PROTECTIVE MATERIALS PRODUCT BULLETIN

# Protective Material PM-3705

bluesign® APPROVED

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## INTRODUCTION

PM-3705 is a hydrocarbon product that provides durable dynamic water repellency (DWR) to many synthetic fabrics. PM-3705 can be used as the sole DWR product, or in combination with fluorochemical DWR products. When used in combination with fluorochemical DWR products, it can improve both the oil and the water repellency durability on nearly all types of synthetic fibers (including microfiber), as well as some blends with cellulose. PM-3705 is especially useful when used in combination with 3M Protective Material PM-3635. PM-3705 will not only increase the repellency and durability of the PM-3635 but will also improve the hand of the treated fabric.

Environmental: PM-3705 is not formulated with fluorochemical compounds. It is not based on blocked isocyanate chemistry and does not contain alkyl phenol ethoxylate (APE) surfactants.

## TYPICAL PROPERTIES

**NOTE: THE PROPERTIES BELOW ARE NOT FOR SALES SPECIFICATION PURPOSES.**

| | |
|---|---|
| Appearance | Milky white to amber dispersion |
| Typical Analysis | 25% Solids |
| | 67% Water |
| | 8 % Propylene glycol |
| Charge | Slightly cationic |
| Density | 1.01 kg/l |
| pH | 5-8 |
| Shelf Life | 2 years after production date |

PM-3705 should not be stored at temperatures over 50°C (122°F).

PM-3705 is freeze/thaw stable to -20°C (-4°F). If exposed to freezing temperatures, return to a temperature above 5°C (41°F) before using. Avoid agitation during the thawing process as this can destabilize the emulsion.

## FABRIC PREPARATION

Fabrics to be treated with PM-3705 should be clean and as free as possible of residual processing agents. Residual sizing, lubricants/softeners, printing gums and other such materials can affect the absorbency and penetration of the treating bath into the fabric. The resulting uneven or inconsistent application can cause reduced durability and inferior repellency performance. Fabric pH (5.5 to 6.5) and percent alkalinity (as NaOH, preferably 0.0 to 0.05%) are recommended. In general, good fabric preparation practices should be followed to obtain the most efficient and effective performance from the product.

## APPLICATION

PM-3705 is suitable to be used by itself as a Non Fluorochemical DWR product. Typical application rates of the PM-3705 range from 50 to 100 grams/liter used in the pad bath treatment solution.

When PM-3705 is used in combination with a fluorochemical water repellent, the use level is normally based on the weight of the fluorochemical water repellent. It has been found to be effective in ratios as low as 20% of the weight of fluorochemical and as high as 100% of the weight of the fluorochemical. In the case of 3M's PM-3635 fluorochemical water repellent, a ratio of 50% PM-3705 (based on weight of PM-3635) is especially effective. Normal application rates of the PM-3705/fluorochemical water repellent combination would range between 30 to 80 grams/liter.

In all cases, laboratory trials are recommended to determine suitability and use level before mill trials are conducted. Factors such as fiber content, chemical additives and treating conditions, will influence whether more than minimum levels are required to achieve the desired performance.

Formulations with PM-3705 are typically applied at the mill by padding. Padding can be accomplished on typical mill pad equipment (two roll or three roll). Bath temperatures of 15-40°C (60-104°F) are generally suitable.

PM-3705 is easily diluted with water. A wet pick-up (WPU) of 30-40% is typical for lightweight nylon taffeta and polyester fabrics, while other nylons, polyesters and blended fabrics may have a 60-100% WPU. Where mill WPU conditions differ from the typical pad formulations listed, adjust the chemical concentrations to compensate for the different wet pick-up.

Fugitive wetting agents, such as isopropyl alcohol, or non-rewetting surfactants should be used whenever necessary to achieve adequate wetting of the fabrics and proper penetration of the finish. Addition of 1 g/l non-rewetting surfactant or 10-30 g/l alcohol to the treating bath is recommended, especially for 'hard to wet' fabrics.

