

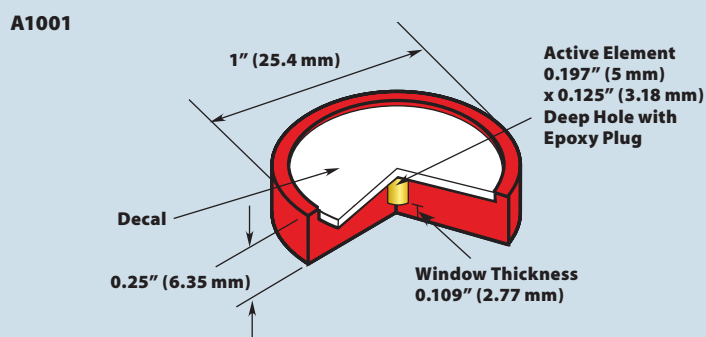
# Gamma and X-Ray Standards

## Gamma Standards—Type D

The type D configuration is mainly used for checking the performance of G.M. and NaI(Tl) detectors. The type D disk is a 1" (25.4 mm) diameter by 0.250" (6.35 mm) thick disk constructed of high strength plastic. The active diameter is 0.197" (5 mm).



**Figure 46-A: Type D Disk**



Overall Dimensions		
Overall Diameter	Active Diameter	Height
1"	0.197"	0.25"
25.4 mm	5 mm	6.35 mm

Window & Active Deposit	
Window	Nature of Active Deposit
Plastic	Evaporated Metallic Salts

## Gamma Standards—Type D

Catalog Number	Nuclide	Half-Life	Major Photon Emissions (keV)	Available Activities
GF-241-D	Americium-241	432.17 y	59.5 (36%), 11-20 (39.5%) Np L x-rays	5 nCi-100 µCi    185 Bq-3.7 MBq
GF-124-D	Antimony-124	60.20 d	602.7 (97.9%), 722.8 (10.9%), 1690.9 (47.6%)	5 nCi-100 µCi    185 Bq-3.7 MBq
GF-125A-D	Antimony-125	1007.7 d	428 (29.7%), 464 (10.5%), 601 (17.7%), 607 (5%), 636 (11.2%), 27-32 (75.1%) Te K x-rays	5 nCi-100 µCi    185 Bq-3.7 MBq
GF-133-D	Barium-133	3862 d	80 (34.1%), 303 (18.3%), 356 (61.9%), 32-37 (53.2%) Cs K x-rays	5 nCi-100 µCi    185 Bq-3.7 MBq
GF-007-D	Beryllium-7	53.284 d	478 (10.3%)	25 nCi-500 µCi    925 Bq-18.5 MBq
GF-207-D	Bismuth-207	1.16 x 10 <sup>4</sup> d	570 (97.7%), 1064 (74.5%), 9-15 (32.5%), Pb L x-rays, 72-88 (77.7%) Pb K x-rays	5 nCi-100 µCi    185 Bq-3.7 MBq
GF-109-D	Cadmium-109	462.6 d	88 (3.6% from Ag-109m), 22-26 (99.4%) Ag K x-rays	50 nCi-1 mCi    1.85 kBq-37 MBq
GF-139-D	Cerium-139	137.640 d	33.03 (22.8%), 33.4 (41.9%), 165.9 (79.9%), 33-39 (80%) La x-rays	5 nCi-10 µCi    185 Bq-370 kBq
GF-141-D	Cerium-141	On Request	—	—
GF-134-D	Cesium-134	754.28 d	563 (8.4%), 569 (15.4%), 605 (97.6%), 796 (85.4%)	5 nCi-100 µCi    185 Bq-3.7 MBq
GF-137-D	Cesium-137	30.17 y	662 (85.1% from Ba-137), 32-37 (7.2%) Ba K x-rays	5 nCi-1 mCi    185 Bq-3.7 MBq
GF-051-D	Chromium-51	27.706 d	320 (9.86%), 4.9-5.4 (22.8%) V K x-rays	25 nCi-500 µCi    185 Bq-37 MBq

