

23 MK

Technical Manual

Ecology Units



ILH BERLIN
INSTITUT FÜR LUFTHYGIENE



Instituto Argentino
de Normalización
y Certificación



MEKAR®
AIR HANDLING UNITS

GENERAL

Mekar ecology units are precisely designed for commercial kitchen to control the environmental emission generated from the kitchen extract system. Integrated components like mechanical filters, electrostatic precipitator and activated carbon filters efficiently eliminate the smoke, grease particle and odour from the kitchen exhaust before the air is exhausted to the environment.



Classification to EN1886:

Mechanical strength	D1
Leakage	L1/L1
Filter By-pass	F9
Transmittance	T2

- 60mm thick double skin construction, completely modular design
- GI casing with extruded aluminium profile for rigid construction unit as standard and various material of construction like SS casing and different sheet metal thickness possible based on request
- Air flow range 1300 CMH to 80000 CMH (28 Basic Sizes)
- 16 reduced height sizes from 4000 CMH to 8000 CMH
- Suitable for Kitchen application to remove oil, grease, odour and smoke
- Multiple stage filtrations

Sponge & G2 Coarse Filter



Electrostatic Precipitator



Fine Filter



Activated Carbon Filter



- Additional (Optional) filtration stages possible based on application.
- Optional Plug & Play units with Mekar Control panel for operation, VFD, Safety switch and field accessories.
- Accessories - Dampers, Flexible connectors, Weather canopy & Belt guard.

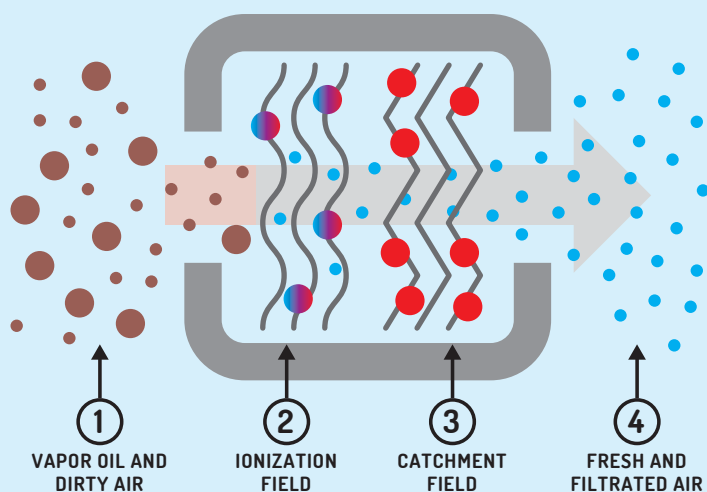
ESP OPERATING PRINCIPLE & KEY FEATURES

An electrostatic precipitator consists in a purification system that allows the separation of pollutants from the air. These particles can be either solid (i.e. dust) or liquid (i.e. oily vapours).

The system, through an electric potential difference generated by emission and collection electrodes, separates pollutants from the gas flowing through the electrodes. In this way, airborne particles of any size are electrically charged due to an electric field generation from the emission electrodes: this causes the ionization of the gas which, passing through the collection field, makes the ions collide with the pollutants. Part of the ions' electrical charge is transferred to these substances, causing them to fall into the collection field where they are held.

The air that flows out is completely purified from pollutants of any kind and, most of all, of any size.

