

General

Flanders TH Series HEPA/ULPA Filter Modules are lightweight unitized low profile disposable ducted supply modules with a minipleat filter pack available in efficiencies from 99.99% on 0.30 micrometer size particles to 99.99999% on 0.12 micrometer size particles. They are available in a complete range of standard frame styles, 2", 3" and 4" pack depths and sizes to meet the needs of critical applications where HEPA/ULPA filtration is required. Individual testing under rigid quality control and modern assembly methods ensures conformance to specifications.

TH Series HEPA/ULPA Filter Modules are used in a variety of Cleanroom applications including:

- Semiconductor Fabrication
- Disc Drive Manufacturing
- Pharmaceutical Production
- Biotechnology
- Aerospace
- Food Processing
- Compact Disc Manufacturing

Application

TH Series HEPA/ULPA Filter Modules are used in ducted supply applications that require ultraclean air. They typically operate at a velocity of 100 fpm mak-

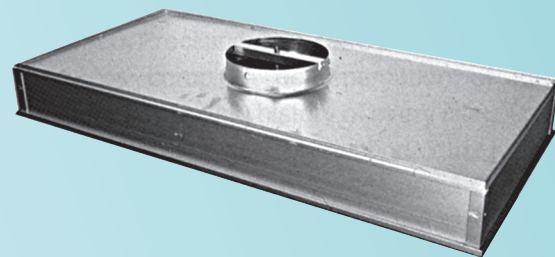
ing them ideal for either unidirectional (laminar flow) or non-unidirectional (non-laminar flow) applications in either a gasketed Tee Grid System or a Gel Grid Ceiling System. Filters of standard construction may be operated at up to 150 fpm face velocity and to a final resistance of 2.0 in. w.g. As with all HEPA/ULPA filters, high efficiency ASHRAE-rated prefilters are recommended.

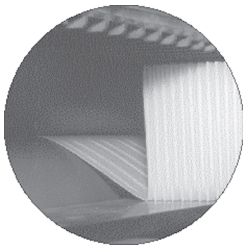
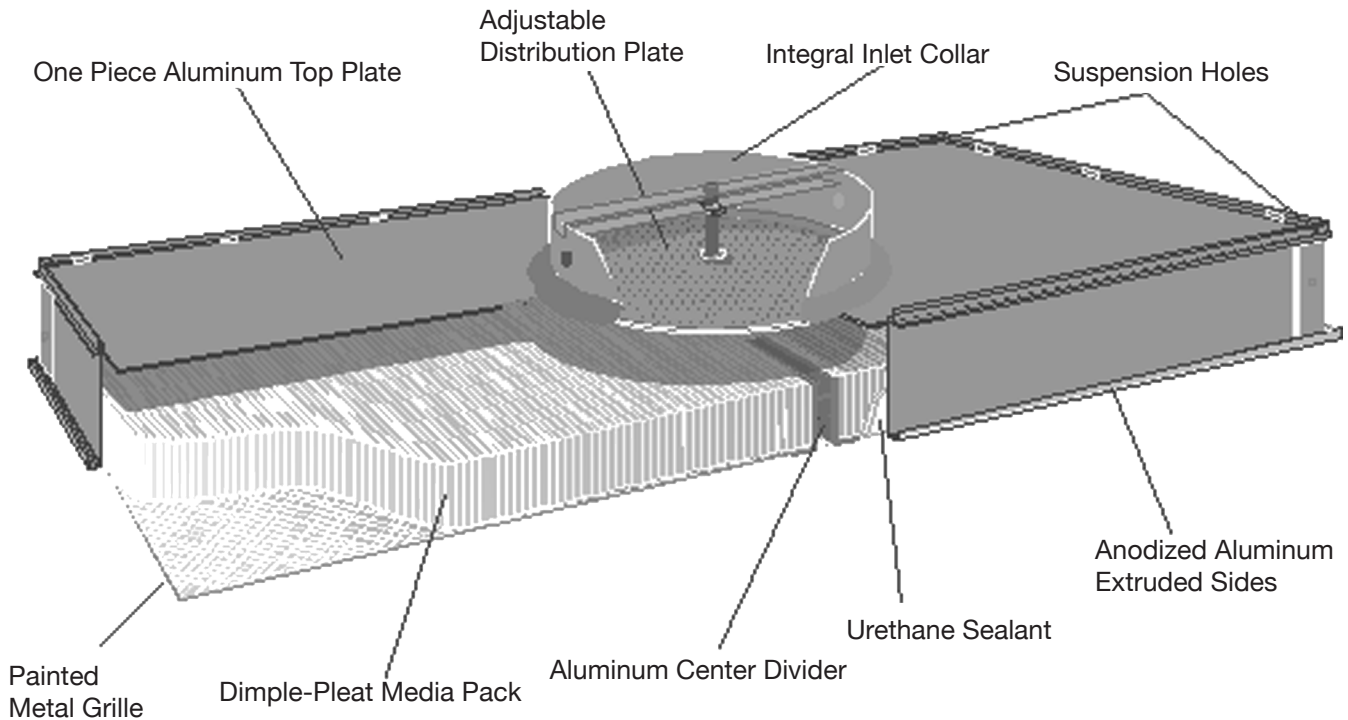
Construction

