

Heavy Metals & Mineral Hydrocarbons in Fibreboard Packaging

THE PACKAGING (ESSENTIAL REQUIREMENTS) REGULATIONS 2003 (Amended 2004)

The CPI and its members have received numerous requests for information regarding the amounts of **HEAVY METALS** or **MINERAL HYDROCARBONS** to be found in corrugated packaging.

In order to obtain worthwhile data Rooney Laboratories Ltd was commissioned in 1991 to undertake a detailed survey of the **HEAVY METALS** and **MINERAL HYDROCARBONS** present in fibreboard, testing in accordance with British Standard 5665 Part 3. CPI members provided a wide cross-section of board types. Samples included permutations of "pure" Krafts and Semi-Chemical flutings as well as recycled Test liners and flutings. A variety of material sources were covered and samples of Solid Fibreboard were also tested.

Many white liners were tested, and most samples also contained significant areas of print.

Surveys were repeated in 1995, 1998 and 2003 to see if the original findings were still valid.

The attached tables summarise the four sets of results. Results, in parts per million (ppm) are shown against the maximum permitted levels of the European Norm EN 71 Part 3 Dec 1988, (as British Standard 5665 Part 3 1989) and against the European Directive on Packaging and Packaging Waste (94/62/EC) transposed into UK law as "The Packaging (Essential Requirements) Regulations SI 2003 No 1941 (as amended by SI 2004 No 1188)".

The tables show :

(a) Generally levels were very low and the aggregate level of the 4 metals Lead, Cadmium, Hexavalent Chromium and Mercury was well below the maxima of the European and American regulations.

- (b) The higher Barium figures may be due to coatings used in some parts of the Fine Papers industry. The Calcium Carbonates & Clays used as surface coatings often contain naturally occurring Barium. (Even the "pure" Krafts now contain significant levels of recycled paper and so will also contain levels of Barium from these sources).
- (c) The higher levels of mineral hydrocarbons probably result from waxes used in the inks, as well as from other sources that get into the recycled paper chain. (Current food legislation is concerned only with mineral hydrocarbons added to the food itself, but some end users still ask about levels in the fibreboard packaging).

The four sets of results are consistent and suggest that fibreboard packaging presents no health hazard arising from the aspects tested. The levels are also well below standards set by the European: "The Packaging (Essential Requirements) Regulations SI 2003 No 1941 (as amended by SI 2004 No 1188)", by the European Norm (EN 71, Part 3, Dec 1988, identical to BS 5665 Part 3 1989) for heavy metals in paints for toys, and by the American CONEG standards for 1994.

However, it should be noted that the results only refer to the samples tested. That is to say, with any recycled material - and almost all fibreboard materials now contain some significant proportion of recycled fibres - there is always a remote chance of some "contamination" occurring.

Where customers require specific assurances as to Heavy Metal content it will be necessary to discuss with their supplier the relevant level of testing needed.

Note: While no external testing has been commissioned since 2003, paper manufacturers have continued with their own internal testing. These internal tests have shown that there has been no increase in the heavy metal levels.

REVIEWED: NOVEMBER 2007

BOARD SAMPLE ANALYSES

Values Are Parts Per Million (ppm)

Summary Of Analyses For Heavy Metal Content And
Mineral Hydrocarbon Contents Performed By Rooney
Laboratories Ltd For The BFPA / CPA 1991 / 1995 / 1998 / 2003

