

Filtering Functions Filtration . Demisting . Humidification . Separation

General Description

Engineered high-performance, flexible polyurethane foams meet many design criteria for a variety of filtration functions. These include removing dust and contaminating particles from air, gases, and liquids (filtration); collecting vaporized oils from industrial equipment (de-misting); acting as an evaporative surface (humidification), and cleaning up oil spills (oil/water separation).

Applications Include: Air filters for small engines, air conditioners, data processing equipment, electronic air cleaners, humidifiers, furnaces, condenser coils, refrigerators, cold drink dispensers, and other appliances where moving air is required either by force or convection.

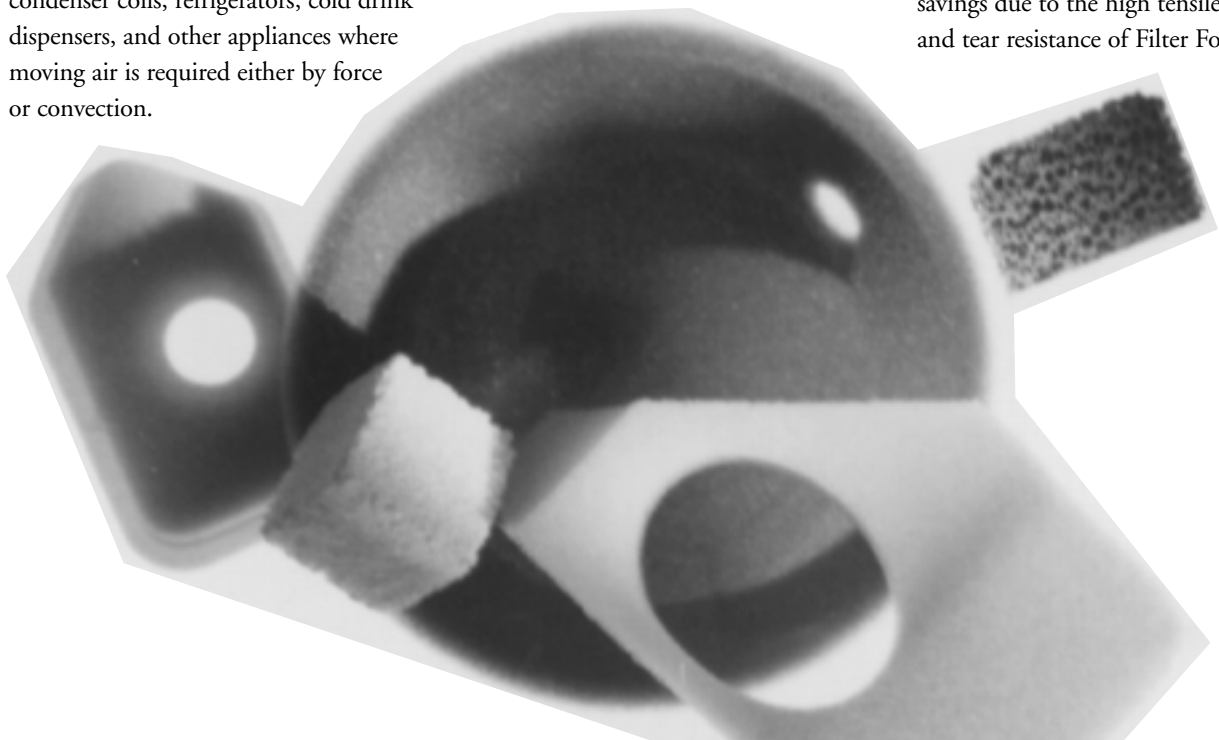
Products

Functions	SIF®	SIF® Felt	SIF® PVC-coated	Applications
Filtering	X	X	X	air filters for engines, air conditioners, furnaces, appliances
De-misting	X	X	X	liquid filters for environmental use and fuels
Evaporative Media	X		X	humidifiers and evaporative coolers
Coalescing	X	X	X	oil spill cleanup

Matrix for Functional Applications of Foamex Cellular Plastic Materials

Benefits Are: Relatively low air resistance and low pressure drop due to the open-pore skeletal structure; large

dust-holding capacity due to the 97 percent void volume, and design potential for easy installation and space savings due to the high tensile strength and tear resistance of Filter Foam (SIF®).