OPERATING PRINCIPLE



ELECTROSTATIC PRECIPITATOR



Features of ESP

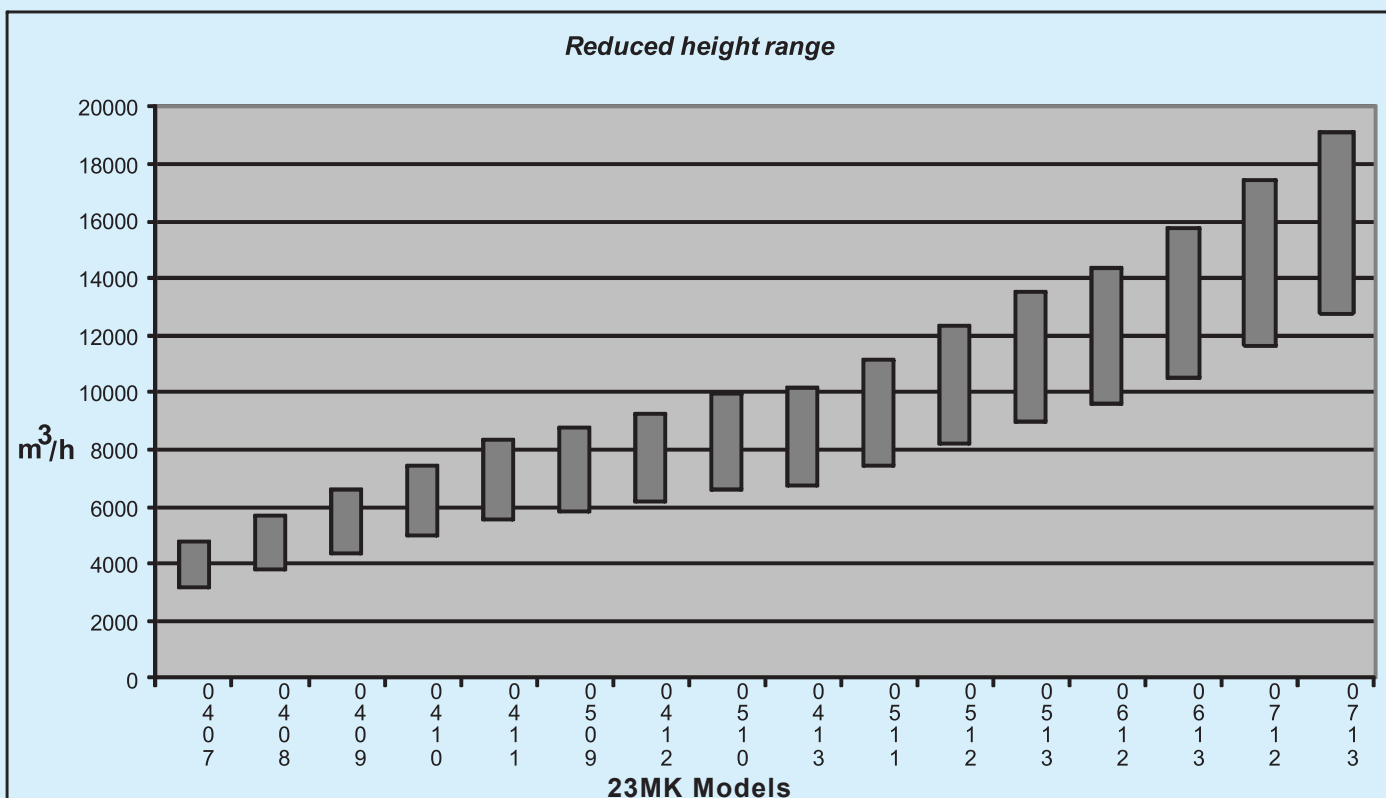
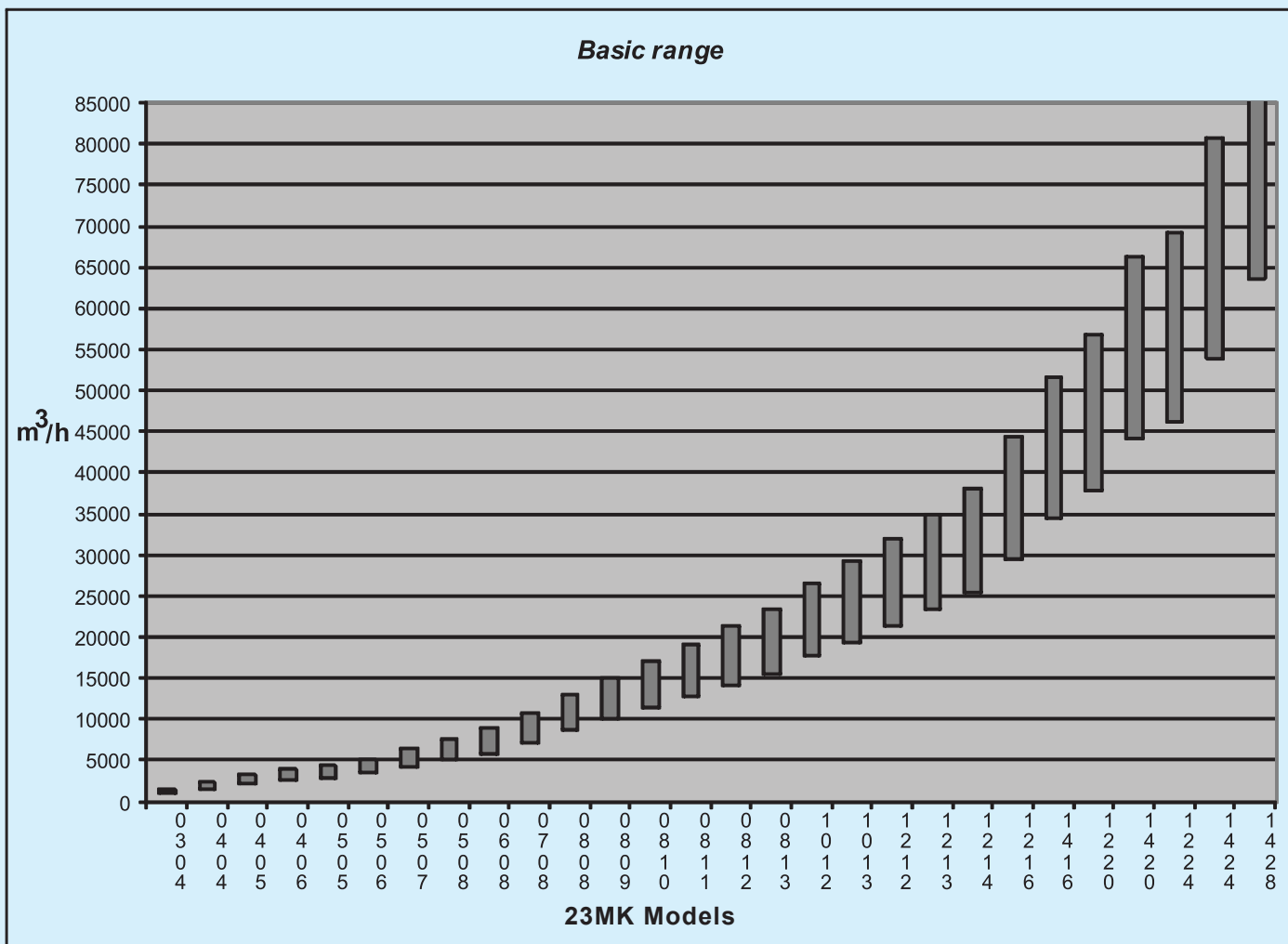
- ASHRAE dimensions
- Flexibility of the product
- Possibility to put more filters in line or stack them to increase the air flow
- Electrostatic cell with blades to facilitate oil drainage
- Built with aluminium and tungsten wires
- Built-in electronics and internally protected with resin
- LED indicating filter status
- High efficiency and constant filtration
- Low and constant pressure drops
- Energy saving
- Design compliant with UNI 11254:2007, EN 1822:2005 and EN 779:2012
- Certified and patented

