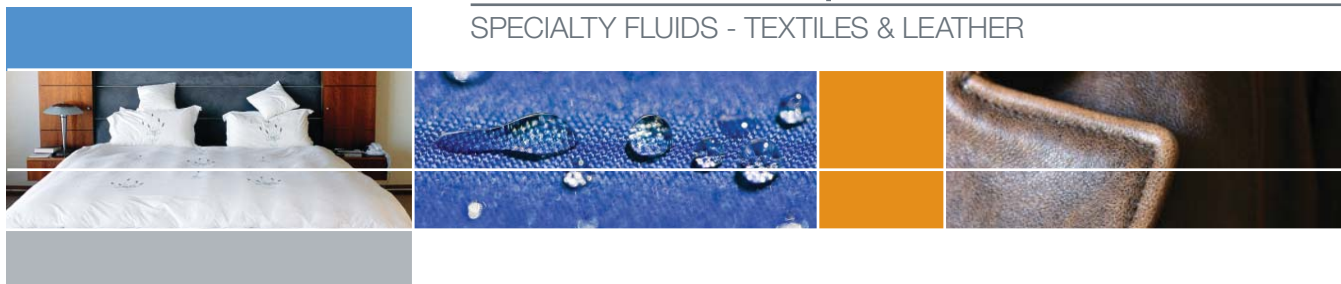


MAGNASOFT* NFR-A and MAGNASOFT NFR-B textile water repellent finish

SPECIALTY FLUIDS - TEXTILES & LEATHER



Magnasoft NFR-A / Magnasoft NFR-B, a two-component water-repellent system, is the latest product offering from Momentive Performance Materials for the textiles industry. It is an excellent candidate to consider for top-of-the range water repellency combined with very high softness and smoothness. Magnasoft NFR-A and Magnasoft NFR-B is a system produced without fluorine-based chemicals. Recent industry regulatory restrictions have severely curtailed the use of certain water repellent chemicals. It is expected that Magnasoft NFR-A and Magnasoft NFR-B will be able to help the industry maintain very high standards of water repellency.

Magnasoft NFR-A is a state-of-the-art specialty silicone emulsion; Magnasoft NFR-B is a catalyst to be co-applied with Magnasoft NFR-A in the finishing bath.

Unlike conventional silicone water-repellent finishes that are usually based on hydrogen-functional silicones and/or hydroxyl-terminated silicones, the combination of Magnasoft NFR-A and Magnasoft NFR-B can deliver a durable water-repellent effect that typically persists even after several home laundry cycles. In addition, it can help impart a luxurious soft and smooth hand-feel on virtually all types of fabric.

Another potential key benefit of the Magnasoft NFR-A & Magnasoft NFR-B system is that it may impart an LAD (Laundry Air Dry) effect on cotton and cotton blends: a treated fabric that has been washed in typical home laundry conditions will exhibit water repellent properties on drying at room temperature. There is no need to heat at a high temperature or to iron in order to re-establish the water-repellent effect.

Typical Physical Properties			
Property	Unit	Magnasoft NFR-A	Magnasoft NFR-B
Appearance	–	Milky white liquid	Beige liquid
Viscosity at 25°C	cPs	50	50
Solid content	%	32	21
pH at 25°C	–	9	4
Ionic	–	Weakly Cationic	Weakly Cationic

The data values of typical physical properties should not be used as specifications; these are available from the nearest Momentive Performance Materials sales office.

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Key Features and Typical Benefits

- contains no PFOS (Perfluoro-octane sulfonic acid), PFOA (Perfluoro-octanoic acid), APEO (Alkyl phenol ethoxylate).
- excellent water repellency, virtually as good as the best industry standard.
- durable water-repellent effect on cotton fabrics even after multiple home laundry cycles, typically outperforms industry standard.
- may provide an LAD (Laundry Air Dry) effect on cotton and polyester/cotton blends even when drying at room temperature; the impact may be durable to several home laundry cycles.
- helps impart superior smoothness and softness on all types of fabric.
- the system is stable for 48 hours at bath pH 4 to 10, enabling a long pot life.
- no need to use specialized equipment, typical dry/cure conditions are applicable. Optimum performance is achieved by drying at 130°Cx2min followed by 160°Cx1min.
- water dispersible; Easy-to-use in any type of finishing process.
- may be combined with a typical fluorocarbon water-repellent to provide moderate oil/stain repellency.

Potential Applications

Magnasoft NFR-A & NFR-B is a two component non-fluorinated water-repellent finish that is an excellent candidate to consider in case there is a need for a powerful water-repellent effect combined with high softness and slickness on virtually all types of fabric. Both components are easily water-dispersible. Magnasoft NFR-A should be co-applied with Magnasoft NFR-B in the finishing bath. In lab tests, such a blend in the bath has exhibited a pot life of up to 48 hours at a pH range of 4 to 10. The blend may then be applied by virtually all the typical means, such as padding, exhaustion or spraying.