TEST RESULTS : 1991

Board Sample Tested					Lead	Cadmium	Chromium	Arsenic	Antimony	Mercury	Selenium	Barium	Mineral Hydrocarbons
Sample No	Liner	Centre Wall	Liner	Fluting	Pb	Cd	Cr	As	Sb	Hg	Se	Ba	
1	WTK		K	W	<5	<1	<5	<1	<1	<1	<1	27	
2	K		K	SC	<5	<1	<5	<1	<1	<1	<1	4	
3	K		K	W	<5	<1	<5	<1	<1	<1	<1	32	
4	K		K	W	<5	<1	<5	<1	<1	<1	<1	10	
5	K		K	W	<5	<1	7	<1	<1	<1	<1	6	
6	K	C	K	W	<5	<1	<5	<1	<1	<1	<1	49	
7	K		K	SC	<5	<1	9	<1	<1	<1	<1	<2	
8	K		K	SC	<5	<1	<5	<1	<1	<1	<1	71	
9	K	K	K	W	<5	<1	<5	<1	<1	<1	<1	51	
10	WTK		WTK	W	<5	<1	<5	<1	<1	<1	<1	73	
11	WTK		WTK	W	<5	<1	<5	<1	<1	<1	<1	61	
12	WTK		WTT	SC	<5	<1	<5	<1	<1	<1	<1	21	
13	WTK		K	W	<5	<1	9	<1	<1	<1	<1	43	
14	MK		K	W	6	<1	<5	<1	<1	<1	<1	35	
15	T		T	W	<5	<1	<5	<1	<1	<1	<1	52	
16	T		T	W	<5	<1	<5	<1	<1	<1	<1	82	
17	T		T	W	6	<1	<5	<1	<1	<1	<1	71	
18	WTT		T	W	<5	<1	<5	<1	<1	<1	<1	75	
19	WTT		WTT	W	<5	<1	<5	<1	<1	<1	<1	93	
20	WTT		T	W	<5	<1	<5	<1	<1	<1	<1	92	
21	C		C	W	<5	<1	<5	<1	<1	<1	<1	94	
22	C		C	SC	<5	<1	<5	<1	<1	<1	<1	50	
23	Solid Board				<5	<1	<5	<1	<1	<1	<1	30	
24	Solid Board				<5	<1	11	<1	<1	<1	<1	26	
25	Solid Board				<5	<1	11	<1	<1	<1	<1	53	
26A	WTT		WTT	W									3400
27A	T		T	W									4200
28A	K		C	SC									2800
29A	Solid Board												3400
30A	Solid Board												2900
31A	C	C	C	W									4400
32A	C	C	C	W									4000
Maximum Result Seen:					6	<1	11	<1	<1	<1	<1	94	4400
EUROPEAN NORM EN 71 PART 3 DEC 1988 (maximum limits), and BS 5665 PART 3 1989													
Maximum Permitted :					90	75	60	25	60	60	500	500	
EUROPEAN "THE PACKAGING (ESSENTIAL REQUIREMENTS) REGULATIONS SI 2003 No 1941"													
Heavy Metals Covered :					**	**	**			**			
The TOTAL ppm for the 4 elements will be :					Less than 600 ppm by 30.06.98 250 ppm by 30.06.99 100 ppm by 30.06.01								

TEST RESULTS : 1995

Board Sample Tested					Lead	Cadmium	Chromium	Arsenic	Antimony	Mercury	Selenium	Barium	Mineral Hydrocarbons
Sample No	Liner	Centre Wall	Liner	Fluting	Pb	Cd	Cr	As	Sb	Hg	Se	Ba	
1	WTK cc	C	T	W	<1	<1	3	<0.1	<0.1	<0.1	<0.1	13	3700
2	K ws	K	K	SC	<1	<1	2	<0.1	0.1	<0.1	<0.1	6	1700
3	WTK cc		T	W	2	<1	1	<0.1	0.1	<0.1	<0.1	9	3400
4	C		C	W	<1	<1	<1	<0.1	0.1	<0.1	<0.1	37	4500
5	WTK		T	SC	<1	<1	1	<0.1	0.1	<0.1	<0.1	8	2800
6	K		T	SC	<1	<1	<1	<0.1	0.1	<0.1	<0.1	7	2800
7	K		T	W	4	<1	<1	<0.1	0.1	<0.1	<0.1	22	4000
8	T		T	W	3	<1	<1	<0.1	0.1	<0.1	<0.1	17	3900
9	MK		T	W	1	<1	<1	<0.1	0.1	<0.1	<0.1	14	3600
10	K	C	T	W	4	<1	<1	<0.1	0.1	<0.1	<0.1	13	3900
11	Solid Board 100%Recycled				<1	<1	<1	<0.1	0.1	<0.1	<0.1	9	4100
12	Solid Board K Lined				<1	<1	<1	<0.1	0.1	<0.1	<0.1	6	4000
13	BK		T	W	<1	<1	<1	<0.1	0.1	<0.1	<0.1	10	2800
14	WTK cc		WTT	W	<1	<1	<1	<0.1	<0.1	<0.1	<0.1	9	3000
15	T		T	W	<1	<1	<1	<0.1	<0.1	<0.1	<0.1	18	3600
16	WTK		WTK	W	<1	<1	<1	<0.1	0.1	<0.1	<0.1	3	2000
Maximum Result Seen:					4	<1	3	<0.1	0.1	<0.1	<0.1	37	4500

