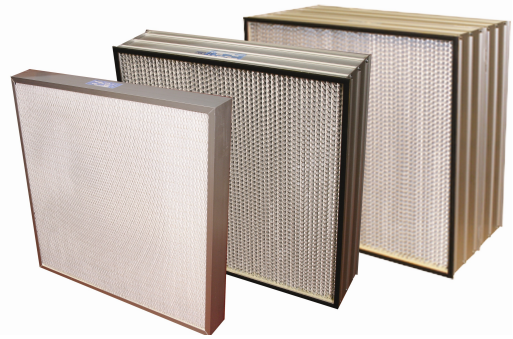
High efficiency HEPA filters of type HEF of H11-H14 classes

Filters of type HEF (filters HEPA) are used for high efficient (final) cleaning of air and sterilizing filtration in medical institutions, at pharmaceutical enterprises, and in clean rooms of other industries (microelectronics, microbiology, food, etc).

Filters can be also used for cleaning of extract air form harmful microorganisms and radioactive aerosols at bacteriological labs, nuclear power plants, etc.



DESIGN

The filter consists of body 1 in which filter medium 2 is stacked in pleats. To prevent sticking of adjacent pleats of filter medium they are interlaid with separators made of aluminium foil 3 (fig. 1) or special thread synthetic or plastic 1 pasted on the surface of filter medium 2 (fig. 2).

Filter body can be made of a special aluminium profile, stainless steel or MDF. Filters made of aluminium structure can be 78; 150 and 300 mm deep. When filter body is made of MDF, stainless steel sheet, the depth of filters can be different. Filtering medium including aluminium or thread separators is sealed in the body by sealing on entire perimeter with special adhesive 4 (fig. 1). Filter body on entire perimeter forms a flange (pressure surface) with the size 15 mm for aluminium structure, 12mm for MDF, and 18mm for stainless steel body. Rubber seal is pasted on this flange (on one or two sides).

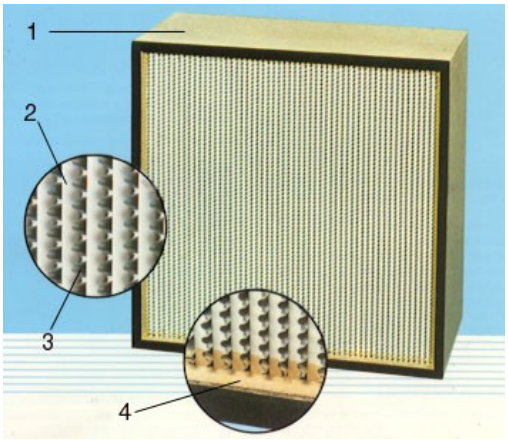


Fig.1 Filter with aluminum separator
1- body; 2- filter media; 3-aluminum foil separators; 4- special adhesive

Fig.2 Fragment of filter with thread separators;
1 – filter media; 2–plastic thread

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Selection of filter based on its characteristics

Filters HEF with aluminium separators are made with the basic sizes of 150 and 300 (292) mm deep. These filters are made in 2 versions:

- base with quantity of a filter medium specified in tab. 1;
- economic, in which the area of filtering surface is about 1.3 times as large as compared to the one of base filter with the depth of 150 mm, and for filters of 300 (292) mm in depth it is 1.5 times as large (tab. 1).

Advantages of the economic filter are lower initial aerodynamic resistance, and increased resource of life, which, from the field experience for filters of 150 mm in depth, can be 1.5-1.7 times as great, and for filters of 300 (292) mm in depth the resource of life is 1.8-2.0 times as great as compared to base version.

Filters with thread separators are manufactured now only as economic version of 78 mm in depth, and also the similar filtering packet can be installed in body of 150 mm in depth to replace filters with aluminium separators in economic version.

Table 1

Dimensions of inlet section, mm	Filtering surface area, m^2			
	Depth 150 mm		Depth 300 (292) mm	
	base	economic	base	Economic
1	2	3	4	5
305x305	2,0	2,6	3,5	5,2
530x530	6,4	8,4	11,2	16,8
305x610	4,2	5,4	7,2	10,8
530x1130	14,0	18,3	24,4	36,6
610x610	8,4	11,0	14,6	22,0
610x1220	17,4	22,7	30,2	45,4
460x920	9,8	12,8	17,0	25,6