The Dimple Pleat[®] media pack is a completely separatorless media pack and is available in 2", 3" and 4" depths depending on the performance requirements. The media pack is sealed to the anodized extruded aluminum filter frame with a fire retardant solid urethane sealant. The filter frame may have either a flat flange to seal in a gasketed Tee Grid or a knife edge to fit in a Gel Grid. A one piece aluminum top with integral inlet collar is provided and the inlet collar is dimpled to secure the flex duct retaining strap. The standard unit has an adjustable distribution plate for minor adjustments of roomside airflow. An anodized extruded aluminum center divider with access port provides access for adjustment of the distribution plate and measurement of the resistance and challenge aerosol. A painted expanded metal faceguard on the downstream side protects the media.

Important Features

- Anodized extruded aluminum frame with one-piece aluminum top/inlet collar
- Dimple Pleat[®] filter pack for a lightweight and low profile design
- State of the art testing
- UL 900 Class 1 Listed and Factory Mutual Approved





Separatorless Dimple Pleat® media is manufactured at Flanders and has dimples formed in the media. The dimples function as typical separators by aligning against each other at adjacent folds of the pleats and give the media pack its shape and strength.

Module Efficiencies

- Filter modules are available in three efficiencies:
- HEPA: 99.99% minimum removal efficiency on 0.3 micrometer particle size.
- ULPA: 99.9995% minimum removal efficiency on 0.12 micrometer particle size.
- VLSI II 99.99999% minimum removal efficiency on 0.12 micrometer particle size. These filters meet today's most rigorous requirements for Class 1 and better cleanroom applications.

Bar Code Documentation

Flanders Corporation uses a bar coding system that provides complete documentation of the media content and testing history of every filter. The system tracks the specific production run and original efficiency test results for every media pack. After the filter is assembled, the system tracks its test history, recording the date and location of each test and providing a pass/fail tally. If a filter fails any test, the reason is documented.



522020904

The Flanders Corporation bar code system provides a customer with the highest level of confidence that every filter purchased meets or exceeds its performance specifications.

ULPA Efficiency Testing

Each ULPA filter module is tested for efficiency and resistance by Dual Laser Spectrometer. The spectrometer samples simultaneously on the upstream and downstream sides of the filter to determine the percentage of penetration. Flanders standard test challenge is an aerosol of PSL (polystyrene latex) spheres. The laser instrument detects the size of each penetrating sphere in seven particle size classes from 0.07 micrometers to 1.0 micrometers. Resistance readings are taken according to volumetric parameters (i.e., 100 cfm per square foot of media face area) and are expressed in inches of water gauge.

VLSI II Efficiency Testing

The highest levels of filtration are achieved with Flanders VLSI II filter. Because of the extremely high efficiency of this media, hours of laser testing would be required to obtain statistically valid results for individual filters. For this reason, the media itself is tested prior to being pleated into packs. In this test, a sample is taken from each batch of media in the production run. (A batch is enough to produce 10 filters.) These samples must not exceed specified maximum values for penetration and resistance. Experience shows that patch test results are confidently correlated to the targeted VLSI II efficiency.

Standard Scan Testing of HEPA, ULPA and VLSI II Modules

Every module is scan tested per Section 6.2 of IEST-RPCC-034.1 for "pinhole" leaks in the media, edge sealant and frame. As the filter is challenged with the PSL aerosol, the test operator scans the face and edge with a probe attached to a laser particle counter. Any reading greater than .01% of the upstream concentration is unacceptable, and the filter must be rejected, or repaired and retested.

