

NOTE

Studies on Kraft Paper Used for Liners and Corrugating Media of Shipping Containers for Frozen Shrimp

In an earlier survey of the master cartons (Corrugated fibre board boxes CFB) used in frozen shrimp industry conducted by Central Institute of Fisheries Technology (Gopal & Govindan, 1980), it was observed that only 9.4% of samples studied conformed to IS specification 6715, in respect of two important criteria namely, bursting strength and cobb value. This might be attributed to the poor quality of kraft paper used for the liners and corrugating media. It was observed that the kraft paper used in the fabrication of CFB boxes was of two different grades namely, virgin and recycled. Hence a large number of samples of kraft papers of different manufacturers in the grammage 120–180 gsm normally used by the converter industry were collected from the CFB box fabricators in and around Cochin and their relevant physical properties like burst factor, breaking length, tear factor, ring stiffness and cobb value were studied (Table 1) as per test methods laid down in IS 1060, 4006 and ASTM-D 1164 and compared with specifications of kraft paper IS 1397. As per this specifications, kraft papers are graded as 1 and 2 depending on their physical properties. It is seen that only 10% of the samples conform to grade I as far as burst

factor is concerned, 30% in case of tear factor and nil in case of breaking length and cobb value. Less than 60% of the samples conform to grade 2 specifications. Burst factor is an important physical parameter of paper, which ultimately decides the load bearing capacity of the finished container. Cobb value (water absorption value) of the liner must be low, as the shipping container is subjected to varying temperature and humidity conditions during handling, transport and storage.

Further it is also observed in some cases that the master cartons are not either adequately waxed (for water proofing) or waxed only on one surface, thereby leaving the other surface prone to moisture absorption, leading to quick deterioration in its performance during usage. To study the effect of moisture absorption on the physical properties of kraft paper, both virgin and recycled papers were exposed to -20°C and 90% RH for three months and changes in physical properties were studied (Table 2). It is observed that while both materials have shown decreases in their physical strengths, in case of recycled paper, the changes are more pronounced.

Table 1. *Physical properties of kraft paper*

Property	Ranges and number of samples (in brackets) falling in them		
	A	B	C
Burst factor	30 and above (2)	30 to 20 (12)	< 20 (7)
Breaking length in meters (Machine direction)	7000 and above (Nil)	7000 to 4500 (6)	< 4500 (15)
Tear factor	120 and above (6)	120 to 75 (12)	< 75 (3)
Specific ring crush (Cross direction)	75 and above (1)	75 to 50 (4)	< 50 (16)
Cobb value (1 min)	15 and below (Nil)	15 to 20 (7)	> 20 (14)

A = Grade I as per ISI specification

B = Grade 2 as per ISI specification

C = others

Table 2. *Physical properties of kraft paper exposed to -20°C and 90% RH for 3 months*

Property	Virgin grade			Non-virgin grade (Recycled paper)		
	Before exposure	After exposure	% change	Before exposure	After exposure	% change
Grammage (gsm)	123	130	+5.7	119	136	+14.2
Bursting strength (KPa)	335	190	-43.2	230	65	-71.7
Tensile strength kgf/15m width (machine direction)	8.8	7	-20.5	5.2	3.8	-26.9
Tear strength (g) (Cross direction)	8	7.5	-6.3	6.2	5.7	-8.0
Ring stiffness (Newtons)	89	69	-22.5	60	42	-30

It is stressed that for the fabrication of master cartons for frozen sea foods, virgin grade kraft paper should be used and the cartons should be given adequate water proofing treatment (either waxed or laminated with polythene film) on both sides.

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References

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