Other benefits are: ease by which it can be shaped, glued, sewn; long life since the flexible foams are washable, reusable and have good depth loading capabilities; benefits also include wide range of particle size filtration due to a range of pore sizes available and the ability to separate oil-based materials in water environments because the foams are oleophilic polymers.

Foamex Filter Media Are: Filter Foam (SIF®), polyvinyl chloride-coated foam (SIF®-PVC), and SIF Felt® foam. These are reticulated flexible polyester urethane foams or specially engineered physical and chemical variations of a polyether foam. Unlike ordinary urethane foams, they have a completely open cell, three-dimensional structure of skeletal strands which give them special filtering properties. They are exceptionally porous and permeable; therefore, they are ideal for many filtration applications where other foams cannot be used.

SIF® PVC-coated foam is a flexible open-pore polyurethane foam coated with polyvinyl chloride. This coating preserves the foam strands without significantly increasing their resistance to air or liquid flow. SIF® PVC-coated foam resists chemical attack and has greater tear strength and compression deflection than uncoated urethane foam.

SIF Felt® is a compressed, reticulated flexible foam. It is made by compressing a 90 pores-per-linear-inch (ppi) foam with both pressure and heat.

Filtration

SIF® and SIF Felt® foams filter air with relatively little air resistance or pressure drop because of the special combination of dust-catching strands and dust-holding capacity in their void space. For example, these foams are used in engine air filters on lawn mowers, motorcycles, automobiles, and trucks. The high-performance foams filter air in air conditioning units, furnaces, computers, refrigerators, and many other products that require dust protection. SIF® and SIF Felt® foams for air filtration can be fabricated in many special ways, such as hot wire cut to complex shapes for lawn mower engine air filters; metal or plastic framed sheets for a pre-filter and/or after-filter use in electronic air cleaners; in addition, the foams can be glued or sewn into bands for filter wraps on automobile carburetor air cleaners.

Stretchable Face Mask: A comfortable mask of fine pore SIF® foam loops behind the ears and fits snugly against the nose and mouth to diffuse the wearer's breath and act as an oral spray screen. It is used, for example, by a dentist while working on a patient. The mask fits easily in a pocket when not in use and is durable enough to be washed and reused.

Gasoline Fuel Filters: SIF Felt® foam is used in place of felt to filter gasoline fuel in chainsaws and other small engines.

Dust Removal Systems: SIF® and SIF Felt® foams are used in this application because they can be manufactured in the optimum pore size for

removing the specific contaminant; they are deep-loading and therefore long lasting; they can be oiled for greater particle impingement; are easily cleaned by vacuuming, hosing, or washing; and are easy on fan motors because of their low air resistance.

Automobile Power Brake Unit:

SIF Felt® foam is used to both filter and diffuse air entering the power actuating cylinder where it helps protect the mechanism from dust and provides for quieter operation.

Electro-Magnetic Door Lock

Actuator Wedge: Thumbnail-size tabs of SIF® foam are used in the solenoid mechanism which must be vented and protected from dust. SIF® was the choice for this application because it is economical, easy to install, and stays in place by virtue of its own compression deflection. It is not affected by rain water in the event of window seal leakage and filters effectively for the normal life of the car.

De-Misting

SIF® effectively filters aerosols or droplets from air drawn through it. The moisture coalesces, or gathers, on the foam, trickles to the bottom, and is collected for reuse or disposal. SIF® foam is an excellent de-misting medium due to its large surface area—up to 2,300 square feet per cubic foot of foam.

