Reservoiring and Delivering

General Description

FXI cellular plastic flexible polyurethane foams are designed to perform a number of different functions or combination of functions such as holding materials (reservoiring), transporting or carrying liquids (wicking), releasing ingredients (applying) and picking up residue (wiping).

The primary foam types used for reservoiring and delivering applications are SIF® and SIF® Felt. SIF® is a reticulated, fully open pore, flexible ester polyurethane foam. It is characterized by a, totally open, three dimensional skeletal structure of strands which provide a constant 97 percent void space and a very high degree of permeability. SIF® Felt is a compressed, reticulated flexible polyester foam. It is made by compressing a foam with time, pressure and heat to a specified thicknesses.

Applications

- Industrial lubricant pads
- Envelope wet sealing mechanisms
- Shoe polish applicators
- Duplicator presses
- Clean room wipers
- Scrub sponges

Benefits

- Controlled permeability and predictable surface area
- Conformation to contact surface and shape retention
- Excellent holding capacity
- Low flow resistance

Pore Size

SIF® foams pore size can be controlled over a wide range of 3 to 110 ppi (pores-per-linear-inch) with tolerances controlled for most grades at plus or minus 5 ppi. The texture ranges from coarse and abrasive in the 3 ppi grades to soft and downy in the 110 ppi grade. Density is not related to pore size and is a nominal 1.9 pcf over the entire range.

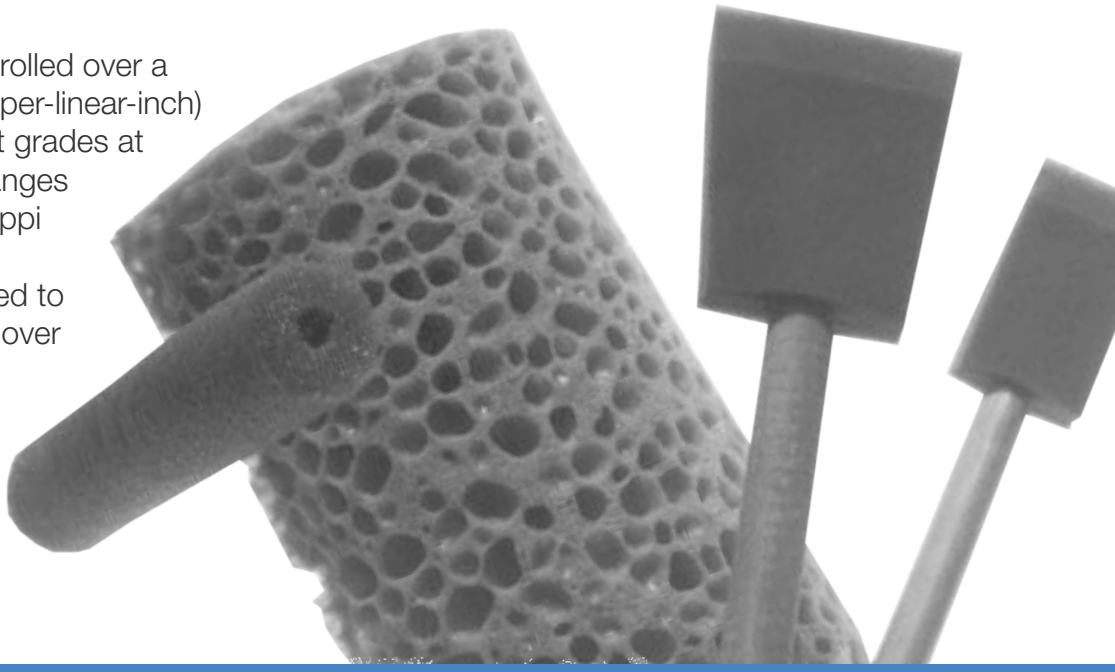

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Table 1: *Products*

Products

Functions	SIF®	SIF® Felt	Applications
Reservoiring	X	X	lubricator wicks wax applicator
Delivering	X	X	cosmetic applicators shoe polish applicators
Wicking		X	fabric softeners
Applying	X	X	scrub/wipe/sponge
Wipe/Scrub/Sponge	X	X	paint brush ink pads

Matrix for Functional Applications of FXI Cellular Plastic Materials

Environmental Properties

SIF® foam can withstand intermittent temperatures as high as 250 °F, allowing the material to be sterilized with boiling water or steam. At temperatures above 500 °F, SIF® foam decomposes. At-40 °F, SIF® foams show no evidence of cracking or tearing when bent around a mandrel equal in diameter to the foam thickness. Chemical properties include resistance to water, soap, detergents and perspiration. SIF® may be dry cleaned and is not affected chemically by most standard oils, cleaning solvents or greases at normal temperatures.

