

Voluntary Technical Standard

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Reviewed

Paper Honeycomb – Determination of Height

DISCLAIMER

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Foreword

EMPHA is the European Manufacturers Paper Honeycomb Association, with headquarters located at The Hague, The Netherlands.

Within EMPHA organization, a Technical Task Team has been created to address the issue of Voluntary Technical Standards. The goal for this committee is to create a set of technical standards and methods that can be used, on a voluntary basis, to create and maintain transparent and measurable parameters that define the specific quality of the paper honeycomb.

The Standard for the determination of the Compression Strength has been approved by the members of the EMPHA in the General Assembly of June 2013.

This Standard has been reviewed by the EMPHA Technical Committee in 2021.

Introduction

Paper Honeycomb applications demand the control of height within strict limits. EMPHA Technical Task Team recognizes three methods of measuring the height:

1. The C-shaped hand held gauge method.
2. The table-top-stand-gauge method.

The widely used hand held gauge, Technical Task Team judges as indicative but not suitable for commercial use. As it is widely used this method is commonly accepted though should be judged and used with care. The R&R results are poor.

The digital unit excludes the reading error and is therefore preferred over the analog unit.

The table top stand gauge is considered a better alternative and TTT proposes a set up for this method in this document. The R&R results are poor (better as the hand held) and the unit can only be used as an offline method.

1. Scope

This Voluntary Technical Standard specifies three different methods to determine paper Honeycomb height.

All procedures are applicable to endless and block paper honeycomb.

2. Normative references

ISO 187 - Paper, board and pulps -- Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples

ISO 5725-2:1994 - Basic method for the determination of repeatability and reproducibility of a standard measurement method

3. Terms and Definitions

Paper Honeycomb: In the context of the EMPHA, paper honeycomb is considered as a paper product consisting of paper strips glued together in a way that forms hexagonal shaped cells when expanded.

Height of Honeycomb: dimension measured perpendicular to the nominal expanded honeycomb.

Unexpanded Honeycomb: compact honeycomb with no visible cells; honeycomb in a certain form, which length is similar (same order of magnitude) as the sum of individual paper sheets thickness.

Expanded Honeycomb: honeycomb with visible formed cells; honeycomb in a certain form, which length is considerable superior (higher order of magnitude) to the sum of individual paper sheets thickness.

Expansion rate of the Honeycomb: ratio between expanded honeycomb width and unexpanded honeycomb width.

Nominal expansion: expansion rate of 75%

4. Principle

The hand held gauge method: A C-shaped thickness measuring gauge with two parallel contact probes is held perpendicular on to the expanded honeycomb core with sufficient pressure to get a reading without damaging the paper edges. The reading is in mm with a one (analogue) or two (digital) decimal precision. This means that the digital type gauge is preferable.

