.872	8.918	$3.897 \times 10^5$		
3.00 TeV	$3.000 \times 10^6$	3.095	3.149	4.496	1.336	12.075	$4.857 \times 10^5$		
4.00 TeV	$4.000 \times 10^6$	3.129	4.263	6.068	1.807	15.268	$5.592 \times 10^5$		
8.00 TeV	$8.000 \times 10^6$	3.212	8.775	12.403	3.773	28.164	$7.492 \times 10^5$		
10.0 TeV	$1.000 \times 10^7$	3.240	11.057	15.594	4.785	34.677	$8.131 \times 10^5$		
14.0 TeV	$1.400 \times 10^7$	3.282	15.612	21.951	6.872	47.718	$9.110 \times 10^5$		
20.0 TeV	$2.000 \times 10^7$	3.327	22.503	31.541	10.078	67.449	$1.016 \times 10^6$		
30.0 TeV	$3.000 \times 10^7$	3.379	33.975	47.495	15.643	100.493	$1.137 \times 10^6$		
40.0 TeV	$4.000 \times 10^7$	3.417	45.508	63.502	21.355	133.783	$1.223 \times 10^6$		
80.0 TeV	$8.000 \times 10^7$	3.510	91.750	127.583	45.332	268.174	$1.430 \times 10^6$		
100. TeV	$1.000 \times 10^8$	3.540	114.930	159.661	57.762	335.894	$1.497 \times 10^6$		