AIR FLOW RANGE - TABLE

Air flowrates								
Face velocity [m/s]	2		2.5		3		3.5	
23MK	m3/h	m3/s	m3/h	m3/s	m3/h	m3/s	m3/h	m3/s
0304	1068	0.297	1335	0.371	1602	0.445	1869	0.519
0404	1602	0.445	2002	0.556	2403	0.667	2803	0.779
0405	2197	0.610	2746	0.763	3295	0.915	3844	1.068
0406	2597	0.721	3246	0.902	3896	1.082	4545	1.263
0505	2929	0.814	3661	1.017	4393	1.220	5126	1.424
0407	3192	0.887	3990	1.108	4788	1.330	5586	1.552
0506	3463	0.962	4329	1.202	5194	1.443	6060	1.683
0408	3787	1.052	4734	1.315	5680	1.578	6627	1.841
0507	4256	1.182	5320	1.478	6384	1.773	7448	2.069
0409	4382	1.217	5477	1.521	6573	1.826	7668	2.130
0410	4977	1.382	6221	1.728	7465	2.074	8709	2.419
0508	5049	1.403	6312	1.753	7574	2.104	8836	2.454
0411	5572	1.548	6964	1.935	8357	2.321	9750	2.708
0509	5842	1.623	7303	2.029	8764	2.434	10224	2.840
0608	5891	1.636	7363	2.045	8836	2.454	10309	2.864
0412	6166	1.713	7708	2.141	9250	2.569	10791	2.998
0510	6636	1.843	8294	2.304	9953	2.765	11612	3.226
0413	6761	1.878	8452	2.348	10142	2.817	11832	3.287
0708	7153	1.987	8941	2.484	10730	2.980	12518	3.477
0511	7429	2.064	9286	2.579	11143	3.095	13000	3.611
0512	8222	2.284	10277	2.855	12333	3.426	14388	3.997
0808	8640	2.400	10800	3.000	12960	3.600	15120	4.200
0513	9015	2.504	11269	3.130	13522	3.756	15776	4.382
0612	9592	2.664	11990	3.331	14388	3.997	16786	4.663
0809	10022	2.784	12528	3.480	15034	4.176	17539	4.872
0613	10517	2.922	13147	3.652	15776	4.382	18406	5.113
0810	11405	3.168	14256	3.960	17107	4.752	19958	5.544
0712	11648	3.235	14559	4.044	17471	4.853	20383	5.662
0713	12771	3.548	15964	4.434	19157	5.321	22350	6.208
0811	12787	3.552	15984	4.440	19181	5.328	22378	6.216
0812	14170	3.936	17712	4.920	21254	5.904	24797	6.888
0813	15552	4.320	19440	5.400	23328	6.480	27216	7.560
1012	17712	4.920	22140	6.150	26568	7.380	30996	8.610
1013	19440	5.400	24300	6.750	29160	8.100	34020	9.450
1212	21254	5.904	26568	7.380	31882	8.856	37195	10.332
1213	23328	6.480	29160	8.100	34992	9.720	40824	11.340
1214	25402	7.056	31752	8.820	38102	10.584	44453	12.348
1216	29549	8.208	36936	10.260	44323	12.312	51710	14.364
1416	34474	9.576	43092	11.970	51710	14.364	60329	16.758
1220	37843	10.512	47304	13.140	56765	15.768	66226	18.396
1420	44150	12.264	55188	15.330	66226	18.396	77263	21.462
1224	46138	12.816	57672	16.020	69206	19.224	80741	22.428
1424	53827	14.952	67284	18.690	80741	22.428	94198	26.166
1428	63504	17.640	79380	22.050	95256	26.460	111132	30.870