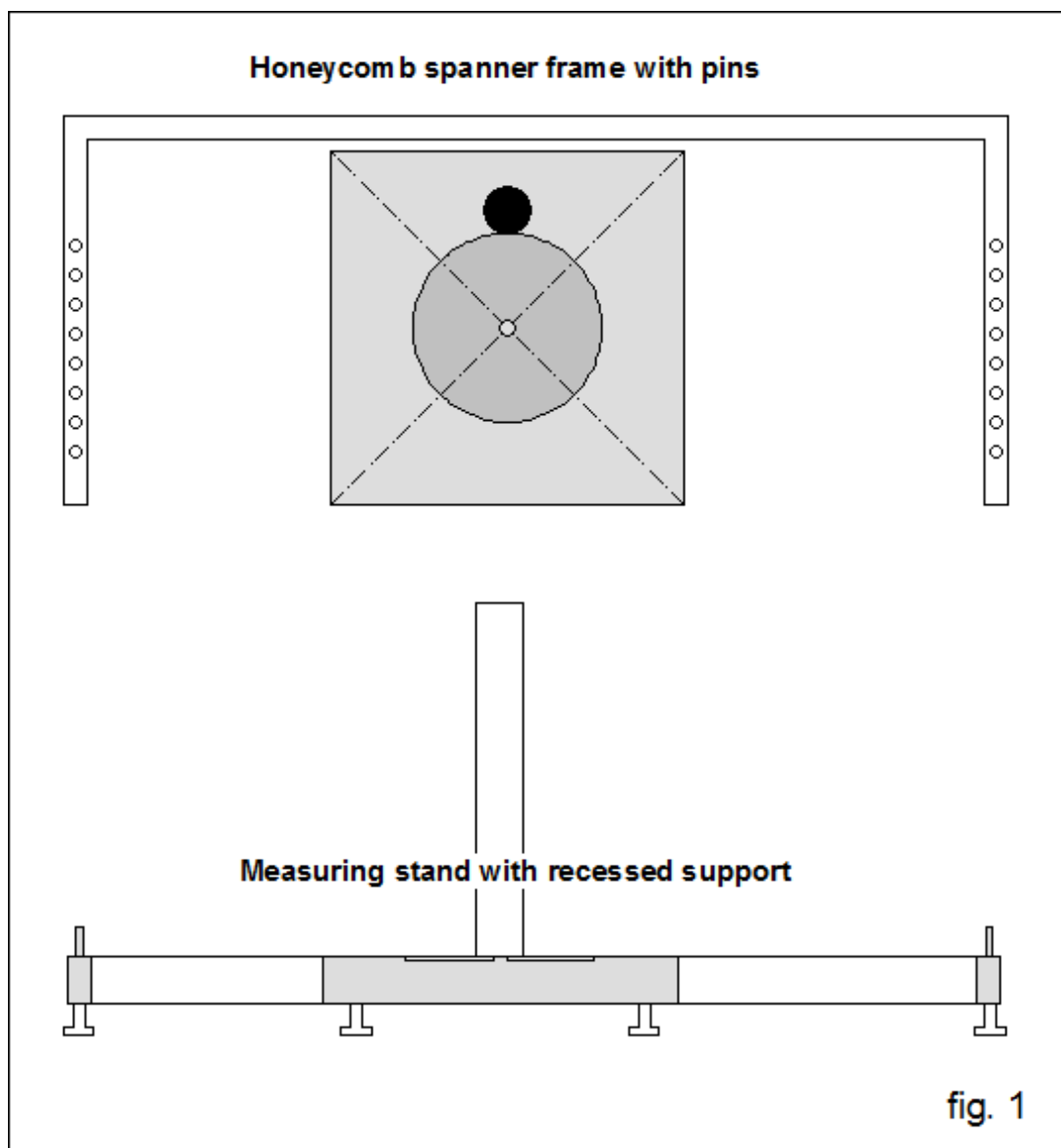
The table top gauge method: the nominally expanded honeycomb core is fixed in a frame in such manner that the core is held parallel to the table top on the same level as the table top gauge. Frame with core and measuring gauge can be moved independently so measuring at multiple positions on the sample is made possible.

5. Apparatus

C-shape hand held gauge:



Table top stand gauge: Various models are commercially available. Minimum requirement is a digital reading with two decimal precision and an adjustable measuring pressure. The top and bottom probes shall have equal dimension adapted to cell geometry. The gauge shall be held stable perpendicular to the table top so as to guarantee a perpendicular measurement. The core fixing frame is made large enough to accommodate the sample as required and to provide independent movement over a 10 cell length. It is advised to support core in its horizontal position on an adequate distance from the measuring probe (see fig 1).





6. Sampling

Test pieces are taken randomly from the Specimen.

Samples shall be taken in equal numbers from both sides of the width of the honeycomb.

The frequency is determined in relation to the needs of the supplier as well as in relation to customer requirements.