Dose level of Magnasoft NFR-A & Magnasoft NFR-B

Optimum dosage levels of Magnasoft NFR-A & Magnasoft NFR-B are subject to the type of fabric and the level of performance required, but 10~20 g/l of Magnasoft NFR-A blended with 3~6 g/l of Magnasoft NFR-B are generally recommended.

As a starting point, *10g/l Magnasoft NFR-A co-applied with 3g/l Magnasoft NFR-B in a bath is recommended.* The dose levels may subsequently be adjusted to achieve the required performance.

Bath pH for Magnasoft NFR-A & Magnasoft NFR-B

6~8 bath pH is typically recommended. The typical bath pH 7.5 is resulted in case of co-applying 10g/l Magnasoft NFR-A and 3g/l Magnasoft NFR-B in a bath.

Drying & Curing Conditions

Magnasoft NFR-A & Magnasoft NFR-B do not require unusual drying and curing conditions or equipment. The commonly used drying and curing conditions are mostly applicable for Magnasoft NFR-A and Magnasoft NFR-B. *Optimum performance can be achieved by drying at 100~130°C for 2min followed by 150~160°C for 1min.*

Combination with a Water-Repellent Fluorocarbon

A typical water-repellent fluorocarbon may be co-applied with Magnasoft NFR-A & Magnasoft NFR-B in a finishing bath to further improve the water repellency in addition to achieving moderate oil/stain repellency. It is recommended that lab tests be performed to establish the optimum conditions and bath ratios of the combination in order to achieve the performance required.

A starting bath formulation of the combination may consist of 10 parts Magnasoft NFR-A, 3 parts Magnasoft NFR-B and 3 parts of a typical water repellent fluorocarbon (30% solids).

If required, pre-blending of Magnasoft NFR-A with a typical water repellent fluorocarbon (30% solids) may be a viable alternative. In this case, the blend needs to be co-applied with Magnasoft NFR-B in the finishing bath.

It is recommended to use a water repellent fluorocarbon (30% solids) that contains no extenders, such as paraffin wax emulsions or polyethylene wax emulsions. The compatibility of the blend needs to be determined by lab testing in advance to ensure problem free operations.

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MAGNASOFT* NFR-A and MAGNASOFT NFR-B textile water repellent finish

Performance Data

Table 1: Water Repellency

Home Laundry Cycles	Cotton			Polyester			Nylon		
	Benchmark A	Benchmark B	Magnasoft NFR-A&B	Benchmark A	Benchmark B	Magnasoft NFR-A&B	Benchmark A	Benchmark B	Magnasoft NFR-A&B
0	95	95	95	100-	100	100-	90+	95+	90
5	0	0	70+	100-	100	100-	80+	90	85
10	0	0	50+	100-	100	100-	75+	90-	80
15	0	0	0	95	100	95	70-	85+	70+
20	0	0	0	95-	100	95	60-	80	60

Benchmark A: Typical C₆-based fluorocarbon water repellent (30% solids)

Note: Test results. Actual results may vary.

Benchmark B: Typical C₈-based fluorocarbon water repellent (30% solids)

Test Conditions

- Apply 10g/l C₆-based fluorocarbon (30% solids) or 10g/l C₈-based fluorocarbon (30% solids) respectively.
- Blend 10g/l Magnasoft NFR-A with 3g/l Magnasoft NFR-B in the finishing bath.
- Dry at 130°Cx2min followed by 160°Cx1min.
- Home laundry up to 20 cycles: AATCC 135 test method.
- Water repellency: AATCC 22 Spray test method.

Table 2: Fabric Softness

Tested by KES (Kawabata Evaluation System)	Polyester/Cotton (65/35) Blended Woven		100% Cotton Woven	
	Softness (B+2HB/2)	Smoothness (MIU)	Softness (B+2HB/2)	Smoothness (MIU)
Untreated	0.0688	0.179	0.0716	0.181
10g/l Magnasoft NFR-A & 3g/l Magnasoft NFR-B	0.0356	0.128	0.0436	0.148
10g/l Benchmark C	0.0503	0.162	0.0573	0.167

Tested by Hand Panel	Cotton Woven	Polyester Woven	Nylon Woven
Untreated	2.5	2.5	2.5
10g/l Magnasoft NFR-A & 3g/l Magnasoft NFR-B	4.5	4.5	4.5
10g/l Benchmark C	3.5	4.0	3.7
10g/l Benchmark	B3.0	3.5	3.3

Benchmark B: Typical C₈-based fluorocarbon water repellent (30% solids)

Note: Test results. Actual results may vary.

Benchmark C: C₈-based fluorocarbon water repellent (30% solids) with increased softness

MAGNASOFT* NFR-A and MAGNASOFT NFR-B textile water repellent finish

Performance Data (continued)

Table 3: Combination with Fluorocarbon Water Repellent

Dosage Co-applied in a Bath (g/l)			Water Repellency			Oil Repellency		
Magnasoft NFR-A	Magnasoft NFR-B	C ₈ -based neat fluorocarbon (30% solids)	Cotton	Polyester	Nylon	Cotton	Polyester	Nylon
10	3	3	100	100	100	1	2-3	4-5
10	1.5	3	95	100	100	1	2-3	4-5
10	1.5	1.5	95	100	100	0-1	1-2	2
0	0	10	85	100	100	2-3	4-5	4-5
0	0	20	95	100	100	4-5	4-5	4-5

Note: Test results. Actual results may vary.