Low Height Units

AIR FLOW RANGE - GRAPH



PRODUCT SPECIFICATION

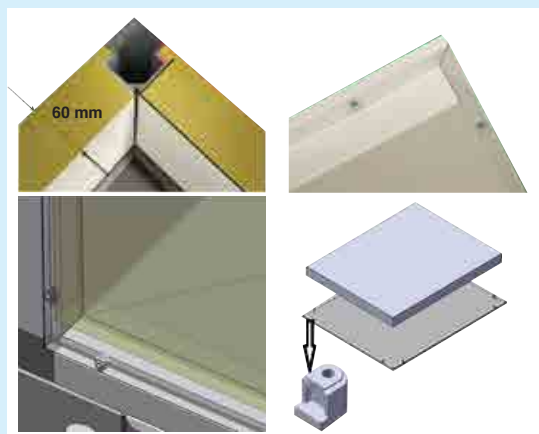
Casing

The unit construction is modular type with anodized aluminium profile frame work and fibre glass reinforced plastic corners. The casing is with double skin of 60mm thk, insulated with injected polyurethane insulation with minimum density of 45 kg/ m3 meeting 0.0246 W/mK as per ISO 8301 standards, the fire resistance comply with ISO 3582 standards and closed pores as per ASTM D2856 standards

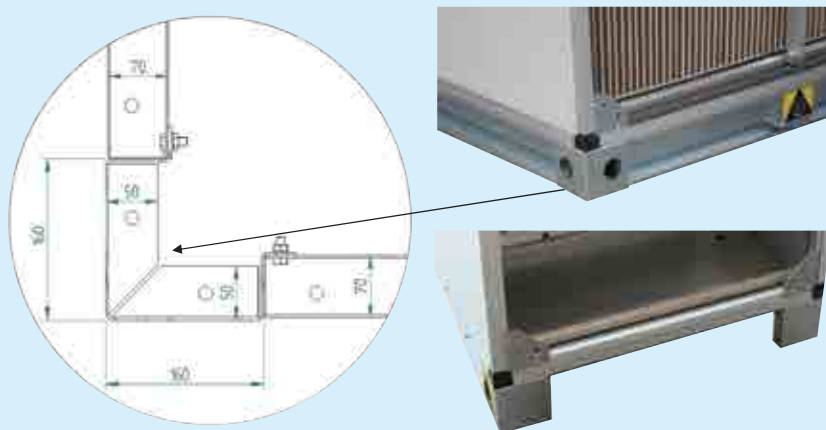
The panel sheet metal thickness can be with various configurations and standard is 0.6mm for the inner skin and 1.0mm for outer skin and made from sendzimir galvanized steel sheets. The outer sheet metal is protected with 25 micron baked enamel polyester pre-coated finish. Inside and outside of panel walls would be completely smooth.