7. Conditioning

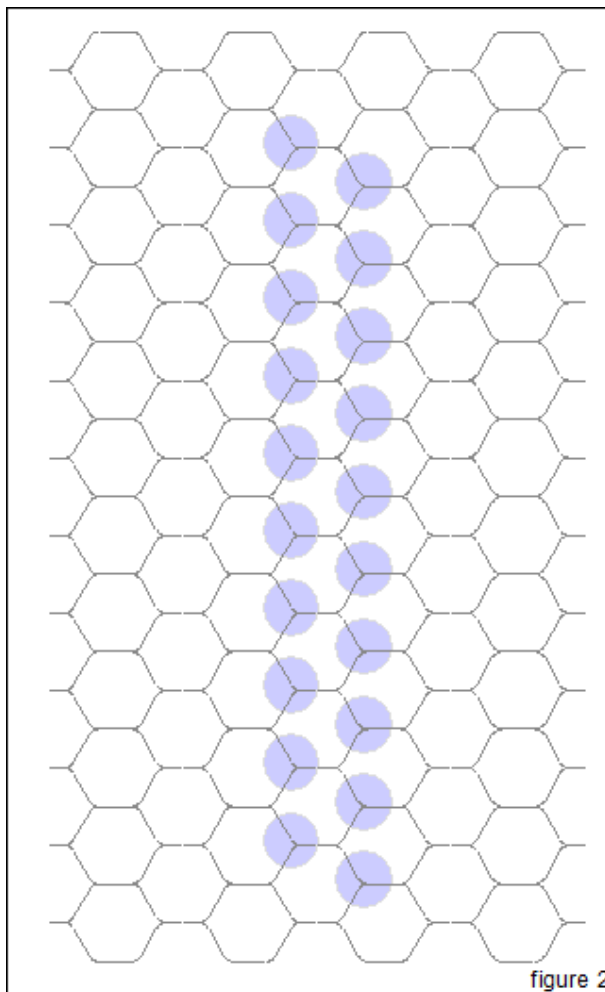
EMPHA recognizes two different alternatives for sample conditioning, for height measuring EMPHA advises only the first method as applicable:

- 1 not dried, in accordance with ISO 187
- 2 Darr dried to less than 2 % - this is considered as indicative and can be used as a certain reference level.

8. Preparation of test pieces

Dimensions

Test pieces shall have sufficient length as to allow measurements of 10 cells sequential and sufficient width to allow measurements of two rows of cells (see fig. 2).



Hand held gauge

The height measurement shall be performed at a joint of two sheets of the honeycomb as shown in figure 2. The honeycomb needs to be expanded to approximately 75% of the unexpanded width.

Table top stand gauge

The height measurement shall be performed at a joint of two sheets of the honeycomb as shown in figure 2. The honeycomb needs to be expanded to approximately 75% of the unexpanded width and spanned on the pinned frame.

9. Procedure

Hand held gauge method

This test method is being advised only to be used as a indicative method. The hand held gauge method is widely used in the industry due to the fact that it gives a fast result and can be used in line.

Due to the fact that this test is indicative it is not needed to condition the sample.

Test is performed to obtain at least 20 valid results per sample for continuous honeycomb and 10 valid results per sample for block type honeycomb.

For a proper measurement 10 adjoining cells (endless honeycomb) in machine direction need to be measured in order to include at least two joints of multi sheet cuts. To assure that joint is not missed two adjoining rows of cells shall be measured (fig. 2). For block type honeycomb 5 cells per adjoining row shall be measured taking care a joint is included.

Table top gauge method

Tests shall be carried out in the conditions in accordance to ISO 187.

Test is performed to obtain at least 20 valid results per sample for continuous honeycomb and 10 valid results per sample for block type honeycomb.

For a proper measurement 10 adjoining cells (endless honeycomb) in machine direction need to be measured in order to include at least two joints of multi sheet cuts. To assure that joint is not missed two adjoining rows of cells shall be measured (fig. 2). For block type honeycomb 5 cells per adjoining row shall be measured taking care that a joint is included.

The spanner frame with the expanded honeycomb sample may be moved over the lower probe of the gauge to measure each sequential joint.

Select the appropriated probe dimensions for the measuring device in order to measure not more than two sheets including the glue joint.

Set the measuring force at a value of 4 – 5 N.

10. Expression of results

The specimen height value is considered to be the average of the valid results. Of these results only one may be less than 0,1 mm outside specified tolerance. Height results shall be reported in mm.

11. Test report

The test report shall include the following information:

- a) a reference to this Voluntary technical standard
- b) the date and place of testing and the person that executed the tests
- c) a description and identification of the product tested
- d) the type of tester used – hand held gauge or table top gauge
- e) The dimension of the top and bottom probes
- f) The measuring pressure applied
- g) test pieces conditioning – ISO 187 or Darr dried
- h) results for the specimens
 - i. each individual measured height
 - ii. Average height for the 20 valid results from each test piece

12. Document Review

F01-2012: Original Issue

F02-2021: Reviewed and section 12 added