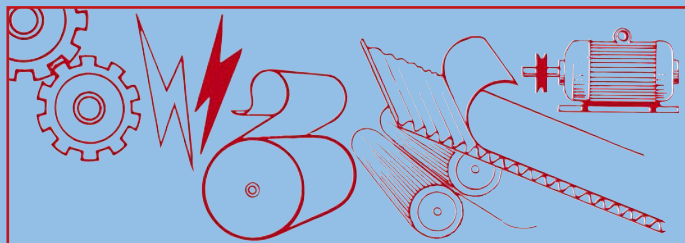
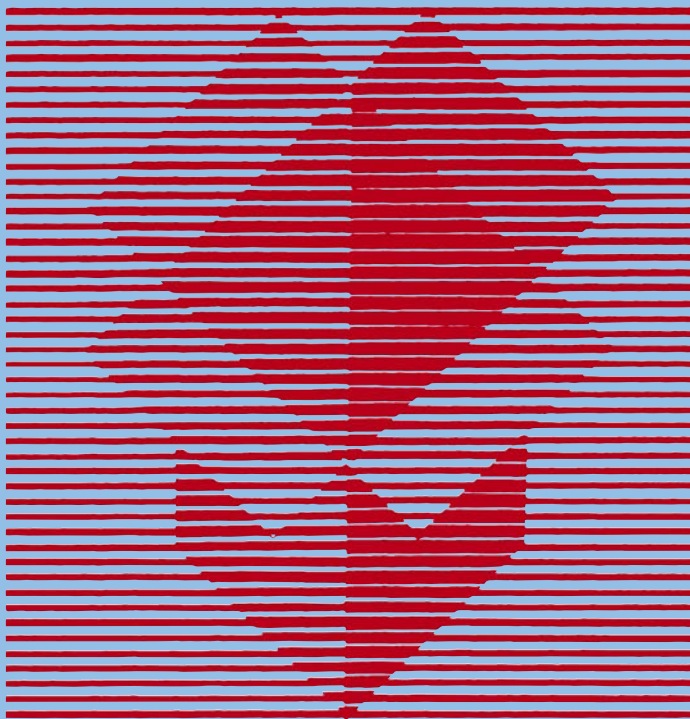


TECHNICAL INFORMATION BOOKLET

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FCBM 37:06

International Rules for Corrugated Board and Cases



**FEDERATION OF CORRUGATED BOX
MANUFACTURERS OF INDIA**

FOREWORD

FCBM Publications continue to evoke interest and receive appreciation from everyone connected with the industry.

These publications have been instrumental in creating uniform codes and meanings for different technical terms and establishing uniform procedures for the different test methods.

This Technical Information Booklet on *International Rules for Corrugated Board and Cases* is a useful compendium of International Rules.

In today's globalised market place, it is indeed necessary to be aware of the rules related to corrugated board and boxes in different countries.

I am sure the readers will find the contents interesting and useful.

I extend my congratulations to the R&D Committee on this excellent effort.

Manohar Shetty
President
Federation of Corrugated Box
Manufacturers of India

Paperboard Packaging magazine printed a summary of "International Rules" as recognized by the International Corrugated Case Association (ICCA). These rules are reproduced here under various sections for the benefit of the members of Federation of Corrugated Box Manufacturers of India.

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SECTION 1: BELGIUM

1) Transport Standards (+), Belgian Packaging Institute, Note No. 122			2) Board Standards, Belgian Packaging Institute, Note No. 120							
M (1)	Dim		T		C	E		P		
	Kg	Lb	Single Wall	Double Wall		Class	Single Wall		kg/cm ²	bar
10	22	125	49	I	I	250	8	800	35	3.43
20	44	150	59	II	II	275	10	1000	40	3.92
30	66	165	65	III	III	300	13	1300	45	4.41
40	88	180	70	IV	IV	400	16	1600	55	5.39
50	110	200	78	V	V	500	20	2000	70	6.86
60	132	220	86	V	Double Wall					
75	165	240	94	VI	I	350	10	1000	70	6.86
M (1) = The maximum mass (weight) of the package				II	II	375	13	1300	80	7.85
Dim = The maximum dimension of the package (L+B+H)				III	III	425	16	1600	90	8.83
T = Type of board according to note No. 120				IV	IV	525	20	2000	100	9.81
(+) = There are separate standards for tropics, farm produce, etc.				V	V	626	24	2400	110	10.79
Minimum flat crush values, in bars, per 100 flutes/meter for each wall of single and double wall corrugated board.				VI	VI	725	28	2800	120	11.77
C = The minimum grammage of the liners										
BAR		1.50	1.40	1.30	E = The minimum burst value of the board					
GSM of fluting paper		112-140	140-150	Above 150	P = The minimum puncture value of the board					

SECTION 2: DENMARK

Undated Instruction of Danish Railways						
At a net weight of		The sum of the dimensions (L+W+H) must not exceed Dim			Minimum Bursting Strength (E)	
Kilograms	Pounds	Centimeters	Inches	Kg / cm ²	Kilopascals	
20	44	152	60	12	1177	
30	66	165	65	15	1471	
40	88	178	70	22	2158	

It is a condition that packaging is complete and intact, and that contents to be packed in it do not consist of a single heavy item, but of goods which can be equally spread in the packaging, and which do not moisten the packaging.