Chemical Stability

Aliphatic hydrocarbons cause slight swelling while aromatics cause considerable swelling. Removal of the hydrocarbons allows the foam to regain its original dimensions and strength.

SIF® foams can be attacked by strong acids, caustics, and chlorine and is not recommended for use in their presence unless protected by a coating. Felted foams have good physical strength abrasion resistance and solvent resistant qualities. Felted foams can save space while maintaining high-performance quality.

Reservoiring

SIF® foams and SIF® Felt can hold many times their weight of various liquids and powders in their open cellular structure. This loading capability results from the 97 percent void volume. Even a highly compressed SIF Felt® compressed to 1/10 its original thickness is still approximately 70 percent void volume. Since these foams are a three dimensional structure, they will hold materials on the surface as well as within the skeletal structure.

Ink Pads and Rollers

The versatility of the SIF® Felt process allows the selection of the right firmness (compression ratio of precompressed foam to final thickness) for maximum ink transfer and graphic reproduction. An extremely hard SIF® Felt, such as firmness 15 used for durable ink rollers, is 55 percent void volume and will retain ink in 50 percent or more of its void volume, eliminating the need to change pads or rollers as frequently. SIF® Felt wicking properties equalize the ink within the pad for print consistency and its resiliency helps prevent physical wear.

Dryer Fabric Softeners and Facial Cleaning Pads

A specially engineered physical and chemical variation of an ether foam is used to reservoir and release dryer fabric softeners. Soft, flexible and lint free, SIF® facial cleaning pads actually perform multiple functions. For example, while reservoiring many times their weight in additives, these pads apply and release additives in a controlledmanner during use.

Other Applications

Oil reservoirs for permanently lubricated fractional horsepower electrical motors and lubricant pads for industrial equipment.

Table 2: *Absorption Data*

SIF® Felt Absorption Data

Firmness	Oil Absorption	
	gms/cc	% by volume
2	0.41	47%
4	0.57	66%
6	0.64	73%
8	0.68	78%
10	0.58	66%
12	0.54	62%

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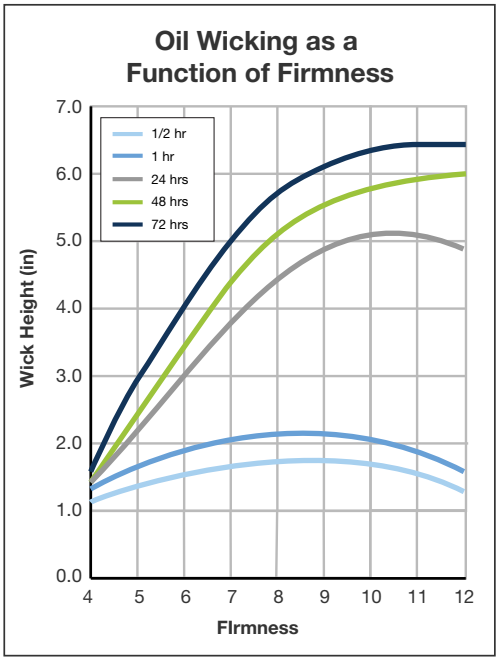
Figure 1: *Oil Wicking*



Applying

SIF® foams apply, deliver and meter various materials. By selecting the appropriate pore size, the transport of gases and liquids through the foam can be controlled within desired parameters. The resilient nature of SIF® foams allows carried ingredients to be released by pressure applied to the flexible foam substrate. The open-cell structure of SIF® foams permits a metered release and dispensing of powders and liquids.