AutoScan Testing Option (ULPA and VLSI II Modules)

Manual scan testing is a reliable quality assurance tool, but the most sensitive applications may benefit from computer controlled automatic scan testing. Because the test operator is removed as a variable in the observation and evaluation of signals produced by the particle counter, the AutoScan is considered to be a more objective test process. It offers assurance that the speed of the probe is correct and consistent, that no area of the filter is left unscanned and provides the ability to detect leaks down to .001% (for VLSI II media). Complete documentation of the scan test data is stored in databases and is available upon request. The leak rates shown below exceed the requirements of Section 6.2 of IEST-RP-CC-034.1.

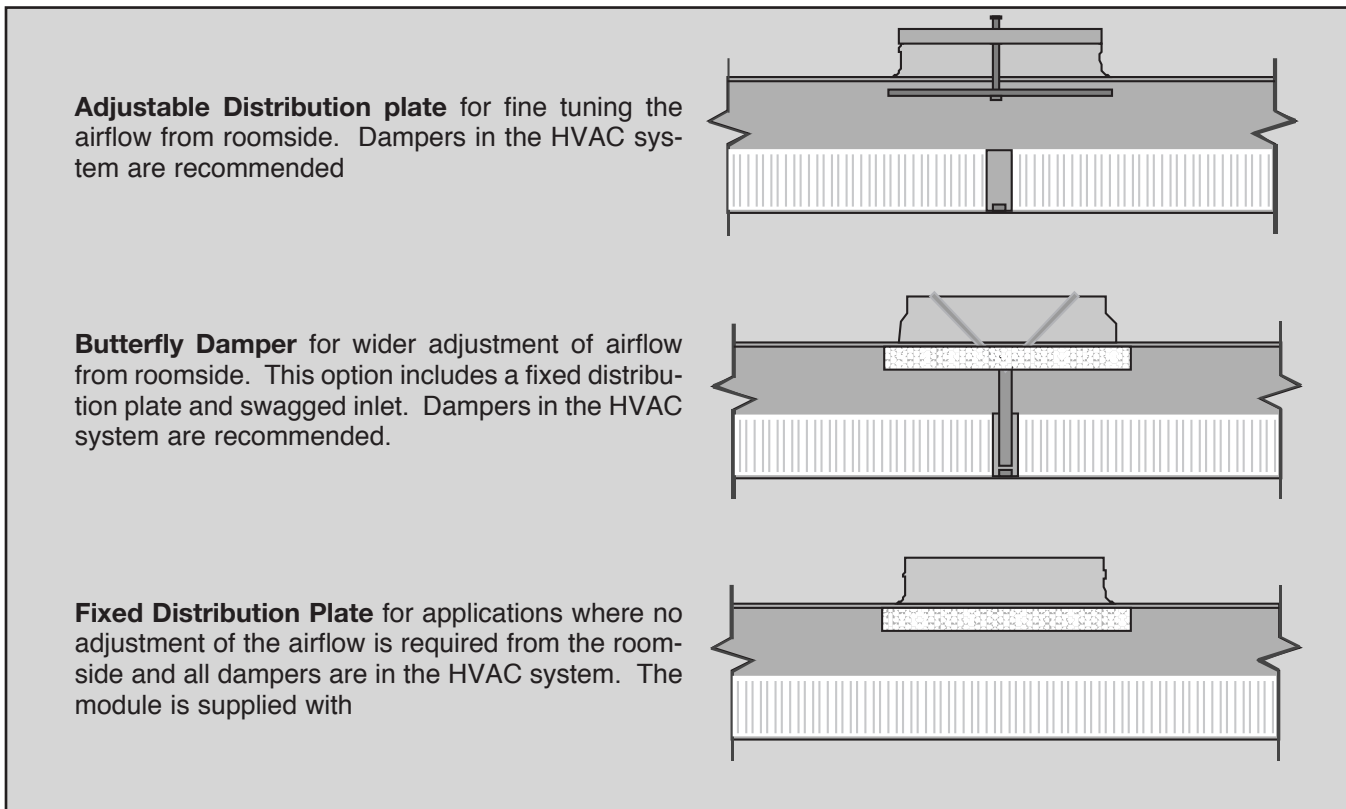


Filter type Type	Upstream PSL Concentration	Maximum Leak Rate	Max. Allowable Leak Rate	Flanders Leak Detection
VLSI II	100,000,000	0.001%	17 particles/sec	8 particles/sec
ULPA	30,000,000	0.005%	25 particles/sec	12 particles/sec

Options

Inlet Sizes

TH Series Modules are available with a nominal 8 in., 10 in., 12 in. or 14 in. diameter inlet. Inlet collars are designed with a continuous rib to help retain the ductwork on the collar.