SIF®—Typical Physical Properties

Porosity* (ppi)	Density (lb/ft ³)	Tensile Strength (psi)	Ultimate elongation (%)	Tear strength (lb/in.)	50% Compression set	Compression deflection (psi)	
						25%	65%
3	1.2	8	150	2	20(max)	.25	.40
10	1.9	20	315	5.5	8	.48	.72
20	1.9	25	320	5.5	7	.42	.67
30	1.9	25	320	5.3	8	.40	.65
45	1.9	28	340	4.7	12	.40	.65
60	1.9	33	402	4.3	12	.40	.65
80	1.9	35	415	3.9	12	.40	.65
100	1.9	35	415	3.9	12	.40	.65

SIF® PVC-Coated—Typical Physical Properties

Porosity* (ppi)	Thickness	Tensile strength (psi)	Ultimate elongation (%)	Tear strength (lb/in.)	50% Compression set	Compression deflection	
						25%	65%
10	.375	25	270	6	23	.6	1.2
20	.250	24	300	6	26	.5	1.1
45	.250	34	320	8	30	.6	1.2
60	.250	34	250	8	25	.5	1.4

SIF Felt®—Typical Physical Properties

Firmness	Density	Tensile strength (psi)	Ultimate elongation (%)	Tear strength (lb/in.)
3-900	5.25	50-80	250-350	5-10
10-900	17.5	160-200	200-300	20-30
15-900	26.2	220-270	200-300	25-35

Typical physical properties not to be used as a specification.

Nominal Pore Size Ranges

Porosity grade (ppi)*	Minimum	Maximum	Suggested minimum sheet thickness (in.)
100	80	110	—
80	70	90	—
60	55	65	—
45	40	50	1/8
30	25	35	3/16
25	20	30	7/32
20	15	25	1/4
10	8	15	1/2
3	3	5	1/2

*Tested in accordance with ASTM D3574 *Porosity (ppi) Foamex method.
As measured on Laminar flow pressure drop apparatus at 575 fpm.

Machine Tool De-Misting: Filters made of SIF® foam help inhibit the accumulation of oil on floors, walls, equipment, and personnel.

Other Applications Include:

Automotive air conditioner “split screens,” paint spray booths, and volatile oil de-misting (coffee oil de-misting, for example).

Humidification

Because SIF® has a large surface area and low pressure drop, it makes an excellent humidifier evaporative medium. SIF® is also used as an “evaporative cooler” medium.

Domestic and Industrial

Humidifiers: A band of coarse, open-pore SIF® foam lifts water from a reservoir pan across the path of a fan-fed airstream. The elasticity of the band of SIF® foam holds it firmly against the drive elements for months of service. Available in several different strand surface grades, its thickness and pore size can be varied to meet designer specifications.

Oil/Water Separation

Being oleophilic, SIF® can be used to attract and separate oil based materials in a water environment.

Typical Applications Are: In oil spill clean-ups, particularly in industrial environments.

Since SIF® foam is light, it floats, is washable with a large surface area, and it is an ideal medium for some laboratory separation processes.

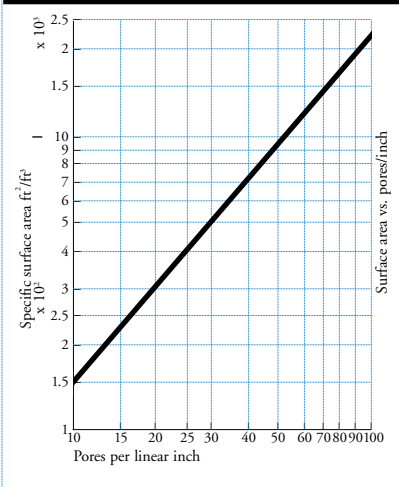
Product Description

Physical Properties: The homogeneous structure of SIF® helps minimize the possibility of open channels which could drastically affect filter efficiency. Each cell in the medium is completely interconnected with all surrounding cells. This allows for free passage of air and at the same time provides high surface-area contact for impingement of dust particles. The resilience and strength of the foam helps prevent strand displacement under normal operating conditions.