Test Conditions

- Blend Magnasoft NFR-A, Magnasoft NFR-B and C₈-based neat fluorocarbon water repellent (30% solids) in the finishing bath.
- Dry at 130°Cx2min followed by 160°Cx1min.
- Water repellency: AATCC 22 Spray test method.
- Oil repellency: AATCC 118 Hydrocarbon resistance test method.

Table 4: LAD (Laundry Air Drying) Effect

Type of Fabric	Product Applied	Water Repellency Before Home Laundry	Water Repellency after 5 Home Laundry Cycles			Water Repellency after 10 Home Laundry Cycles		
			Dry at 30°C	Dry at 60°C	Ironing	Dry at 30°C	Dry at 60°C	Ironing
Cotton	Benchmark A	95	0	0	60	0	0	0
	Benchmark B	95	0	0	70-	0	0	0
	Magnasoft NFR-A & Magnasoft NFR-B	95	70+	70+	70+	50+	50+	50+
Polyester	Benchmark A	100-	100-	100-	100	100-	100-	100
	Benchmark B	100	100	100	100	100	100	100
	Magnasoft NFR-A & Magnasoft NFR-B	100-	100-	100-	100-	100-	100-	100-
Nylon	Benchmark A	90+	80+	80+	85	75+	75+	80
	Benchmark B	95+	90	90	95	90-	90-	95
	Magnasoft NFR-A & Magnasoft NFR-B	90	85	85	85	80	80	80

Benchmark A: Typical C₆-based fluorocarbon water repellent (30% solids)

Benchmark B: Typical C₈-based fluorocarbon water repellent (30% solids)

Note: Test results. Actual results may vary.

Test Conditions

- Apply 10g/l C₆-based fluorocarbon (30% solids) or 10g/l C₈-based fluorocarbon (30% solids) respectively.
- Blend 10g/l Magnasoft NFR-A with 3g/l Magnasoft NFR-B in the finishing bath.
- 130°Cx2min drying and then 160°Cx1min curing.
- Measure water repellency (no home laundry) according to the AATCC 22 test method.
- 5 home laundry cycles according to AATCC 135 test method.
- Measure water repellency after drying the laundered fabrics at 30°C & 60°C respectively and after ironing.
- 10 home laundry cycles.
- Measure water repellency after drying the laundered fabrics at 30°C & 60°C respectively and after ironing.

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MAGNASOFT* NFR-A and MAGNASOFT NFR-B textile water repellent finish

Performance Data (continued)

Table 5: Effect of Aging of the Finishing Bath

Bath pH	Bath Temperature (°C)	Fabric Water Repellency vs. Bath Aging			Bath Stability
		1 hour	24 hours	48 hours	
4	27	90+	90+	90	Stable
	38		90+	90-	
	45		90	90-	
7	27	95	95	90	Stable
	38		95	90	
	45		90-	80	
10	27	95	90	90	Stable
	38		90	80	
	45		80	80-	

Note: Test results. Actual results may vary.

Test Conditions

- Prepare a blend of 10 parts Magnasoft NFR-A and 3 parts Magnasoft NFR-B in a finishing bath using hard water (250ppm CaCO₃).
- Age the blend for 1 hour, 24 hours and 48 hours respectively at the three different pH values and at three different temperatures shown in the table above.
- Observe the stability of the bath.
- Apply on cotton woven fabric, dry/cure at 130°Cx2min/160°Cx1min and measure water repellency (AATCC 22).

MAGNASOFT* NFR-A and MAGNASOFT NFR-B textile water repellent finish

Patent Status

Technical subject matter in this publication is described and protected by one or more pending US patent applications.

Product Safety, Handling and Storage

The storage temperature at 5~30°C for Magnasoft NFR-B is recommended to maximize the performance.

Customers considering the use of this product should review the latest Material Safety Data Sheet and label for product safety information, handling instructions, personal protective equipment if necessary, and any special storage conditions required. Material Safety Data Sheets are available at www.momentive.com or, upon request, from any Momentive Performance Materials representative. Use of other materials in conjunction with Momentive Performance Materials products may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.

Limitations

Customers must evaluate Momentive Performance Materials products and make their own determination as to fitness of use in their particular applications.

MAGNASOFT* NFR-A and MAGNASOFT NFR-B textile water repellent finish

Emergency Service

Momentive Performance Materials maintains an around-the-clock emergency service for its products. The American Chemistry Council (CHEMTREC) and CareChem24 International also maintain an around-the-clock emergency service for all chemical products:

<u>Location</u>	<u>Momentive Performance Materials Products</u>	<u>All Chemical Products</u>
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At sea	Radio U.S. Coast Guard, which can directly contact Momentive Performance Materials at 518.233.2500 or CHEMTREC at 800.424.9300.	

DO NOT WAIT. Phone if in doubt. You will be referred to a specialist for advice.

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