Lighting

Flow-through fluorescent light fixtures may be mounted beneath the module. Access to the lamps and to the ballast is from the roomside through a hinged grille. Two, three or four lamps per fixture and the desired voltage may be specified.

Insulation

Two-inch thick fiberglass with aluminum foil backing prevents moisture formation and heat loss. For modules installed side-by-side, the insulation covers only the top. If modules are to be installed separately, the insulation also covers the sides. The type of insulation coverage may be specified in the model number.

Protective Grilles

The standard grille is 65% open expanded metal painted white. Anodized aluminum and Type 304 stainless steel grilles with 40% open circular perforations are also available.

Sprinkler Pan

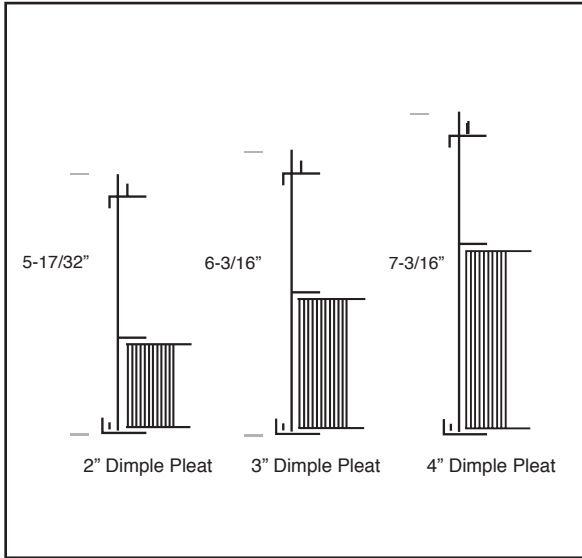
For Tee Grid applications requiring fire protection, an aluminum pan incorporating a pass-through for a sprinkler head and piping may be attached and sealed at one end of the module. (Modules must be undersized relative to grid size to allow room for the pan.)

Reinforced (Walkable) Tops

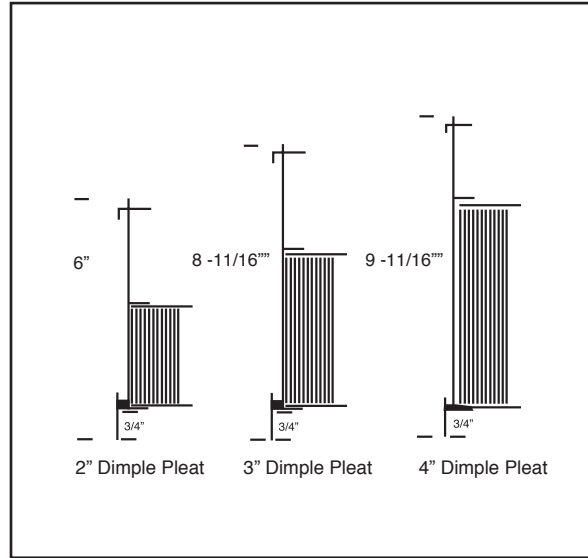
The standard module top is .050 in. thick aluminum plate. A .125 in. thick top, designed to support the weight of installation and service personnel, is also available. (This option must be specified in writing separately from the model number.)