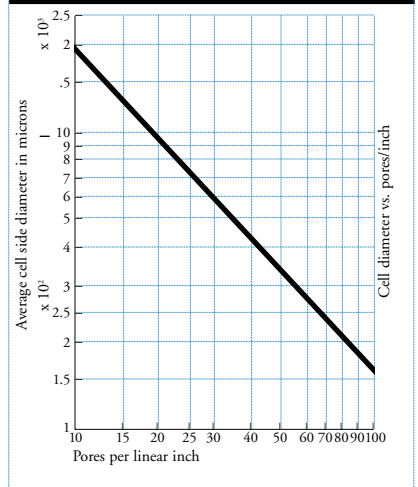
Fabrication: The high tensile strength and tear resistance of SIF®, together with its workability, greatly facilitate design of mounting devices. It can be sewn, stapled, glued, or grommeted. This foam can be framed as a more conventional filter medium, or it can be used simply as a filter pad with no additional fabrication. It is being used successfully both ways. The material, however, is most practically and economically used as a filter pad alone where design of original equipment will accommodate this type of application.

Pore Size: SIF® is produced in many standard pore grades. Expressed as the average number of pores-per-linear-inch, these grades range from 5 to 100 ppi. Their resistance to airflow or pressure differential is measured in inches of water. A 1/2-in. thick pad of 30 ppi SIF® has a resistance to airflow at 450 feet per minute of only 0.15 inches of water. Two- or three-stage filters can be produced by combining several pore sizes. Range in pore size for each grade is controlled within specified limits.

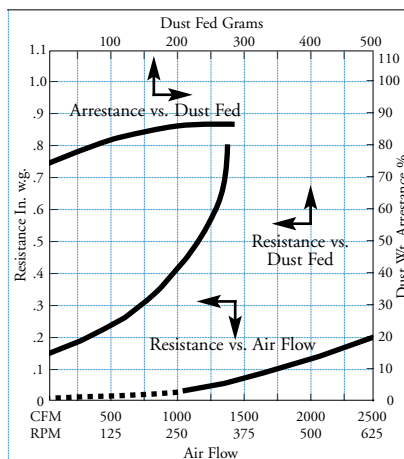
Surface Area



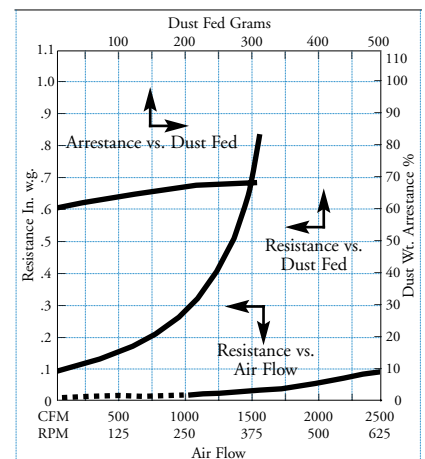
Avg. Cell Side Diameter



ASHRAE STD.52-76 Air Filter Performance Report



Test Number: 1523
 Medium: 20 ppi Z (oiled)
 Test Size: 1/2" x 24" x 24" (4 ft.²)
 Air Velocity: 500 rpm (2000 cfm)
 Average Arrestance: 82%
 Dust Holding Capacity: 220 gm



Test Number: 1519
 Medium: 30 ppi Z
 Test Size: 1/4" x 24" x 24" (4 ft.²)
 Air Velocity: 500 rpm (2000 cfm)
 Average Arrestance: 63%
 Dust Holding Capacity: 210 gm

Additional Test Reports Available

SIF Felt®

Made from a reticulated polyester or polyether polyurethane foam, SIF Felt® has excellent permeability, high physical strength, outstanding filtration efficiency, abrasion resistance, and oil-wicking characteristics.

SIF Felt® Grade 900 is manufactured by compressing 90-ppi (pores-per-linear-inch) reticulated foam under heat to impart a permanent compression set. By varying machine conditions and the ratio of initial foam thickness to final felt thickness, the specific design properties of the end product can be controlled. This compression ratio is called the firmness of the material.

A firmness as high as 20 is available. As the particle size to be filtered decreases, the firmness increases and the resistance to fluid flow increases.

