

Introduction to Nonwoven and Technical Textiles

Textiles and Nonwovens

- Textiles vs. nonwoven fabrics
- Product applications
- Textile testing
- Nonwoven fabric testing
- Grade recommendations
- Laboratory demonstrations

What are Textiles?

- Any cloth or article that is produced by weaving or knitting
- Used in apparel, shoes, linens, drapes, etc.
- Typically have better wetting than nonwovens

What are Nonwoven Fabrics?

- Any cloth or article that is produced by forming bonding materials to form webs
- Used in medical garments, filters, automotive applications, etc.
- Non-wovens typically have some hydrophobic properties without fluorochemical treatment.



Product Applications

- Textiles and nonwovens are treated similarly.
- Customer's formulation is used for treating fabric with AsahiGuard.
- Percent Wet Pickup = $\frac{\text{Wet Mass} - \text{Dry Mass}}{\text{Dry Mass}} \times 100$
- Nonwovens usually require more or better wetting agents.
- Wetting agents lower the surface energy of a solution, increasing the speed the solution penetrates the fabric.
- Examples of wetting agents: Hexanol, Isopropanol
- The amount of wet pick-up is very important in understanding how well a product works in a given application.

Customer Example

- Customer's current formulation = 100% wet pick-up
- AsahiGuard grade formulation = 60% wet pick-up

This means that 40% less fluorochemical solution is applied to the fabric.

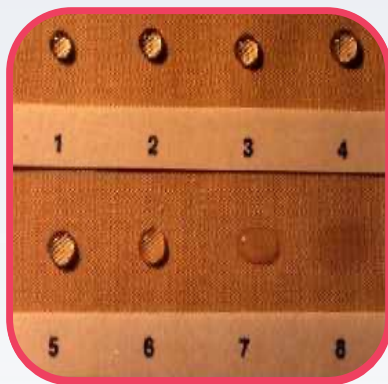
- Improving wet pick-up:
 - Increase the wetting agent
 - Decrease nip pressure
 - Decrease roller speed

Textile Performance Evaluation

Name	Method
Water Repellency	AATCC 193
Oil Repellency	AATCC 193
Spray Performance	AATCC 22
Stain Release	AATCC 130
Wash Durability	Customer Specific

Static Water Repellency: Drop Kit Test Method

- Three drops of the IPA and water solutions are placed on the fabric
- Fabric passes the test if no wetting is observed after ~15 seconds



**Water Drop
Kit Test
AATCC 193
(Teflon/CHT
Standard)**

Kit Comparison

3M Kit Test		
Grade	Isopropanol	Water
W	0%	100%
1	10%	90%
2	20%	80%
3	30%	70%
4	40%	60%
5	50%	50%
6	60%	40%
7	70%	30%
8	80%	20%
9	90%	10%
10	100%	0%

Teflon® Kit Test		
Grade	Isopropanol	Water
1	2%	98%
2	5%	95%
3	10%	90%
4	20%	80%
5	30%	70%
6	40%	60%
7	50%	50%
8	60%	40%

Oil Repellency: Drop Kit Test Method

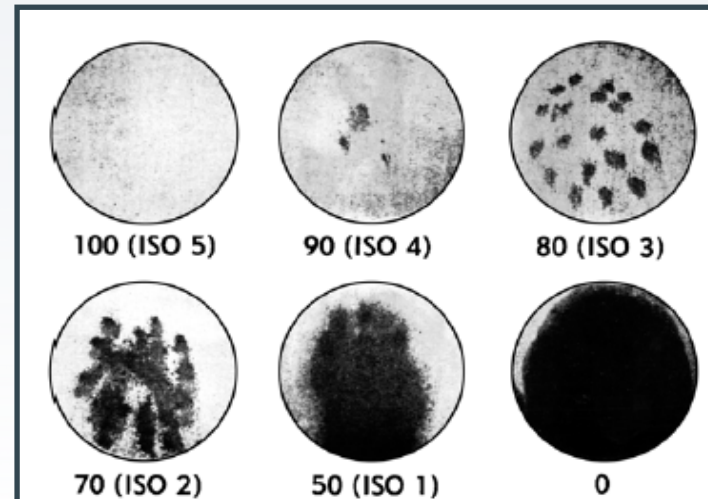
- Three drops of the test grade are placed on the fabric
- Fabric passes the test if no wetting is observed after 15–30 seconds

Oil Kit Test	
Grade	Description
1	Kaydol Oil
2	65:35 Kaydol: Hexadecane
3	Hexadecane
4	Tetradecane
5	Dodecane
6	Decane
7	Octane
8	Heptane

**Oil Drop
Kit Test
AATCC 118**

Dynamic Water Repellency: Spray Test Method

- 250 ml of tap water is sprayed over fabric
- Spray height = 15 cm
- Knock off the specimen
- Ratings: 0–100



**Spray Test
AATCC 22**

Stain Release Test Method



**Stain Release
Test
AATCC 130**

Measures ability of fabric to release oily stains during home laundering

- Corn oil and mineral oil are applied to fabric.
- Glassine surface is placed on top followed by a 2.27 kg weight for 60 seconds.
- Surface and weight are removed and the fabric is washed.

Wash Durability

- Allows fabric to be washed and dried as much as required
- Sample evaluation is completed again after the wash and dry cycles are completed
- Provides a numerical value for performance longevity
- Used in stain release evaluations

Nonwoven Testing

Performance Evaluation

- Water Repellency
- Wash Durability
- Hydrostatic Testing
- Static Decay
- Surface Resistivity

Optional Evaluations

- Oil Repellency
- Spray Performance
- Stain Release



Hydrostatic Pressure Testing

- Equipment measures the force (kPa) and time required to force a liquid, usually water, through a piece of fabric.
- The greater the force and time required to penetrate the fabric, the more resistant the fabric is to that particular liquid.
- This equipment provides a means of quantitatively differentiating treatments that perform similarly in the testing discussed earlier.

Static Decay Testing

- Measures the time it takes for the charge applied to the fabric to dissipate.
- Decay data is useful for medical garment and carpet customers.

Surface Resistivity Testing

- Electrical resistance of the fabric surface is measured between two concentric rings.
- Comparing the voltage gradient to the current density provides a numerical value of how much charge can build up on the surface of the fabric.



AsahiGuard Recommendations

	Solid content [%]	Ionic character	Feature
E061	20	WC	Mildly Durable
E081	30	WC	Durable without X-linker
E082	20	WC	Durable, Mildly durable
E092	20	WC	Soft handle
E400	20	WC	Soft handle, For initial
E500D	30	WC	Durable, Less OR, Bundesmann
E550D	30	N	Durable, Nonionic, highest MW
E700D	30	WC	Durable, Bundesmann
E100	20	WC	Stain Release
E600	25	AM	For PP-SMS
E300D	30	N	For filter media

- Customer applications are unique.
- AG recommendations should be tailored to fit each customer's desired characteristics.



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