Gaskets

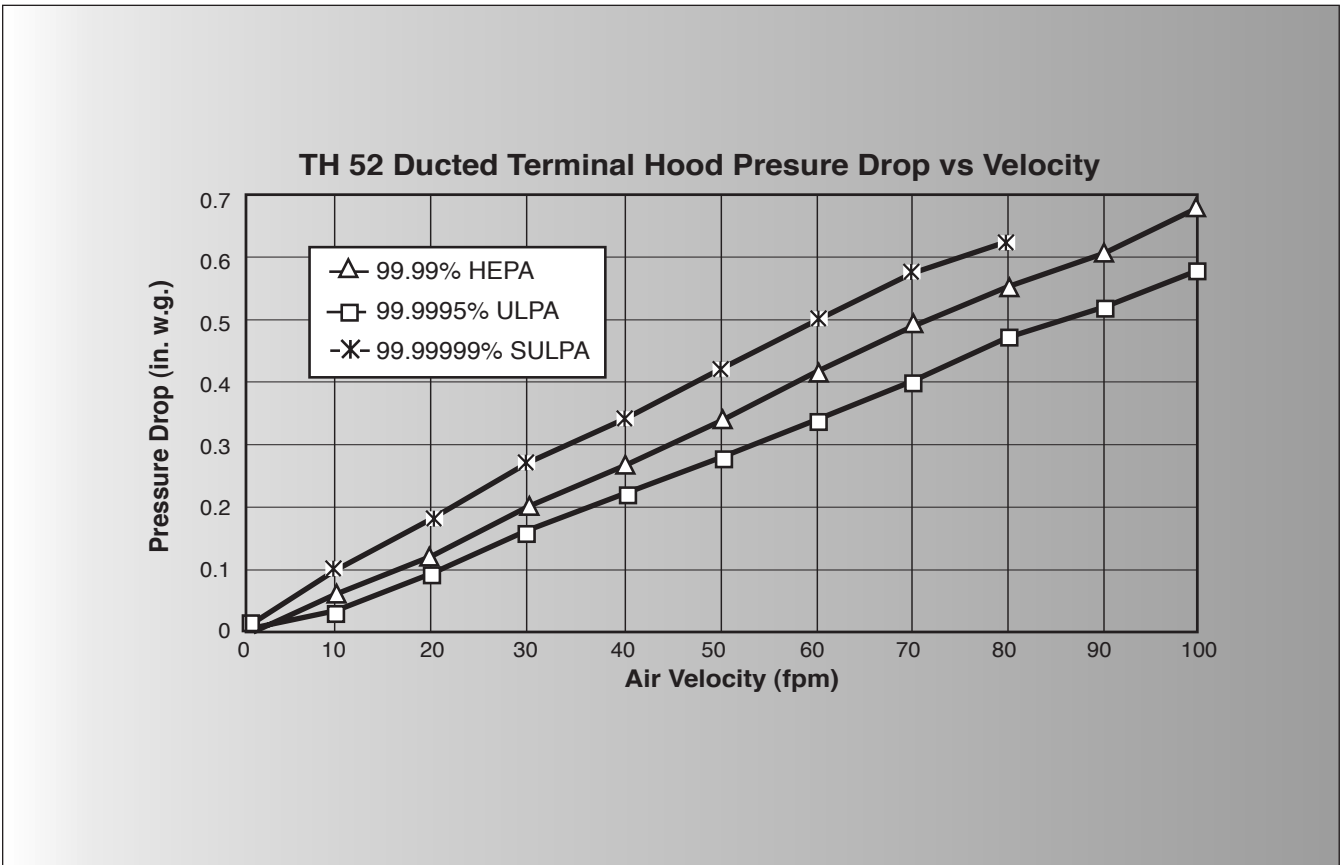
White or black 1/4 in. thick EPT polyethylene butyl gasket material may be specified for modules to be installed in ungasketed Tee Grid installations.



Gasket System



Gel Grid System



TH Modules for Gel Grid Systems
Resistance and CFM:

Particle Size Efficiency %	Overall Actual Size LxW (inches)	Size Designator for Pack Depth			2" Pack Depth			3" Pack Depth			4" Pack Depth		
		2 in.	3 in.	4 in.	CFM at Face Velocity, fpm								
					70	90	100	70	90	100	70	90	100
99.99 on 0.30 Micrometers	23x23	KGG		KGG	210	270	300	210	270	300	210	270	300
	23x35	KGP		KGP	335	430	480	335	430	480	335	430	480
	23x41	KGH		KGH	400	515	570	400	515	570	400	515	570
	23X47	KGQ		KGQ	460	595	660	460	595	660	460	595	660
			Initial resistance, " w.g.			.42	.52	.57	.35	.45	.50	28	.37
99.9995 on 0.12 Micrometers	23x23	KGG		KGG	210	270	300	460	595	660	210	270	300
	23x35	KGP		KGP	335	430	480	335	430	480	335	430	480
	23x41	KGH		KGH	400	515	570	400	515	570	400	515	570
	23X47	KGQ		KGQ	460	595	660	460	595	660	460	595	660
			Initial resistance, " w.g.			.48	.61	.68	.40	.51	.57	.32	.40
99.99999 on 0.12 Micrometers	23x23	KGG		KGG	210	270	300	460	595	660	210	270	300
	23x35	KGP		KGP	335	430	480	335	430	480	335	430	480
	23x41	KGH		KGH	400	400	515	570	400	515	570	400	515
	23X47	KGQ		KGQ	460	595	660	460	595	660	460	595	660
			Initial resistance, " w.g.			.58	N/A	N/A	.48	.41	.68	.42	.53