SECTION 3: F. E. F. C. O.

FEFCO RECOMMENDATION FOR CORRUGATED BOARD GRADES							
	GRADE	BURST		PUNCTURE		E C T VALUES	
		Kg/cm ²	kPa	cm-kgf	J	Kg/cm	kN/m
CLASS 1 Single Wall	11	5	490	25	2.5	-	-
	12	7	690	30	2.9	-	-
	13	9	880	35	3.4	-	-
	14	12	1170	40	3.9	-	-
	15	15	1470	50	4.9	-	-
	16	20	1960	65	6.4	-	-
CLASS II Single Wall	21	4	390	-	-	2.7	2.6
	22	6	590	-	-	3.3	3.2
	23	8	780	-	-	4.0	3.9
	24	10	980	-	-	4.8	4.7
	25	13	1280	-	-	5.9	5.8
	26	18	1770	-	-	7.3	7.2
Class I: Recommended for the basic ability of the case to contain contents of self support							
Class II: Recommended for extra resistance to compression of the case of non self support							

SECTION 4: FINLAND

FINNISH RAILROAD (VALTION RAUTATIEN, VR – PPO)

M (1)		T	Dim		E		P		Legend
Kg	lb		Cm	In	Kg/cm ²	kPa	Kg-cm	J	
10	22	1	125	49	8	785	40	3.92	T = Type of corrugated board 1 = Single wall corrugated board 2 = Single or Double wall corrugated board 3 = Double wall corrugated board
20	44	1	150	59	12	1177	55	5.39	
30	66	1	165	65	16	1570	70	6.86	
40	88	2	180	70	20	1962	90	8.83	T = Single or Double wall corrugated board 3 = Double wall corrugated board
50	110	3	200	78	25	2452	115	11.28	
60	132	3	200	78	28	2747	140	13.73	
70	154	3	200	78	32	3139	170	16.70	
M (1) = The maximum mass of package									
Dim = The maximum combined dimension of the package (L + W + H)									
E = The minimum burst (Mullen) value of the corrugated board									
P = The minimum puncture value of the corrugated board									

SECTION 5: FRANCE

A.F.N.O.R / C.E.T.E.C / U.S.F.O. (NO. Q 12 – 008 FOR BOARD / NO. NTC – 27 FOR PACKAGE)									
CLASS	M (2) Max		Dim. Max		P min	C min	E min	Legend	
	Kg	lb	cm	in					
Single Wall									
1.1	10	22	125	49	1950	250	750	<p>P = The sum of the mass of the two external liners multiplied by 4 plus the burst resistance in kPa. Note: If the mass of one liner exceeds 50% of the other, the P value is limited to 2.5 times the GSM lighter liner.</p> <p>M (2) = The Gross weight of the packed contents</p> <p>Dim = The maximum combined dimension of the package (L + W + H)</p> <p>C = The minimum combined Grammage of the two exterior liners only</p> <p>E = The minimum burst value (Mullen) of the board</p> <p>Note: The minimum flat crush value for 100 flutes of single wall board for all GSM shall be the arithmetic mean of 5 single measurement not less than 145 kPa.</p>	
1.2	20	44	150	59	2450	275	850		
1.3	30	66	170	67	2900	325	1050		
1.4	40	88	185	73	3600	400	1400		
1.5	50	110	205	80	4500	550	1800		
1.6	60	132	225	88	5250	650	2200		
Double Wall									
2.2	20	44	150	59	2050	250	850		
2.3	30	66	170	67	2350	250	950		
2.4	40	88	185	73	2800	275	1250		
2.5	50	110	205	80	3300	325	1400		
2.6	60	132	225	88	4050	400	1800		
2.7	75	165	240	94	5050	650	2200		