TEST RESULTS : 1998

Board Sample Tested					Lead	Cadmium	Chromium	Arsenic	Antimony	Mercury	Selenium	Barium	Mineral Hydrocarbons
Sample No	Liner	Centre Wall	Liner	Fluting	Pb	Cd	Cr	As	Sb	Hg	Se	Ba	
1	WTK cc		TL3	SC	3.0	0.6	<0.1			0.0			
2	WTT		TL3	W	7.0	0.8	<0.1			0.1			
3	K		K	W	3.6	0.6	0.7			0.1			
4	K		K	SC	1.8	0.4	0.7			0.0			
5	WLT cc Litho		TL3	W	6.6	0.8	0.8			0.3			
6	W		W	W	6.9	0.7	1.1			0.1			
7	TL2		TL3	W	1.0	0.7	0.8			0.0			
8	C		C	W	14.0	0.9	1.1			0.1			
9	WTT		WTT	W	4.1	0.9	<0.1			0.0			
10	MK		TL3	W	6.2	0.3	<0.1			0.1			
11	TL2		TL3	W	0.8	0.6	<0.1			1.0			
12	WTK		K	W	3.3	0.3	<0.1			0.8			
13	WTK cc		TL3	W	3.0	0.3	0.9			0.0			
14	K ws K	K	K	SC	0.4	0.1	0.8			0.1			
15	K		TL3	W	5.7	0.5	0.8			0.1			
16	WTK		WTK	SC	0.7	0.5	0.7			0.0			
17	K ws K ws	K ws	K ws	SC	1.2	0.1	0.2			0.1			
18	Solid Board 100% Recycled				8.2	0.3	0.7			0.1			
19	Solid Board BK lined, printed				7.8	0.5	0.7			0.0			
20	Solid Board BK / Poly lined				7.5	0.6	<0.1			0.1			
Maximum Result Seen:					14.0	0.9	1.1			1.0			

TEST RESULTS : 2003

Board Sample Tested					Lead	Cadmium	Chromium	Arsenic	Antimony	Mercury	Selenium	Barium	Mineral Hydrocarbons
Sample No	Liner	Centre Wall	Liner	Fluting	Pb	Cd	Cr	As	Sb	Hg	Se	Ba	
1	K ws	K ws	K ws	SC	<1	<1	<1			<1			
2	K ws Coated Blue	K ws	K ws	SC	<1	<1	<1			<1			
3	K ws	K	K ws	SC	<1	<1	<1			<1			
4	K ws	TL2	K ws	SC	<1	<1	<1			<1			
5	K	TL2	K	SC	<1	<1	1			<1			
6	WTK		TL3	W	3	<1	2			<1			
7	K		K	W	3	<1	1			<1			
8	MK		K	SC	<1	<1	<1			<1			
9	WTK		TL3	W	3	<1	2			<1			
10	WTK		TL3	W	3	<1	1			<1			
11	K		TL2	W	5	<1	2			<1			
12	WTK cc		WTK	W	3	<1	2			<1			
13	WTK cc	C	TL3	W	3	<1	2			<1			
14	WTK cc		TL3	W	7	<1	2			<1			
15	Solid Board WTK Lined				3	<1	2			<1			
16			TL2	W	7	<1	3			<1			
17	WTK	W	TL2	W	4	<1	2			<1			
18	WTT		TL3	W	7	<1	2			<1			
19	WTT		W	W	6	<1	1			<1			
20	WTT		W	W	6	<1	<1			<1			
21	WTT		TL3	W	6	<1	2			<1			
22	WTK		K	SC	1	<1	<1			<1			
23	WTT		TL2	W	6	<1	1			<1			
24	TL2		TL2	W	9	<1	2			<1			
25	WTK	W	TL2	W	7	<1	2			<1			
26	WTK		TL2	W	4	<1	<1			<1			
27	WTK		TL2	SC	1	<1	<1			<1			
28	WTT		W	W WTK cc	7	<1	<1			<1			
Maximum Result Seen:					9	<1	3			<1			

MATERIAL ABBREVIATIONS

BK	Bleached Kraft	SC	Semi-Chem Fluting	W	Waste Fluting (100% recycled)
C	Chip (100% recycled)	Solid Board	Laminated Solid Board	WLT cc Litho	White Lined Test clay coated
K	Kraft	T	Test Liner (100% recycled)	WTK	White Top Kraft
K ws	Kraft wet strength	TL2	Test Liner 2 (100% recycled)	WTK cc	White Top Kraft clay coated
MK	Mottled Kraft	TL3	Test Liner 3 (100% recycled)	WTT	White Top Test