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Determination of containerboard roll hardness

1. Scope

This test method describes a procedure to determine the uniformity in relative hardness of rolls of containerboard. Since several devices are currently available that use significantly differing technologies to determine hardness, this method only addresses the actual measurement process and not the test equipment specifically.

2. Significance

- 2.1 This method provides a means to determine the uniformity of roll hardness.
- 2.2 Variation in roll hardness can be the result of excessive moisture, basis weight, or thickness variation as well as an indication of winder problems.
- 2.3 Non-uniform roll hardness can result in serious converting problems which, without the aid of hardness measurements, can be very difficult to troubleshoot.
- 2.4 Although low values can be a concern, it is typically the variation in hardness across a given roll that relates most directly to such converting issues with soft edges being perhaps the biggest contributor.

3. Safety

While hardness testers are relatively safe, it is recommended never to discharge the device directly against any part of the body.

4. Apparatus

- 4.1 Multiple devices are currently available that will provide comparable readings.
- 4.2 As the most widely used and most heavily referenced apparatus, the Type L Schmidt Hammer is the primary reference device. In order to avoid ambiguity and until such time as the use of the Schmidt Hammer diminishes, where possible, all such measurements should be referenced to and reported as Schmidt Hardness values.

Approved by the Standard Specific Interest Group for this Test Method



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5. Calibration and maintenance

5.1 Calibration and maintenance are unique to the specific test apparatus in use. Reference manufacturer documentation for further guidance.

5.2 Regardless of measurement apparatus, calibrate the hardness tester regularly through the use of a known calibration standard.

5.2.1 Prior to each use or once a week, whichever is less frequent, place the measurement device on the calibration standard.

5.2.2 Take ten readings in a row on the reference calibration standard.

5.2.3 Record the average of the ten readings.

5.2.4 If the average readings vary from the equipment manufacturer's specifications, service and recalibrate the device until it meets such requirements.

6. Sampling

6.1 Sample, test, and accept or reject individual reels or rolls according to one of the following methods:

6.1.1 Sample reels at the mill after the winder to determine paper uniformity and to troubleshoot paper machine operations before rewinding.

6.1.2 Sample rewind rolls at the mills to monitor rewinder performance and roll quality.

6.1.3 Sample rolls upon arrival at the converting operation to identify issues such as if excessive drying of the edges has occurred during transport.

6.1.4 The most widely used sampling and measurement method occurs after the bands and outer wraps have been removed, and the rolls have been mounted in the converting operation.

6.2 Note also that hardness values can change as rolls age or are wound or unwound. When troubleshooting specific issues sample the rolls at various intervals as they are built or consumed based on the problem under investigation.

7. Conditioning

Perform this test in an operating environment on unconditioned samples.

8. Procedure

8.1 Place the measurement device solidly against the roll, perpendicular to the roll surface and parallel to the ground.

8.2 Begin the measurement process no less than 2.5 cm (about 1 in.) but no more than 7.5 cm (about 3 in.) in from the edge of the roll.

8.3 Repeat measurements approximately every 15 cm (6 in.) across the roll in the CD direction.

8.4 Record individual readings by position.

9. Calculation

9.1 Calculate the average or mean of all readings.

9.2 Determine the maximum variation (highest reading minus the lowest reading).

10. Report

Report the mean value and variation of each roll evaluated in Schmidt Hardness units.