SECTION 6: GERMANY

Quality Class		Grammage g / m ²	Dim.	Burst kPa	Puncture J	Strength values of corrugated board cases according to VDW – Standard DIN 55 468
(A)	(B) EV3					
1.0	-	225		490	2.5	Quality Class A: 1.0 to 1.5 are single wall, 2.2 to 2.7 are double wall, and, 3.1 to 3.6 are tri wall.
1.1	10	250		590	3.4	
1.2	20	250		880	3.9	
1.3	30	300		1180	4.4	Quality Class B: Maximum Gross weight in Kgs of the package. EV3 relates to packaging of non dangerous goods.
1.4	40	400		1470	5.4	
1.5	50	500		1760	6.9	Figures in the Grammage column are the minimum values or the prescribed values of liner Grammage, inasmuch as the latter exceeds minimum values.
2.2	20	350		880	6.9	
2.3	30	375		1180	7.8	
2.4	40	425		1470	8.8	
2.5	50	525		1760	9.8	
2.6	60	625		2160	10.8	
2.7	75	725		2550	11.8	The Puncture values do not apply to E-flute corrugated boards nor to combination of E-flute board with any other type of flute. Dim: (Dimensions): Total of Length + Width + Height not to exceed 200 cm. (external measurements). Longest edge not to exceed 100 cm. Second longest edge not to exceed 75 cm. In addition to this rules regarding the manufacturer joint are to be complied with.
3.1	100	1000		-	19.6	
3.2	125	1100		-	24.5	
3.5	150	1200		-	29.4	
3.6	-	1300		-	33.6	

SECTION 7: GREAT BRITAIN

Home Trade Specifications						Export Specification					
	A	B	C	D	E		A	B	C	D	E
Single Wall	5	635	600	250	-	Single Wall	10	1025	1180	450	-
	8	750	800	300	-		15	1275	1410	550	-
	10	1025	1030	400	-		20	1525	1500	600	-
	15	1275	1180	450	-	Double Wall	30	1650	1850	800	-
	20	1525	1270	500	-		10	1025	850	250	125
	30	1650	1500	600	-		15	1275	1000	300	125
Double Wall	40	1775	1850	800	-	20	1525	1380	450	125	
	15	1275	850	250	125	30	1650	1610	550	125	
	20	1525	1000	300	125	45	1775	2200	900	All liners	
	30	1650	1380	450	125	55	2150	2550	1200	All liners	
	40	1775	1610	550	125	Fluting media: Minimum GSM 112 g/m ² . The made up board to be capable of with standing a flat crush test, having values: for A flute – 140 kPa, for B flute – 180 kPa, for C flute – 165 kPa.					
A: Max. Gross mass of contents Kg						Note 1: For each 10% reduction in mass of contents below maximum permitted, dimensions show in table may be increased by 5%.					
B: Max. Dim L+W+H in mm						Note 2: No single dim to exceed 50% of combined dimensions					
C: Mini. Burst in kPa.											

SECTION 8: INDIA

IS: 2771 (PART I) – 1977 SPECIFICATION FOR FIBREBOARD BOXES (AMENDMENT NO. 1 DECEMBER 1980)			
Type of Board	Max. Mass of contents	Max. Combined Dim. L+W+H	Mini. Burst
	Kg	mm	Kg/cm ²
Single Wall	5	635	6
	8	750	8
	10	1025	9
Double Wall	15	1275	10
	20	1525	12
	25	1525	13
Triple Wall	30	1650	14
	40	1775	17
	55	1900	24
	75	2150	29

<p>Note 1: Boxes shall be made with no single dimension exceeding 50% of the sum of the permitted combined dimensions.</p>
<p>Note 2: The Single/Double/Triple wall boxes may be selected for maximum mass of contents in column 2 when the bursting strength properties can be achieved as per the requirement of the article packed.</p>
<p>Note 3: For calculating the maximum combined dimensions for any intermediate mass content, for each 10% reduction in mass content below the maximum permitted for a box, the calculated combined dimensions for the same may be increased by 5%.</p>
<p>Note 4: If a box is required for export or special use, it may be advisable to equate the board details given in the table to a reduced mass of content or reduced maximum combined dimension.</p>
<p>Note 5: The values of bursting strength given in column 4 are for general guidance and the user can choose minimum burst value appropriate to his product requirement.</p>

SECTION 9: ITALY

1) GIFCO TRANSPORT STANDARDS				2) GIFCO BOARD STANDARDS						
Class	M (1)		T	Type	Class (4C/100) + E	C		E		F
	Kg	lb				g/m ²	Kg/cm ²	Kg/cm ²	kPa	
10	10	22	1 S	Single Wall	19	250	7	686	1.2	117
20	20	44	2 S		23	275	9	883		
30	30	66	3 S	3 D	28	325	11	1078		
40	40	88	4 S		34	400	15	1471		
50	50	110	5 S	5 D	43	550	18	1766	1.3	127
60	60	132	6 S		52	650	21	2058		
75	75	165	6 D	Double Wall	20	250	8	785		
M = The gross mass (weight) of the package					23	250	10	981		
Dim = The max. Combined dimension of the case (L+W+H)				3 D	27	275	12	1177		
T = Type of board according to GIFCO BOARD STANDARD, S = Single wall, D = Double wall				4 D	32	325	14	1372		
C = The minimum GSM of the two exterior liners.				5 D	39	400	18	1766		
E = The minimum burst (Mullen) value of the board				6 D	50	650	21	2058		
F = The minimum Flat crush values per 100flutes/meter				<p>Note: The classes are defined according to (4C/100) + E. The minimum values of C & E do not guarantee the desired values and therefore to be compensated.</p>						

