MODEL PO-02 TYPE B(U) PACKAGING

USAGE

Model PO - 02 Type B(U) packaging is intended for the transport of radioactive materials. The radioactive materials may be special form or other than special form in the solid or liquid states.

The *universal transport box* will always accommodate *a shielding container* supplied by the user. The *shielding container* may be of various design but it must meet requirements for the transport of the following package types: IP1, IP-2, IP-3 A, B(U). The weight of the shielding container must not exceed 2100 kg.

The assembly obtained by insertion of the *shielding container* into the *universal transport box* is a packaging which meets requirements for Type B(U) radioactive packages. This allows shielding containers which, on their own, do not meet requirements for Type B(U) to be transported.

The maximum permitted activity of the radioactive material depends on the type and thickness of the material used in the shielding container structure and is limited by the maximum permitted heat power of the radionuclide, which is 400 W – refer to Table 1.

RN	Shielding thickness and maximum activity at PDE = 2 mSv/hr							
Shielding thickness [mm]	Uranium[1]		Tungsten[2]		Lead[3]		Concrete[4]	
	Radial	Axial	Radial	Axial	Radial	Axial	Radial	Axial
	a_{max}[TBq]		a_{max}[TBq]		a_{max}[TBq]		a_{max}[TBq]	
^{22}Na	135	140	155	155	230	230	400	400
	1050						0.191	
^{32}P	0	0	0	0	0	0	0	0
	3600							
^{60}Co	140	145	165	165	250	245	400	400
	1000						0.113	
^{75}Se	15	15	25	25	55	55	400	400
	6150						18.9	
^{90}Sr	0	0	0	0	0	0	0	
	2200							
^{109}Cd	1	1	2	2	5	5	15	15
	2300							
^{124}Sb	135	140	155	155	220	220	400	400
	115						0.182	
^{131}I	65	65	85	85	115	115	400	400
	4400						5,58	

(Table continues)

RN	Shielding thickness and maximum activity at PDE = 2 mSv/hr							
Shielding thickness [mm]	Uranium[1]		Tungsten[2]		Lead[3]		Concrete[4]	
	Radial	Axial	Radial	Axial	Radial	Axial	Radial	Axial
	a_{max}[TBq]		a_{max}[TBq]		a_{max}[TBq]		a_{max}[TBq]	
^{137}Cs	70	70	95	95	120	120	400	400
	3000						1.42	
^{147}Pm	1	1	2	2	5	5	15	15
	1100							
^{152}Eu	135	140	160	165	230	235	400	400
	725						0.343	
^{192}Ir	60	60	80	80	110	110	400	400
	2500						0.258	
^{226}Ra	140	145	165	165	235	230	400	400
	52.5						0.069	
^{238}Pu	2	2	3	3	10	10	30	30
	21000							
^{239}Pu	2	2	3	3	10	10	30	30
	21000							
^{240}Pu	2	2	3	3	10	10	30	30
	21000							
^{241}Am	2	2	3	3	10	10	30	30
	450							

Note. Concrete shielding design must respect the internal size of the transport box: its thickness must not exceed 400 mm, with a shielding capacity of 0.113 **TBq** ^{60}**Co**. The shielding thicknesses of U, W, and Pb include a steel jacket 7 mm thick. The concrete shielding includes a steel jacket 1 mm thick.

Table 1

The neutron emission limit is **6×10^{8} s^{-1}** for paraffin shielding diameter 500 mm and paraffin shielding thickness **220 mm** – refer to Table 2.

Source type	Maximum neutron emission	Maximum activity
^{252}Cf, ^{242}Cm, ^{244}Cm	6×10^{8} s^{-1}	5.3 GBq
^{241}Am/Be, ^{242}Cm/Be, ^{244}Cm/Be, ^{210}Pb/Be, ^{210}Po/Be, ^{238}Pu/Be, ^{239}Pu/Be	2.58×10^{8} s^{-1}	3 TBq
^{266}Ra/Be	1.3×10^{6} s^{-1}	3.7 GBq

Table 2

[1] Depleted uranium: φ = 18.7 g/cm^3
[2] Tungsten pseudoalloy: φ = 18.3 g/cm^3
[3] Lead: φ = 11,3 g/cm^3
[4] Concrete: φ = 2,3g/cm^3
[5] Paraffin: φ = 0,82 g/cm^3

Shielding containers without shielding material and/or thickness specification may be transported in the transport box provided that the dose equivalent rates on the shielding container surface and at 1 m from the surface do not exceed **2 mSv/hr** and **0.1 mSv/hr**, respectively.

Furthermore, radioactive materials not specified above may be transported up to the A_1, A_2 levels as per Table 1 in Annex 3 to Czech Regulation No. 317/2002, or Table I in Section IV, Safety Standards No. TS-R-1, Regulations for the Safe Transport of Radioactive Materials, 2005 Edition, IAEA.

TECHNICAL SPECIFICATIONS

Package (shielding container included):	Type B(U) for special form radioactive substances as well as radioactive substances other than special form and liquids

The highest admissible activities of the radioactive materials and emissions of neutron radiations are specified in the section **Chyba! Nenalezen zdroj odkazů.**.

Maximum heat output of the source:	400 W

Transport box

Shielding material (i.e. steel) thickness:	10 mm
Outer size (width × length × height):	1060 mm × 1360 mm × 1210 mm
Internal space size (width × length × height):	860×1160×910 mm
Load-bearing capacity (i.e. maximum shielding container weight):	2100 kg
Weight of the transport box alone:	up to 1200 kg
Weight of the complete packaging:	up to 3300 kg

PO-02 Packaging

weight : ≤3 300 kg