### Gamma Standards—Type D

Catalog Number	Nuclide	Half-Life	Major Photon Emissions (keV)	Available Activities
GF-056-D	Cobalt-56	77.31 d	846.8 (99.9%), 1238 (66.1%), 1771 (15.5%), 2035 (7.8%), 2598 (17%), 3253 (7.6%), others up to 3452	10 nCi-100 µCi 370 Bq-3.7 MBq
GF-057-D	Cobalt-57	271.79 d	14 (9.2%), 122 (85.6%), 136.5 (10.7%), 6.4-7.1 (57.9%) Fe K x-rays	5 nCi-1 mCi 185 Bq-37 MBq
GF-058-D	Cobalt-58	70.86 d	810 (99.5%), 6.4-7.1 (26.7%) Fe K x-rays	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-060-D	Cobalt-60	5.272 y	1173 (100%), 1333 (100%)	5 nCi-1 mCi 185 Bq-37 MBq
GF-152-D	Europium-152	4933 d	122-1408, 40-47 (74%) Sm + Gd x-rays	25 nCi-100 µCi 925 Bq-3.7 MBq
GF-154-D	Europium-154	3136.8 d	123-1597, 42-50 (25.6%) Gd x-rays	25 nCi-100 µCi 925 Bq-3.7 MBq
GF-155-D	Europium-155	1770 d	87 (34%), 105 (20.6%), 42-50 (24.0%), Gd K x-rays	10 nCi-100 µCi 370 Bq-3.7 MBq
GF-153-D	Gadolinium-153	242 d	97 (29.5%), 103 (21.1%), 40-49 (122%) Eu K x-rays	5 nCi-1 mCi 185 Bq-37 MBq
GF-068-D	Germanium-68	270.8 d	511 (178%), 1077 (3.2%) from Ga-68, 9.2-10.4 (44.1%) Ga K x-rays, 8.6-9.6 (4.7%) Zn K x-rays	100 nCi-100 µCi 3.7 kBq-3.7 MBq
GF-166-D	Holmium-166m <sup>(1)</sup>	1200 y	81-1427, 48-58 (37.6%) Er K x-rays	10 nCi-10 µCi 370 Bq-370 kBq
GF-125-D	Iodine-125	59.43 d	35 (6.58%), 27-32 (139%) Te K x-rays	10 nCi-100 µCi 370 Bq-3.7 MBq
GF-129-D	Iodine-129	1.57 x 10 <sup>7</sup> y	40 (7.5%), 29-35 (70.4%) Xe K x-rays	50 nCi-1 µCi 1.85 kBq-37 kBq
GF-059-D	Iron-59	44.51 d	1099 (56.3%), 1292 (43.7%)	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-054-D	Manganese-54	312.3 d	835 (100%), 5.4-5.9 (25.6%) Cr K x-rays	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-203-D	Mercury-203	46.595 d	279.2 (81.5%)	10 nCi-50 µCi 370 Bq-1.85 MBq
GF-226-D	Radium-226	1600 y	47-2448 (includes daughters)	50 nCi-10 µCi 1.85 kBq-370 kBq
GF-106-D	Ruthenium-106	1.020 y	512 (20.7%), 622 (9.8%) from Rh-106	25 nCi-100 µCi 925 Bq-3.7 MBq
GF-046-D	Scandium-46	83.79 d	889 (99.9%), 1121 (99.9%)	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-075-D	Selenium-75	119.64 d	121 (17.1%), 136 (58.8%), 265 (59%), 280 (25%), 10.5-12.0 (56.8%) As K x-rays	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-110-D	Silver-110m	249.8 d	657.8 (94.4%), 884.6 (72.6%)	5 nCi-50 µCi 185 Bq-1.85 MBq
GF-131-D	Simulated I-131	~5 y	356 (from Ba-133), 662 (from Cs-137/Ba-137)	50 nCi-100 µCi 1.85 kBq-3.7 MBq
GF-022-D	Sodium-22	950.8 d	511 (178%), 1275 (100%)	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-085-D	Strontium-85	64.849 d	514 (98.4%), 13.3-15.3 (58.7%) Rb K x-rays	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-228-D	Thorium-228	698.2 d	84-2614 (includes daughters)	10 nCi-10 µCi 370 Bq-370 kBq
GF-113-D	Tin-113	115.09 d	392 (64% from In-113 m), 24-28 (96.8%) In K x-rays	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-235-D	Uranium-235 <sup>(1)</sup>	7.037 x 10 <sup>8</sup> y	143 (10.5%), 186 (53%), 90-105 (10.8%) Th K x-rays	10 nCi-100 nCi 370 Bq-3.7 kBq
GF-238U-D	Uranium (Natural) <sup>(1)</sup>	4.468 x 10 <sup>9</sup> y	26-2448 (includes daughters)	10 nCi-100 nCi 370 Bq-3.7 kBq
GF-088-D	Yttrium-88	106.630 d	898 (94%), 1836 (99.4%), 14.1-16.2 (61.6%) Sr K x-rays	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-065-D	Zinc-65	244.26 d	1116 (50.6%), 8.0-8.9 (38.7%) Cu K x-rays	5 nCi-100 µCi 185 Bq-3.7 MBq
GF-095-D	Zirconium-95/Nb-95	64.02 d	724 (44.1%), 757 (54.5%)	10 nCi-50 µCi 370 Bq-1.85 MBq

1) 9 mm active diameter.

### Gamma Sets—Type D

Catalog Number	Available Activities	Sets Consist Of
GF-290-0.1D	0.1 µCi 3.7 kBq	Ba-133, Cd-109, Co-57, Co-60, Cs-137, Mn-54 and Na-22
GF-290-1D	1 µCi 37 kBq	Ba-133, Cd-109, Co-57, Co-60, Cs-137, Mn-54 and Na-22
GF-290-10D	10 µCi 370 kBq	Ba-133, Cd-109, Co-57, Co-60, Cs-137, Mn-54 and Na-22