SECTION 10: JAPAN

JAPANESE INDUSTRIAL STANDARDS J.I.S Z. 1516 (CONFIRMED 1970)						
Class	Burst		Puncture		J	Note 1: The maximum mass (weight) of the package not specified. Note 2: The maximum combined dimensions of the package not specified
	Kg/m ²	kPa	Kg-cm			
Single Wall						
1	8.8	863	45	4.41		Board moisture content at time of manufacture min 11 ± 2%.
2	12.3	1206	55	5.39		Puncture is an optional alternative to burst if specified.
3	14.0	1373	60	5.88		The center liner of double wall board may be corrugating medium or interior liner.
4	19.3	1893	75	7.36		'A' flute to be 36 ± 3 flutes per 30 cm.
5	24.5	2403	95	9.32		'B' flute to be 51 ± 3 flutes per 30 cm.
Double Wall						
1	14.0	1373	95	9.32		Burst and Puncture values shown above are the average of three test.
2	19.3	1893	113	11.08		Note: kPa and Joules values are not shown in the Japanese Specification and have been added for convenience.
3	24.5	2430	135	13.24		
4	35.0	3433	185	18.15		
5	42.0	4120	205	20.11		

SECTION 11: SWITZERLAND

Corrugated Board Qualities –As agreed by the Swiss Convention of Corrugated Board Manufacturers									
Type of board	E C T		MULLEN		Type of board	E C T		MULLEN	
	Kg/cm	kN/m	Kg/cm ²	kPa		Kg/cm	kN/m	Kg/cm ²	kPa
A – flute approximately 5 mm thick									
106	3.3	3.2	4.4	432	206	3.3	3.2	4.4	432
111	4.0	3.9	5.8	569	211	4.0	3.9	5.8	569
113	4.7	4.6	6.9	677	231	4.0	3.9	7.9	775
131	4.0	3.9	7.9	775	232	4.2	4.1	9.7	951
132	4.2	4.1	9.7	951	252	4.4	4.3	12.5	1226
133	4.7	4.6	10.5	1030	264	4.2	4.1	8.2	804
136	5.2	5.1	12.0	1177	272	4.2	4.1	10.5	1030
153H	6.4	6.3	13.0	1275	281	4.3	4.2	6.0	588
154	5.6	5.5	16.0	1569	A + B flute approximately 8 mm thick				
165	4.6	4.5	9.5	932	532	6.6	6.5	12.5	1226
Tolerances: ECT: – 5% of the guaranteed median value									
Mullen: – 5% of the guaranteed median value.									
The guarantee refers to controlled median values of samples taken at the corrugator, with testing at normal climatic conditions, i.e., (20°C and 65% R.H). FEFCO test methods No. 1, 4 and 8.									
Conversion factors: Mullen: 1 kg/cm ² = 98.07 kPa									
ECT: 1 kg/cm = 0.981 kN/m									
536	7.6	7.5	15.0	1471	553	8.4	8.2	20.0	1961
554	9.0	8.8	23.0	2256	557	11.0	10.8	30.0	2942
564	6.5	6.4	11.5	1128	564	6.5	6.4	11.5	1128
581	6.0	5.9	9.0	883	581	6.0	5.9	9.0	883

SECTION 12: U.S.A. / CANADA

Item 222 of National Motor Freight Classification (NMFC) and Rule 41 of Uniform Freight Classification (UCF)						
A	B	C	D	E	F	
Single wall corrugated fiberboard boxes						
20	40	52	125	-	23	42
35	50	66	150	-	26	48
50	60	75	175	-	29	51
65	75	84	200	-	32	61
80	85	111	250	-	40	71
95	95	138	275	-	44	82
120	105	180	350	-	55	
Triple wall corrugated fiberboard						
A: Maximum weight of the box and contents in pounds						
240	110	168	-	700	67	
B: Maximum Outside dimensions, Length, Width, and Height added in inches.						
260	115	222	-	900	80	
280	120	264	-	1100	90	
300	125	360	-	1300	112	
E: Minimum puncture test values in in.oz. per tear in.						
F: Minimum Edge crush test values in pounds per inch.						
D: Minimum Burst in pounds per sq. inch						

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