

**EFFECT OF TEMPERATURE AND RELATIVE HUMIDITY ON
STRENGTH OF BOXBOARDS**

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Paperboards are highly sensitive to environmental conditions, including temperature and relative humidity due to their privileged cellulose structure. Therefore, the strength of the boxboards may be altered with the changes in temperature and relative humidity. This study was undertaken to determine the effect of different temperature and relative humidity (RH) conditions during storage on grammage, moisture content, thickness and grain flow direction of the boxboards which are often subjected to deformation. Seven grey back and five ivory boxboards with different dimensions were stored under three storage conditions with; 19 °C with 72% RH, 23 °C with 83% RH and 31 °C with 44% RH which considered as treatment 1, 2 and 3, respectively. Grammage, moisture content, thickness and grain flow direction were measured continuously for seven days of storage time. Results were analysed using one-way Analysis of Variance (ANOVA) with a 95% confidence level. The highest ($p < 0.05$) moisture content and grammage were observed in treatment 2 whilst treatment 3 resulted in the lowest value ($p < 0.05$) throughout the evaluated period. A diminishing pattern was observed in the same parameters at 31 °C temperature with 44% relative humidity while extending the storage time. Grain flow direction was not changed, however, the lowest droop length towards the grain flow direction was always obtained by the boxboards stored under 31 °C temperature with 44% relative humidity. Moisture increment and droop length towards the grain flow direction were lower in ivory boxboards than grey back boxboards with same dimensions. The material strength was increased with decreased moisture content. Boxboards with higher droop length towards the grain flow direction resulted deformation within the creasing lines towards the same direction. Therefore, in conclusion, 31 °C temperature with 44% relative humidity is the best condition to store boxboards avoiding moisture absorption. Utilization of ivory boxboards is beneficial to minimize the deformation of packages.

Keywords: Boxboards, Moisture content, Storage conditions, Storage time