BS EN ISO 9073 Standard Test Methods for Non-Woven

Description

ISO 9073 series of standards defines properties of Non wovens as below parts:

- Part 1 Nowovens. Test methods. Determination of mass per unit area
- Part 2 Textiles. Test methods for nonwovens. Determination of thickness
- Part 3 Nonwovens. Test methods. Determination of tensile strength and elongation at break using the strip method
- Part 4 Textiles. Test methods for nonwovens. Determination of tear resistance
- Part 5 Textiles. Test methods for nonwovens. Determination of resistance to mechanical penetration (ball burst procedure)
- Part 6 Textiles. Test methods for nonwovens. Absorption
- Part 7 Textiles. Test methods for nonwovens. Determination of bending length
- Part 8 Textiles. Test methods for nonwovens. Determination of liquid strike-through time (simulated urine)
- Part 9 Textiles. Test methods for nonwovens. Determination of drape coefficient
- Part 10 Textiles. Test methods for nonwovens. Lint and other particles generation in the dry state
- Part 13 Textiles. Test methods for nonwovens. Repeated liquid strike-through time
- Part 14 Textiles. Test methods for nonwovens. Coverstock wetback
- Part 15 Textiles. Test methods for nonwovens. Determination of air permeability
- Part 16 Textiles. Test methods for nonwovens. Determination of resistance to penetration by water (hydrostatic pressure)
- Part 17 Textiles. Test methods for nonwovens. Determination of water penetration (spray impact)
- Part 18 Textiles. Test methods for nonwovens. Determination of breaking strength and elongation of nonwoven materials using the grab tensile test

5 Important tests to the end use applications

Nonwovens testing of physical and mechanical properties are essential to determining their end-use

applications. For example, if a nonwoven has high absorptive capacity, it could potentially be used in an advanced wound care application, or, if the material has high tear strength, it could be used in the construction industry. There are numerous test methods used in order to establish nonwoven characteristics; this article explores five commonly measured nonwovens characteristics and the test methods used to establish them.

ABSORBENT CAPACITY

The absorbent capacity is the amount of liquid a nonwoven material can retain. The testing procedures involve soaking the nonwoven material with liquid and then letting the material stand for a period of time. This allows the liquid not absorbed by the material to disperse (either through natural gravity, gravity from centrifugal force, or external pressure). The remaining liquid in the nonwoven is measured to determine the absorbent capacity of the material. This specification is generally measured in percentage (%).

Absorbent capacity is particularly important in advanced wound care applications where a high absorptive capacity allows the product to absorb exudate from a wound bed. Absorption also plays a critical role in point of care diagnostic applications. Understanding the absorbent characteristics of a material allows an R&D team to select the correct material, and design a procedure for an optimal sample/reagent reaction.

Common Test Methods:

- ASTM D1117-80

BURST STRENGTH

The bursting strength is defined as the amount of hydrostatic pressure that causes a rupture in the nonwoven material when applied to a specific area. The procedure involves clamping the nonwoven material to a rubber diaphragm and subjecting the specimen to fluid pressure until point of rupture. The bursting strength of a material is generally measured in kilopascals (kPa).

Burst strength, which is indicative to the strength of the nonwoven, is an important property. Many of the nonwovens used in the medical or pharmaceutical industries must be able to withstand a certain amount of hydrostatic pressure before failing. For example, it is crucial that the burst strength of nonwovens used as a pleat support in laterial flow cartridges be high enough to ensure that they do not fail during downstream filtration of pharmaceutical drugs.

Common Test Methods:

- ASTM D3786 / D3786M

PERMEABILITY

Air Permeability

Air permeability is the rate of air flow passing through a predetermined area of the nonwoven material.

The test method details how the nonwoven must be clamped to isolate a specific circular area of the material. Using a vacuum, gradient air pressure is induced causing upstream air pressure to be greater than downstream. Consequently, air will naturally migrate towards the area of lower pressure, and the resulting air flow is used to determine air permeability. The air permeability of a material is generally measured in $cm^3/s/cm^2$ or $ft^3/min/ft^2$.

Common Test Methods:

- ASTM D737-96

Moisture Permeability

Moisture vapor transmission rate (MVTR) or water vapor transmission rate is similar to air permeability in that it measures the rate of water vapor passing through a predetermined area of the nonwoven material. The upright test method requires a nonwoven material placed on top of a cup containing distilled water. The cup is then sealed so that water vapor can only leave through the nonwoven material. The sample weight is recorded regularly throughout the duration of the test. The change in weight is used to determine the rate of water vapor loss and thus determine the MVTR. The MVTR of a material is generally measured in $g/m^2/day$.

Common Test Method:

- ASTM E96

Both air and liquid permeability have a drastic impact on the functionality of the end use product. Simplistically, a material will either block moisture and liquid to act as a barrier, or it will allow the passage of these substances resulting in a filtration effect. If a material has low moisture permeability, but high air permeability it is possible that this is used in venting applications. For example, these types of nonwovens are used in the automotive markets to protect sensors, and can be found in the caps of chemical storage containers in laboratories.

ELONGATION

Elongation is the amount of warp experienced by a nonwoven material while under stress. The testing procedures involves performing a grab strength test in which a nonwoven sample is clamped in the tensile testing machine (with the midpoint of the sample equidistant from the clamps). The clamps are moved apart at a specified rate until the sample breaks. The elongation of the material can then be found by determining the increase in sample length. The elongation of a material has no units (as it is a ratio of elongated material to non-elongated material) but can be presented as % strain.

Elongation is a specification that impacts the physical performance of a material. Products that require the ability to contract and expand, be stretched, are designed for long term medical use, etc. need materials with increased elongation so that after deformation the product can return to its original form. Conversely, products that have minimal elongation will function as a support, like the backing material of a diagnostic card, or are required to maintain their form to function properly, similar to membrane casting substrates which must minimize standing fibers. Low elongation values are desirable for these types of products because it maintains the structural integrity of both the overall

material and the fibers.

Common Test Method:

- ASTM D5034

TEAR STRENGTH

Tear strength is the amount of force necessary to rip a nonwoven with a pre-cut slit. The test method makes use of an Elmendorf tear tester, a specialized piece of equipment with a pendulum that is used to create a force that further tears the slit. The nonwoven sample is clamped into the Elmendorf tear tester with clamps on either side of the cut; one of the clamps is fixed to the machine while the second clamp is attached to the pendulum. When the pendulum is raised and released the resulting force causes the pendulum clamp to move away from the fixed clamp, further tearing the material. The tearing force is digitally measured and used to determine the tear strength of the nonwoven material.

The tear strength of a nonwoven is instrumental in determining its application. The wide range of tear strengths within the nonwovens family allows them to be used in a variety of industries. For example, nonwovens are commonly used as wipes (personal or industrial) and therefore require high tear strength in order to prevent rips during use. Nonwovens can also be used in construction as geotextiles or roofing components. In all of these applications, the tear strength of the nonwoven must be carefully engineered and tested. This is a major performance characteristic that ensures the final product can withstand the stresses that will be applied by the structure or external environment it is exposed to.

Common Test Method:

- ASTM D5734

Category

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