CHARACTERISTICS

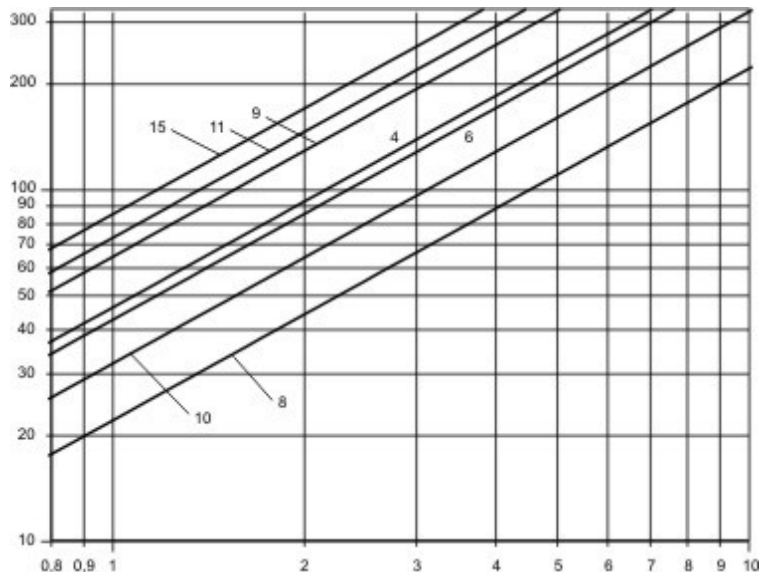
Main characteristics of filters of type HEF are in tables 2,4,5 and 6.

Table 2

Class of filter HEF by EN 1822	Nominal specific air flow m^3/h, per m^2 of inlet section (air velocity, m/s)		Efficiency *, % not less	Pressure drop, Pa **					
				Initial					Recommended final
				For filters with thread separators (economic)	For filters with aluminum separators				
					Depth 150		depth 300 (292)		
	78 (150)	300 (292)			base	economic	base	economic	
H11	1620 (0,45)	5375 (1,49)	95	55	65	50	135	120	600
H13	1620 (0,45)	5375 (1,49)	99,95	105	130	100	250	190	600
H14	1620 (0,45)	5375 (1,49)	99,995	140	150	120	300	230	600

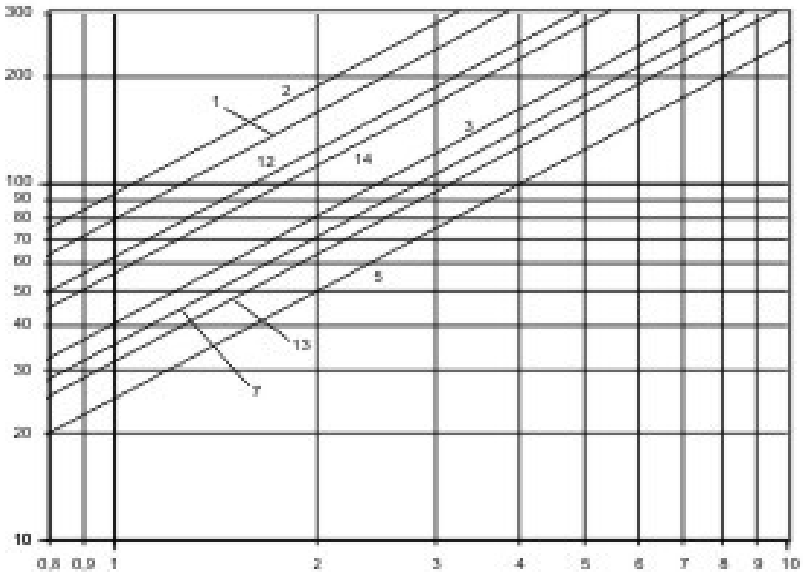
* - efficiency is determined according to methods of Eurostandard EN 1822.
** - pressure drop at air loads different from nominal is determined by fig.3 (a, b).

a) Initial pressure drop, Pa



Specific air flow (m^3/h x m^2) x 1000

b) Initial pressure dr



Specific air flow (m^3/h x m^2) x 1000

Encoding of graphs at fig.3 (a,b)

Table 3

Filter characteristic	Class	Graph number on the figure		
		Filter depth, mm		
		78	150	300(292)
Base with aluminum separators	H11	-	3	5
	H13	-	1	4
	H14	-	2	14
Economic with aluminum separators	H11	-	13	8
	H13	-	12	7
	H14	-	11	6
Economic with thread separators	H11	10	-	-
	H13	9	-	-
	H14	15	-	-

The filters are operational and keep their characteristics at air temperature from -40° to +70° C and relative humidity not over 95%.

Air flows (for main standard dimension-types) are in the tables 4; 5 и 6.

Table 4

Notation of dimensions of filter HEF	Class by EN 1822	Nominal air flow, m^3/h	Initial pressure drop at nominal air flow, Pa		Air flow at max initial resistance of 250 Pa, m^3/h		Dimensions, mm		
			base	economic	base	economic	height	width	depth
0 05	**H11**	150	-	55	-	688	305	305	78
0 02		450	-	55	-	2063	530	530	78
0 5		300	-	55	-	1375	610	305	78
0 04		970	-	55	-	4446	530	1130	78
0 6		600	-	55	-	2750	610	610	78
0 03		1200	-	55	-	5500	610	1220	78
1 05		150	65	50	500	700	305	305	150
1 02		450	65	50	1500	2100	530	530	150
1 5		300	65	50	1000	1400	610	305	150
1 04		900	65	50	3000	4200	530	1130	150
1 6		600	65	50	2000	2800	610	610	150
1 03		1200	65	50	4000	5600	610	1220	150
3 09		2300	135	120	3910	4255	460	920	300 (310)
3 05		500	135	120	850	925	305	305	300 (292)
3 02		1500	135	120	2550	2775	530	530	300 (292)
3 5		1000	135	120	1700	1850	610	305	300 (292)
3 6		2000	135	120	3400	3700	610	610	300 (292)
3 03		4000	135	120	6800	7400	610	1220	300 (292)