TH Modules for Gasketed Tee Grid Systems
Resistance and CFM:

Particle Size Efficiency %	Overall Actual Size LxW (inches)	Size Designator for Pack Depth			2" Pack Depth			3" Pack Depth			4" Pack Depth		
		2 in.	3 in.	4 in.	CFM at Face Velocity, fpm								
					70	90	100	70	90	100	70	90	100
99.99 on 0.30 Micrometers	23-5/8 x 23-5/8	E2786		E0291	220	285	315	220	285	315	220	285	315
	23-5/8 x 35-5/8	E-2886		E0391	345	445	495	345	445	495	345	445	495
	23-5/8 x 41-5/8	E1296		E1396	410	525	585	410	525	585	410	525	585
	23-5/8 x 47-5/8	E2986		E0491	475	610	680	475	610	680	475	610	680
			Initial resistance, " w.g.			.42	.52	.57	.35	.45	.50	28	.37
99.9995 on 0.12 Micrometers	23-5/8 x 23-5/8	E2786		E0291	220	285	315	220	285	315	220	285	315
	23-5/8 x 35-5/8	E-2886		E0391	345	445	495	345	445	495	345	445	495
	23-5/8 x 41-5/8	E1296		E1396	410	525	585	410	525	585	410	525	585
	23-5/8 x 47-5/8	E2986		E0491	475	610	680	475	610	680	475	610	680
			Initial resistance, " w.g.			.48	.61	.68	.40	.51	.57	.32	.40
99.99999 on 0.12 Micrometers	23-5/8 x 23-5/8	E2786		E0291	220	285	315	220	285	315	220	285	315
	23-5/8 x 35-5/8	E-2886		E0391	345	445	495	345	445	495	345	445	495
	23-5/8 x 41-5/8	E1296		E1396	410	525	585	410	525	585	410	525	585
	23-5/8 x 47-5/8	E2986		E0491	475	N/A	N/A	475	610	680	475	610	680
			Initial resistance, " w.g.			.58	N/A	N/A	.48	.41	.68	.42	.53

Values shown may be averages or estimates typical of product styles.
 Contact factory for test data on specific models.

TH Series Component Chart

Specify the desired TH Module using the Style Code shown here and the standard size designators on pages 5 & 6 of this bulletin.

For Odd Size TH Modules use the following Alpha Numeric Designator. The first two numbers specify the Height Whole Number with an Alpha Designator specifying the Height Fraction. The second two numbers specify the Width Whole Number with an Alpha Designator specifying the Width Fraction

A "Z" Drawing will be developed and become the size designator for any TH module which has special materials or testing which are not covered in the Style Code System.

Alpha Numeric Height and Width Designator

A = 0"	J = 1/2"
B = 1/16"	K = 9/16"
C = 1/8"	L = 5/8"
D = 3/16"	M = 11/16"
E = 1/4"	N = 3/4"
F = 5/16"	P = 13/16"
G = 3/8"	Q = 7/8"
H = 7/16"	R = 15/16"

Terminal Hood	TH- (All model numbers use this prefix)		
Pack Depth	52-With 2-inch Dimplepleat® filter element 54 - With 4 inch Dimplepleat® filter element		
Size Code	See charts or review instructions above.		
Filter Media	007 - 99.99% min. efficiency on 0.30 micrometers particle size 009 - 99.9995% min. efficiency on 0.12 micrometers particle size 012 - 99.99999% min. efficiency on 0.12 micrometers particle size		
Sealant	SU - Solid urethane and scan tested		
Grille or Diffuser	F - Painted (white) expanded metal S - Circular perforated Type 304 S/S	A - Circular perforated anodized aluminum 0 - NONE	
Inlet	08 - 8 inch diameter 12 - 12 inch diameter	10 - 10 inch diameter 14 - 14 inch diameter	
Damper	A - Adjustable distribution plate B - Butterfly damper with fixed distribution plate (Swaged inlet only)	F - Fixed distribution plate	
Insulation	1 - top only 2 - Top and sides 0 - None		
Gasket	B - 1/4" thick black polyethylene butyl W - 1/4" thick white polyethylene butyl	0 - None X - Special as specified by customer	
Skirt	3 - 3/4" knife edge 0 - None		
Light Fixture or sprinkler	L - Light fixture S - Pan for sprinkler penetration	0 - None	
Lamps for Light Fixture	2 - two lamps 3 - Three lamps 4 - Four lamps	0 - None	
Voltage for Light Fixture	1 - 120 volt 2 - 277 volt	0 - None	

