

Restriction of Hazardous Substances (RoHS)

BMF 69-Restriction of Hazardous Substances (RoHS)

The **EU Restriction of Hazardous Substances (RoHS) Directive (2011/65/EU)** which came into force 3rd Jan. 2013, restricts the maximum allowable levels of six substances including lead (Pb), cadmium (Cd), mercury (Hg), hexavalent chromium (Cr6+), polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE); the latter two are used as flame retardants in electrical equipment. In order to produce such kinds of products within the EU or to import them into the EU, manufacturers are responsible for providing appropriate documentation.



Since the adoption of the EU RoHS directive, a number of other jurisdictions have created, or are in the process of creating similar restrictions of hazardous substances including China RoHS, Korea RoHS, California RoHS, Taiwan RoHS, Turkey RoHS, and India RoHS. Similar regulations exist in other areas of the world, such as Norway, Japan and the USA.

The maximum allowed amounts by weight in homogenous materials are:

- Lead: 0.1%
- Cadmium: 0.01%
- Mercury: 0.1%
- Hexavalent chromium: 0.1%
- Polybrominated biphenyl (PBB): 0.1%
- Polybrominated diphenyl ether (PBDE): 0.1%

n.b. Homogenous material does not imply goods in total, but every homogenous part of it.

Testing for these substances is normally carried out according to the **method IEC 62321**. Chiron is happy to offer recommended standards for the determination of mono- to decabrominated PBBs and PBDEs, according to that method. The level of PBBs and PBDEs are determined by GC-MS after soxhlet extraction (i.e. **USEPA method 3540C**).

Polybrominated biphenyl ethers (PBDEs) are primarily used as flame retardants in plastic and foam consumer products, including electrical items. Polybrominated biphenyls (PBBs) are also brominated compounds, used for similar applications as PBDEs. PBBs have been banned in most countries since the 1970s.

BMF 69-Restriction of Hazardous Substances (RoHS)

PBBs used for calibration (IEC 62321):

Pr. No.	Compound name	PBB	CAS No.
3091.12	4-Bromobiphenyl	BB-003	92-66-0
3096.12	4,4'-Dibromobiphenyl	BB-015	92-86-4
2664.12	2,4,5-Tribromobiphenyl	BB-029	115245-07-3
3102.12	2,2',4,5'-Tetrabromobiphenyl	BB-049	60044-24-8
10266.12	3,3',4,4'-Tetrabromobiphenyl	BB-077	77102-82-0
3107.12	2,2',4,5',6-Pentabromobiphenyl	BB-103	59080-39-6
3108.12	2,2',4,4',5,5'-Hexabromobiphenyl	BB-153	59080-40-9
3109.12	3,3',4,4',5,5'-Hexabromobiphenyl	BB-169	60044-26-0
2679.12	Technical mixture containing hepta-, octa-, and nonabromobiphenyls	Dow FR-250	27858-07-7
2677.12	Decabromobiphenyl	BB-209	13654-09-6

PBDEs used for calibration (IEC 62321):

Pr. No.	Compound name	PBDE	CAS No.
8748.12	4-Bromodiphenyl ether	BDE-003	101-55-3
8750.12	4,4'-Dibromodiphenyl ether	BDE-015	2050-47-7
1961.12	2,4,4'-Tribromodiphenyl ether	BDE-028	41318-75-6
10267.12	2',3,4-Tribromodiphenyl ether	BDE-033	147217-78-5
1962.12	2,2',4,4'-Tetrabromodiphenyl ether	BDE-047	5436-43-1
1967.12	2,2',4,4',5-Pentabromodiphenyl ether	BDE-099	60348-60-9
1968.12	2,2',4,4',6-Pentabromodiphenyl ether	BDE-100	189084-64-8
1971.12	2,2',4,4',5,5'-Hexabromodiphenyl ether	BDE-153	68631-49-2
1972.12	2,2',4,4',5,6'-Hexabromodiphenyl ether	BDE-154	207122-15-4
1973.12	2,2',3,4,4',5',6-Heptabromodiphenyl ether	BDE-183	207122-16-5
1975.12	2,2',3,4,4',5,5',6-Octabromodiphenyl ether	BDE-203	337513-72-1
9033.12	2,2',3,3',4,4',5,5',6-Nonabromodiphenyl ether	BDE-206	63387-28-0
1811.12	Decabromodiphenyl ether	BDE-209	1163-19-5

Surrogate standards to monitor analyte recovery:

Pr. No.	Compound name	PBDE	CAS No.
2891.12	4,4'-Dibromooctafluorobiphenyl	DBOFB	10386-84-2

Internal standards to correct for injection errors:

Pr. No.	Compound name	PCB	CAS No.
8708.12	Decachlorobiphenyl	CB-209	2051-24-3

BMF 69-Restriction of Hazardous Substances (RoHS)

Alternative internal standards: Fluoro-PBDEs

Pr. No.	Compound name	F-PBDE	CAS No.
1608.12	3- Bromo -4'-fluorodiphenyl ether	4'-F-BDE-2	50904-38-6
2257.12	3'-Fluoro-3,4- dibromo diphenyl ether	3'-F-BDE-12	N/A
2160.12	2'-Fluoro-2,4,4'- tribromo diphenyl ether	2'-F-BDE-28	876310-22-4
2161.12	6-Fluoro-2,2',4,4'- tetrabromo diphenyl ether	6-F-BDE-47	876310-23-4
2505.12	3,6-Difluoro-2,2',4,4',5- pentabromo diphenyl ether	3,6-F2-BDE-99	886748-34-1
2163.12	3-Fluoro-2,2',4,4',6- pentabromo diphenyl ether	3-F-BDE-100	887401-80-1
1929.12	4'-Fluoro-2,3,3',4,5,6- hexabromo diphenyl ether	4'-F-BDE-160	863314-88-9
2166.12	3-Fluoro-2,2',4,4',5,5',6-heptabromodiphenyl ether	3-F-BDE-183	876310-28-0
2167.12	4',6-Difluoro-2,2',3,3',4,5,5',6'- octabromo diphenyl ether	4',6-F2-BDE-199	863314-96-9
2168.12	4'-Fluoro-2,2',3,3',4,5,5',6,6'- nonabromo diphenyl ether	4'-F-BDE-208	876310-29-1

Please note: All details are without guarantee.

Chiron also offers a large variety of different PBBs and PBDEs (see BMF 15). Please enquire.

Literature:

EU RoHS Directive (2011/65/EU).

IEC method 62321.

USEPA method 3540C.



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