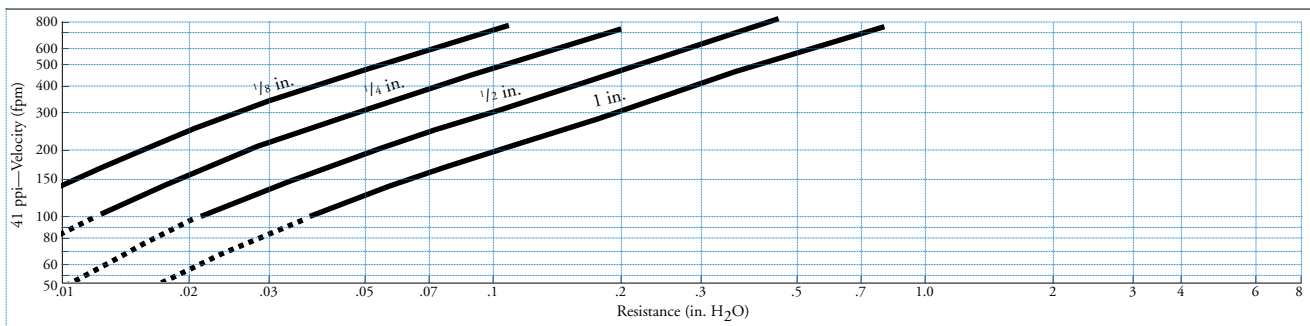
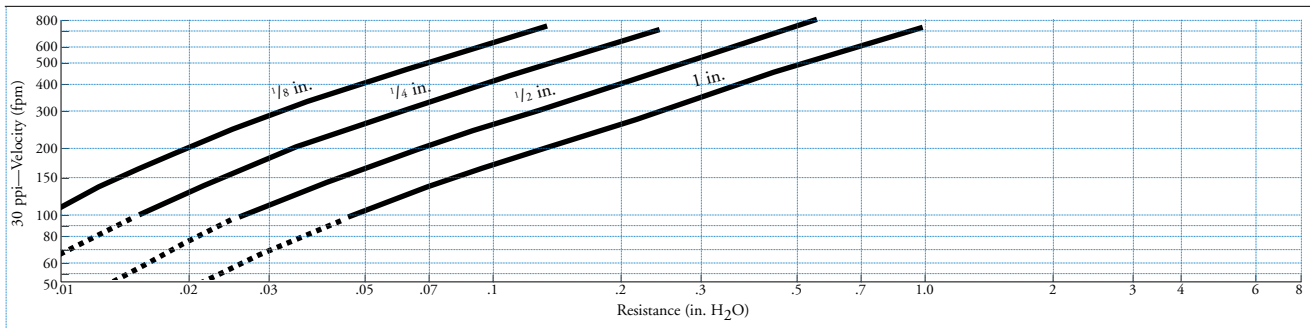
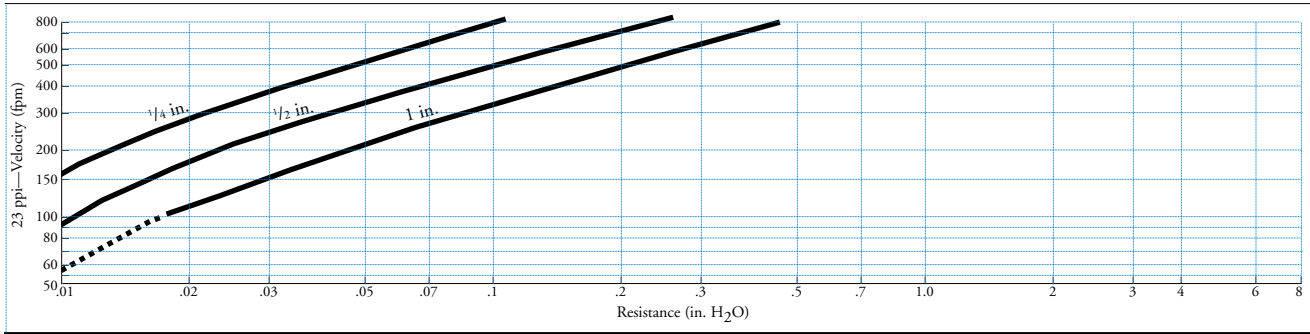
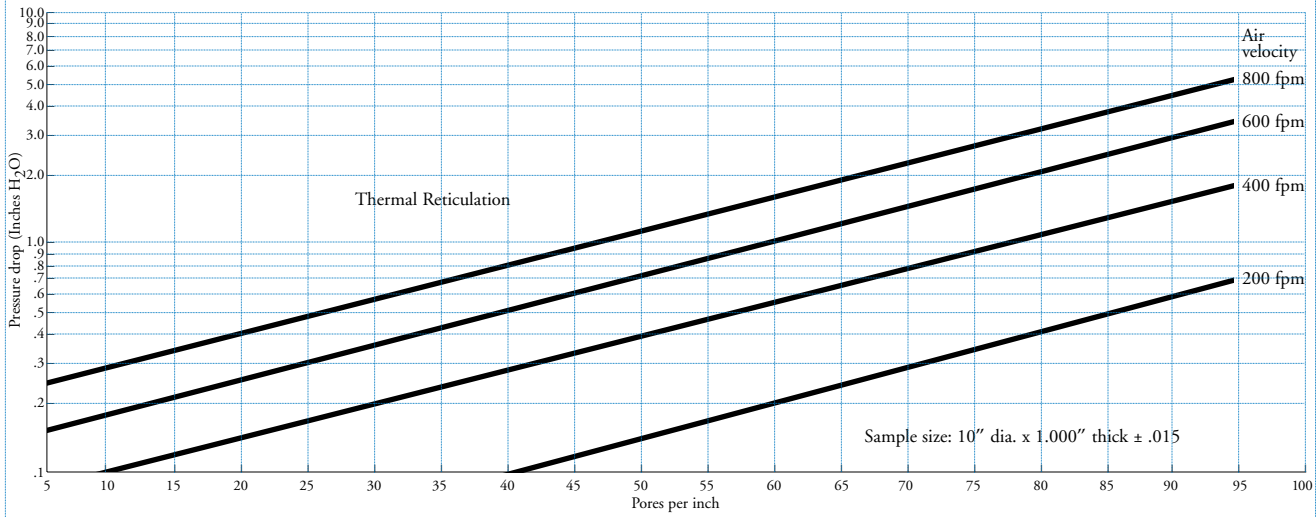
SIF Felt® is easy to work with and is easily cut, glued, or shaped into unusual or curved configurations. Because it is a homogeneous material, it does not fragment or fall apart.