Table 5

Notation of dimensions of filter HEF	Class by EN 1822	Nominal air flow, m^3/h	Initial pressure drop at nominal air flow, Pa		Air flow at max initial resistance of 250 Pa, m^3/h		Dimensions, mm		
			base	economic	base	economic	height	width	depth
0 05	**H13**	150	-	105	-	350	305	305	78
0 02		450	-	105	-	1050	530	530	78
0 5		300	-	105	-	700	610	305	78
0 04		970	-	105	-	2263	530	1130	78
0 6		600	-	105	-	1400	610	610	78
0 03		1200	-	105	-	2800	610	1220	78
1 05		150	130	100	288	363	305	305	150
1 02		450	130	100	863	1088	530	530	150
1 5		300	130	100	575	725	610	305	150
1 04		900	130	100	1725	2175	530	1130	150
1 6		600	130	100	1150	1450	610	610	150
1 03		1200	130	100	2300	2900	610	1220	150
3 09		2300	250	190	2300	2875	460	920	300 (310)
3 05		500	250	190	500	625	305	305	300 (292)
3 02		1500	250	190	1500	1875	530	530	300 (292)
3 5		1000	250	190	1000	1250	610	305	300 (292)
3 6		2000	250	190	2000	2500	610	610	300 (292)
3 03		4000	250	190	4000	5000	610	1220	300 (292)

Table 6

Notation of dimensions of filter HEF	Class by EN 1822	Nominal air flow, m^3/h	Initial pressure drop at nominal air flow, Pa		Dimensions, mm		
			base	economic	height	width	depth
0 05	**H14**	150	-	140	305	305	78
0 02		450	-	140	530	530	78
0 5		300	-	140	610	305	78
0 04		970	-	140	530	1130	78
0 6		600	-	140	610	610	78
0 03		1200	-	140	610	1220	78
1 05		150	150	120	305	305	150
1 02		450	150	120	530	530	150
1 5		300	150	120	610	305	150
1 04		900	150	120	530	1130	150
1 6		600	150	120	610	610	150
1 03		1200	150	120	610	1220	150
3 09		2300	300	240	460	920	300 (292)
3 05		500	300	240	305	305	300 (292)
3 02		1500	300	240	530	530	300 (292)
3 5		1000	300	240	610	305	300 (292)
3 6		2000	300	240	610	610	300 (292)
3 03		4000	300	240	610	1220	300 (292)

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MARKING

As it was specified above, filters HEF can be made of various designs: by body type (aluminium profile, MDF, stainless steel); separators (aluminium, thread); class of cleaning (H10-H14); rubber seal (on one or two sides); dimensions of inlet section and depth; quantity of filtering material (base and economic); presence of a mesh at filter outlet.

Sample marking of filter in an order.

HEF – Э 13 H 0 05. 3 A

Table 7

Encoding of notation	Possible versions							
«E»-notation of version by quantity of filter medium	«E» - economic		«__» – absence of index- base					
«13» – digital notation of class by EN 1822	10; 11; 12; 13; 14							
«T» - type of separator	«T» - thread		«S» – separators of aluminum foil					
«0» - one-digit number -notation of filter depth	Depth, mm		78		150	292	300	310
	notation		0		1	2	3	4
«05» – one- or two-digit number - notation of dimensions of inlet section	Size,мм width height	305 305	610 305	610 610	530 530	1130 530	920 460	1220 610
	notation	05	5	6	02	04	09	03
«3» – one-digit number – notation of location of seals and presence of the mesh at outlet	Version	No seal	Seal at inlet	Seal at outlet	Seal at both sides	Seal at inlet, mesh at outlet		
	notation	0	1	2	3	4		
«A» – notation of body material	Type of material		Aluminum profile		MDF	Stainless sheet		
	notation		A		M	SS		

Sample marking of nonstandard filter in an order

HEF – 13 S 635x570x470. 3M

Encoding:
13 – class by EN 1822 – “H13”;
S – separators of aluminum foil;
635x570x470 – dimensions (width x height x depth) mm;
3 – seal at both sides;
M – filter body of MDF.

MAINTENANCE

When filters are in operation it is necessary to check their aerodynamic resistance by readings of manometer. It is necessary to replace filters upon reaching pressure difference specified in the passport, selected in the project, or based on available pressure in ventilating system.