Liquid Shoe Polish, Rug and Upholstery Shampoo Applicators

With an appropriate pore size and controlled permeability, SIF® foams will meter ingredient flow from a container onto an applicator pad where the polish or shampoo is released by applying slight pressure.

Soft Applicator Tip or Puff

SIF® foams are used as powder eye shadow brushes, liquid lip gloss applicators, powder puffs, and facial cleaning pads.

Trap Applicator

The fine pore SIF® foams serve as “trap” applicators for car wax. The wax is ‘’trapped” in the open-cell structure and is released by light pressure to automotive surfaces.

Duplication Presses and Cleanroom Wipers

SIF® foams are used in these applications because they are lint free and because they transfer and carry solvents.

Paint Brush

The open-cell structure, of SIF® foam, readily picks up high-viscosity paints.

Wicking

SIF® Felt compressed reticulated foams transport fluids from a reservoir to an application surface. The consistent and precise cell structure of SIF® Felt helps provide excellent, controllable capillary action. The capillary wicking properties are a result of reduced average pore size which is

Table 3: *Typical Physical Properties*

Typical Physical Properties[1]

	4-900Z	6-900Z	8-900Z	10-900Z	12-900Z	4-900C	6-900C	8-900C	10-900C	12-900C	4-700ZE	8-700ZE
Foam Type	Polyester	Polyester	Polyester	Polyester	Polyester	Polyester	Polyester	Polyester	Polyester	Polyester	Polyether	Polyether
Average Density (pcf)	7.5	11.5	15	19	21-24	7-8	10-11	14-15	18-19	22-23	6-8	12-15
Estimated Void Volume (%)	89	84	79	74	68	-[2]	-[2]	-[2]	-[2]	-[2]	89	79
Tensile Strength (psi)	110	160	200	265	330	105	150	195	230	280	75	150
Elongation (%)	450	450	425	245	310	425	390	385	370	375	315	290
25% Compression Force Deflection (psi)	2	6	10	22	47	2	6	14	29	41	2	10
65% Compression Force Deflection (psi)	16	32	62	75	78	13	40	60	90	90	11	58
50% Compression Set (%)	18	18	18	16	12	18	18	22	22	20	15	11
Frazier Permeability (cfm/ft²)	78	43	20	14	6	-[2]	-[2]	-[2]	-[2]	-[2]	113	33

1 Not to be used as a specification. Physicals from 1/4" materials
2 Void Volume and Frazier Permeability are not applicable to Custom Felt

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achieved by compressing reticulated foam. Since SIF® Felt is oleophilic, it will hold and transport oils to wear surfaces.

Lubricated Electric Motors
SIF® Felt is used to wick oil from a reservoir to a bearing.

Postage Machines
SIF® Felt transports ink in mailing equipment machines.

Ink Jet Printer
Felted reticulated foam is used in thermal ink jet printers to control back pressure and ink delivery.

Wiping/Scrub Sponge
SIF® is used as a wiper, sponge, or scrubber because of its open-cell structure, non-linting solvent resistant and good loading properties. SIF® has a very wide texture range from rough (3 ppi) to extremely soft (110 ppi).

Cleanroom Wipe
Lintless, depth loading of picked up soil, and solvent resistant properties make SIF® an excellent cleanroom wiper.

Scrub Sponge
Scrubbers made from SIF® are relatively inexpensive and can therefore be considered semi-disposable. It is possible to select the degree of scrubber abrasiveness due to the texture range of SIF®. It can be laminated to other foam grades to combine scrubbing and sponging.

Industrial Cleaning Sponge
SIF® sponge material is used by a major automotive manufacturer for solvent wipes.

Lintless Record Cloth
Fine pore SIF® is used as a record cleaning cloth. It is lintless; it holds anti-static treatment and does not redeposit the dust since it is held in the void structure of the foam.

FXI – Committed to Innovation, Service and Quality

For over 50 years FXI's technology has been leading the way to new and innovative applications for polyurethane foam solutions. We have one of the largest R&D centers and hold more patents than most companies in our industry. Across an increasing range of markets and applications, our team is ready to help you solve your most complex problems. With manufacturing facilities across the country, FXI is there when you need us – ready to deliver the highest quality products to help your business grow.

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