Temperature Features: SIF® and SIF Felt® foam have excellent high- and low-temperature characteristics. They can withstand intermittent temperatures as high as 225°F (121°C). At temperatures above 500°F (260°C), these foams begin to melt with decomposition and vaporization. At -40°F (-40°C), they show no evidence of cracking or tearing when bent around a mandrel equal in diameter to the foam thickness.

Chemical Properties: SIF® and SIF Felt® foams are not adversely affected by water, soap, and most detergents, perspiration, oils, and most cleaning solvents, or greases at normal temperatures. Aliphatic hydrocarbons cause slight swelling and aromatics cause considerable swelling. Removal of the hydrocarbons allows the foam to regain its original dimensions and strength. Since these foams contain no plasticizer, no migration difficulty from the foam itself is expected. SIF® and SIF Felt® are attacked by strong acids, caustics, and chlorine, and are not recommended for use in their presence unless protected by a coating.



Pressure Drop (Foamex Method)



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IMPORTANT NOTICE REGARDING FLAMMABILITY—All polyurethane foams including combustion modified foams will burn and generate smoke and gases. Performance conditions and corresponding data refer to typical performance in specific tests, such as UL-94 and MVSS-302, and should not be construed to imply the behavior of this or any other product under other fire conditions. All data regarding these products were obtained using specific test methods under controlled laboratory conditions intended to measure performance against specifications. Due to the great number and variety of applications for which Foamex products are purchased, Foamex does not recommend specific applications or assume any responsibility for use results obtained or suitability for specific applications. Foamex warrants its products only to direct buyers. (See Foamex's Standard Terms of Sales for Foamex's warranty.) IN NO EVENT SHALL Foamex BE RESPONSIBLE FOR ANY CLAIM IN EXCESS OF Foamex's SALE PRICE OF THE PRODUCT TO WHICH THE CLAIM RELATES.

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