**CAUTION!** Isopropyl alcohol is considered flammable. Follow all safety procedures. Additionally, some fugitive wetting agents may also have lower flash points. Consult wetting agent (and any other auxiliary) SDS for safe handling practices. Typically, L-22589 is added after isopropyl alcohol; otherwise, flocculation may occur. *Never add alcohol to a bath which already contains the PM-3705 resin, because immediate flocculation will occur.*

Consistent with good finishing mill procedures, it is always advisable that the finishing bath be filtered as it is transferred to the padder (foulard) in order to ensure dried particulates or other solid contaminants are not introduced into the pad bath.

In the event foaming problems are encountered, and a defoaming or antifoaming chemical is required, a non-silicone foam control agent is advised. Evaluate any foam control agent both for bath compatibility, and its effect on performance.

***Note:*** Thoroughly evaluate any silicone in the laboratory to determine its effect on performance prior to inclusion in any mill production, since such materials can severely affect oil and water repellency of fluorochemical formulations. Some silicones have been used successfully. All fabrics, as well as mixing and processing equipment must be free of silicones to avoid contamination of the bath. Use of silicones even in earlier production steps could still cause contamination of the bath. Likewise, the use of antistatic agents in a pad bath should be evaluated in the laboratory for their subsequent effects on DWR performance.

## TYPICAL PAD APPLICATION

The following formulations are only offered as a guide for the application of PM-3705 based formulations on synthetic fabrics. It is suggested that any formulation first be evaluated in the laboratory, both for compatibility and for performance.

For Non Fluorochemical DWR:

A. Polyester Taffeta and Polyester Microfiber
   - 0 - 2 ml/l Acetic Acid (60%)
   - 50 - 100 g/l PM-3705
   - 0 - 10 g/l Antistatic agent

B. Polyamide Taslan and Polyamide Microfiber
   - 0 - 2 ml/l Acetic Acid (60%)
   - 50 - 100 g/l PM-3705

For Fluorochemical DWR:

C. Polyester Taffeta and Polyester Microfiber
   - 0 - 2 ml/l Acetic Acid (60%)
   - 20 - 50 g/l PM-3705
   - 0 - 50 g/l PM 3635
   - 0 - 10 g/l Antistatic agent

D. Polyamide Taslan and Polyamide Microfiber
   - 0 - 2 ml/l Acetic Acid (60%)
   - 20 - 50 g/l PM-3705
   - 0 - 50 g/l PM-3635
   - 0 - 10 g/l Antistatic agent

Note: Addition of 1 g/l non-rewetting surfactant or 10 - 30 g/l Isopropyl alcohol is recommended especially for ‘hard to wet’ fabrics.

## DRY AND CURE CONDITIONS

The drying and curing of PM-3705 or its combinations with fluorochemical DWR products is generally accomplished in one-step. Drying is not a critical step and can be done over a wide temperature and time range depending upon specific mill practices.

Curing temperatures are readily achieved under mill conditions when 100% synthetic fibers are ‘heat set’, or under mill conditions normally used for curing resin finishes. Typical curing temperatures are in the range of 130–180°C (230-356°F) respectively, during 30 seconds to 3 minutes depending on the kind of fabric and curing facilities.

## ENVIRONMENTAL HEALTH AND SAFETY

Normal care should be taken to avoid skin contact, eye contact and prolonged breathing of vapors or dusts. Hands should be washed prior to smoking or eating. Before using this product, please read the current PM-3705 Safety Data Sheet (available through your local representative), and the precautionary statement on the product package. Follow all applicable directions.

## IMPORTANT NOTICE TO PURCHASER:

The information in this publication is based on the tests we believe are reliable. Your results may vary due to differences in test type and conditions. You must evaluate and determine whether the product is suitable for your intended application. Since conditions of product use are outside of our control and vary widely, the following is made in lieu of all express or implied warranties (including the warranties of merchantability or fitness for a particular purpose). Except where prohibited by law, 3M's only obligation and only remedy is replacement or, at 3M's option, refund of the original purchase price of the product that is shown to have been defective when you received it. In no case will 3M be liable for any direct, indirect, special, incidental, or consequential damages (including, without limitation, lost profits, goodwill, and business opportunity) based on breach of warranty, condition or contract, negligence, strict tort, or any other legal or equitable theory.

Home Care Division
3M Center
Saint Paul, MN 55144-1000, USA
3M.com