Example: TH52KGQ_007SU-A10B103000

Guide Specifications

1.0 General

- 1.1 Terminal Filter HEPA/ULPA Modules shall be Dimple Pleat® TH as manufactured by Flanders.
- 1.2 Module sizes, efficiencies and capacities shall be as scheduled or noted on the drawings.
- 1.3 Modules shall be UL 900 Class 1 listed and Factory Mutual approved.

2.0 Module Construction

- 2.1 The module filter pack shall be 2 in. or 4 in. deep Dimplepleat® Separatorless design constructed of a water laid microfine glass media containing a water repellent binder. The filter pack shall have raised impressions on the media that shall align against each other when pleated to support adjacent folds without the use of dissimilar materials such as media strips, strings or glue filaments as separators.
- 2.2 The filter pack shall be sealed to the module frame with a fire retardant solid urethane.
- 2.3 The anodized extruded aluminum module frame shall have either a flat flange to fit in a conventional gasketed Tee Grid System or an integral 3/4 inch knife-edge to fit in a Gel Grid System.
- 2.5 The module top shall be one piece aluminum with an integral (8 in., 10 in., 12 in., or 14 in.) inlet collar. The module shall have a distribution plate adjustable through an access port with a removable plug located in the center divider.
- 2.6 The protective grille shall be painted expanded metal. Perforated stainless steel or anodized aluminum are available as an option.

3.0 Performance

- 3.1 Initial and final resistances shall not exceed the scheduled values.
- 3.2 Each filter module shall have a barcode label applied at the beginning of manufacture to document the media lot used and testing results.

- 3.3 TH HEPA Filter Modules shall have a rated minimum efficiency of 99.99% on 0.30 micrometer size particles and shall be scan tested per Section 6.2 of IEST - RP - CC034.1. By challenging the module with a high concentration of PSL Spheres using a particle counter, the media pack and the pack to frame seal shall be scanned to insure that there are no leaks greater than .01% of the upstream concentration at 100 fpm face velocity.
- 3.4 TH ULPA Filter Modules shall have a minimum efficiency of 99.9995% on 0.12 micrometer size particles when tested with a laser test system using a PSL challenge. Each ULPA Filter Module shall be scan tested per section 6.2 of IEST - RP - CC0341. By challenging the module with a high concentration of PSL Spheres using a particle counter, the media pack and the pack to frame seal shall be scanned to insure that there are no leaks greater than .01% of the upstream concentration at 100 fpm face velocity.
- 3.5 TH VLSI II Filter Modules shall have a minimum efficiency of 99.99999% on 0.12 micrometer size particles. Penetration shall not exceed .00028% on 0.10 to 0.30 micrometer size particles for each batch of media subject to patch testing. By challenging the module with a high concentration of PSL Spheres using a particle counter, the media pack and the pack-to-frame seal shall be scanned to insure that there are no leaks greater than .01% of the upstream concentration at 100 fpm face velocity.
- 3.6 When specified, each TH ULPA and VLSI II Filter Module shall be autoscan tested with a high concentration (30x10⁶ ULPA or 100 x 10⁶ VLSI II) of PSL Spheres. Using a particle counter, the media pack and the pack-to-frame seal shall be scanned using a computer controlled probe to insure that there are no leaks greater than .005% (ULPA) or .0001% (VLSI II) of the upstream concentration at 100 fpm face velocity.



Flanders Corporation
531 Flanders Filters Road
Washington, NC 27889

Phone: (252) 946-8081
Fax: (252) 946-3425
Toll Free: (800) 637-2803

Website: www.flanders-ffi.com

REPRESENTED BY: