

Test Report

63058-023 P03 029

Principal: Isolante Service GmbH
Hövelmarkt 7
33161 Hövelhof

Order dated: 27 July 2003

Object supervised:	Original sample designation K-Flex ST	GfA sample designation 3N189702	Appearance Elastomer foam tube outside lining
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Test target: Thermal decomposition and testing of the thermal decomposition product with regard to the 25 polychlorinated and polybrominated dibenzofurans and dibenzodioxins (PCDF / D and PBDF / D or PHDF / D respectively).
Testing as regards meeting the specification pursuant to GfA / L'Isolante K-Flex Supervising Agreement 63058-023 V01 with regard to the dioxin formation in the case of fire.

Sampling: The sample was sent to GfA by the Forschungsinstitut für Wärmeschutz e.V. (FIW), 82166 Gräfeling.

Receipt of sample: 30 July 2003

Test procedure: **Thermal decomposition:**

Decomposition apparatus:	VCI Apparatus
Furnace temperature:	800 °C
Air stream:	400 ml synthetic air
Sample input:	Multiple input technique; input of 10 sample portions at approximately 40 mg via the input chute in sequences of one minute each
Total sample quantity:	Approximately 0.4 g
Duration of the thermal load:	Input time (max. 10 min) plus 10 after burning time
Sampling of the emissions:	By means of XAD-2 absorber resin
Analysed fractions:	Mutual analysis of the extracts from the quartz tube of the apparatus, the connecting parts, the residues and the XAD absorber resin

PHDF/D analysis

Addition of twenty-one $^{13}\text{C}_{12}$ marked PHDF/D standards to a portion of the total extract; column chromatographic cleaning; PCDF/D and PBDF/D analysis by means of HRGC/HRMS; quantifying via the internal $^{13}\text{C}_{12}$ marked standards (isotope dissolution method, GfA PA_158/97; accredited pursuant to DIN EN ISO/IEC 17025:2000).

Test begin: 14 August 2003

End of test: 28 September 2003

Test results: The results of the analysis of the thermal decomposition products on the 25 PHDF/D according to the Chemicals Prohibition Regulation are stated in Table 01. The quantity of the PHDF/D proven in the thermal decomposition product (residue and emission phase) was related to the quantity used of the elastomer foam material.

Notes: The values shown in Table 01 prove that the specifications with regard to the dioxin formation in the case of fire:

I-TEQ 25 PHDF/D pursuant to ChemVerbV $\leq 10 \mu\text{g}$
I-TEQ/kg
2,3,7,8TetraCDD pursuant to GefStoffV $> \mu\text{g}/\text{kg}$

have been met with by the K-Flex ST sample tested here.

Table 01: Formation of the PCDF/D and PBDF/D congeners of the Chemicals Prohibition Regulation in the case of thermal decomposition of the elastomer foam sample K-Flex ST at 800 °C; the details stated refer to the quantity of the material used.

Original sample designation GIA Sample designation		K Flex ST 3N189702	I-TEF	WHO-TEF
Dimension		µg/kg		
Sec. 4	2378-TetraCDD	0.62	1.0	1.0
Col. 1,	12378-PentaCDD	0.65	0.5	1.0
No. 1	2378-TetraCDF	4.84	0.1	0.1
	23478-PentaCDF	7.76	0.5	0.5
Sec.4,	123478-HexaCDD	< 0.17 ^e	0.1	0.1
Col. 1	123678-HexaCDD	0.19	0.1	0.1
No. 2	123789-HexaCDD	0.20	0.1	0.1
	12378-/12348-PentaCDF ^a	6.16	0.05	0.05
	123478-/123479-HexaCDF ^a	8.58	0.1	0.1
	123678-HexaCDF	7.08	0.1	0.1
	123789-HexaCDF	0.60	0.1	0.1
	234678-HexaCDF	5.48	0.1	0.1
Sec. 4,	1234678-HeptaCDD	0.33	0.01	0.01
Col. 1,	OctaCDD	0.11	0.001	0.0001
No. 3	1234678-HeptaCDF	12.05	0.01	0.01
	1234789-HeptaCDF	2.89	0.01	0.01
	OctaCDF	4.97	0.001	0.0001
Sec. 4,	2378-TetraBDD ^d	< 0.02	1.0	1.0
Col. 1,	12378-PentaBDD ^d	< 0.03	0.5	1.0
No. 4	2378-TetraBDF ^d	< 0.02	0.1	0.1
	23478-PentaBDF ^d	< 0.03	0.5	0.5
Sec. 4,	123478-/123678-HexaBDD ^{b,d}	< 0.06	0.1	0.1
Col. 1,	123789-HexaBDD ^d	< 0.06	0.1	0.1
No. 5	12378-PentaBDF ^d	< 0.03	0.05	0.05
I-TEQ (NATO/CCMS)				
17 PCDF/D pursuant to ChemVerbV excl. BG		7.99	Specification pursuant to Supervising Agreement 63058-023 V01	
17 PCDF/D pursuant to ChemVerbV incl. BG		8.01		
8 PBDF/D pursuant to ChemVerbV excl. BG		ND		
8 PBDF/D pursuant to ChemVerbV incl. BG		0.07		
25 PHDF/D pursuant to ChemVerbV excl. BG		7.99		
25 PHDF/D pursuant to ChemVerbV incl. BG		8.07	≤ 10 µg I-TEQ/kg	
2,3,7,8-TetraCDD		0.62		

All values have been rounded up to a maximum of three significant digits

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ND: Not determined, because none of the corresponding congeners were above the BG

[a] : Isomers that cannot be severed gas chromatographically at the GC phase SP-2331

[b] : Isomers that cannot be severed by means of gas chromatography at the GC phase DB-5

[c] : No congener detectable

[d] : Maximum value; a co-elution with additional congeners of this homologue group cannot be excluded

[e] : Increased limit of detection due to disturbing component

Münster, 29 September 2003

(signed) (signature)

Dr. St. Hamm

(Head of Department Special Tests)

Note: The test results refer exclusively to the test objects. Excepts of the Test Report are permitted to be copied only with prior written consent of the GfA mbH.