The modular sections have integrated base frame made of 150mm height heavy gauge(2.5mm) galvanized steel continuous channel base. Each section is joined together by corrosion resistant bolt and nuts using gasket.

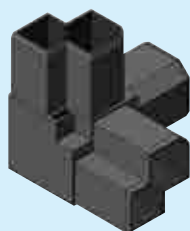
PANEL CONSTRUCTION



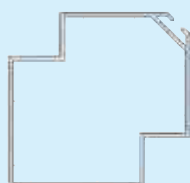
BASE FRAME & SECTIONAL JOINTS



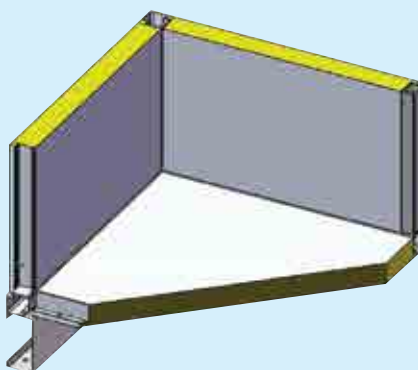
3 WAY CORNER JOINT



ANODIZED ALUMINIUM FRAME TB



INSIDE CASING



FLAT ROOF

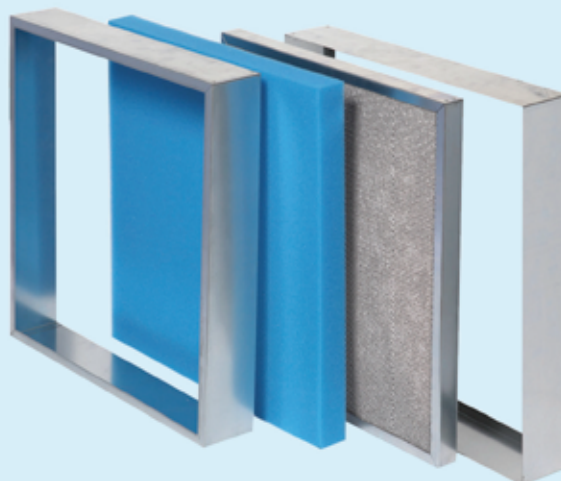


PRODUCT SPECIFICATION**Casing**

Hinged type access doors provided to all filters, precipitator and fan sections with compressible gasket to ensure air tightness. Hinges shall be of fibre glass reinforced plastic or epoxy coated metallic construction. The complete unit would be with different level of filtrations and built-in Electrostatic precipitator. All the filters are mounted on the GI filter frame with necessary access door and safety switch for fan section.

ACCESS DOOR**SAFETY SWITCH****First stage of filtration (Sponge & G2)**

High quality sponge filter with 100% aluminium alloy frame. This filter would stop the oil dripping caused by the air coming from the kitchen hoods which is full of vapour oils and grease. This would allow preserving the core filter of air treatment unit in order to have the best filtration efficiency and increase the time from first maintenance to next maintenance to extend the life cycle of ESP. Built-in with metallic mesh plane filter cell, class G2 according to EN 779:2012. The filter media protected with wire mesh on both sides to ensure the consistency of the pack. Filter media is multi-layer aluminium and electro-welded steel wire protection meshes constructed in galvanized steel frame. The complete filter media can be used continuously by washing it with tap water and detergents. The final pressure drop of filter is as per Eurovent norms and filters are suitable for greasy vapours and aggressive atmospheres.



PRODUCT SPECIFICATION

Electrostatic Precipitator (Third Stage of Filtration)

Electrostatic precipitator would be inside the Ecology unit and not providing separately. ESPs are formed by a box shaped structure made of an aluminium alloy, having appropriate thicknesses, printed and press-bent substantially parallel pipe-shaped, formed by four insides, two by two opposing ranging which create a holding frame having standardized dimensions according to EN 15805:2009 for mounting on sliding rails or standardized support frames.

The structure inside act as support for two or more support bars for the positioning of the ionization wires and to be suitably mounted to ceramic insulators. The ionization wires made of aluminium and tungsten wires. The bars to be with ionization wires powered by high voltage needed to charge the airborne pollutants. This frame serves as a support for the capitation means of charged pollutants, consisting of a plate pack connected directly to the frame structure and grounded. The bottom side pointed blades, is guaranteed for better dripping of oily pollutants to the drain which is fixed by ceramic insulators to the same frame, and will be powered with high voltage; frame to generate and manage necessary high voltage for the required operation of the electrostatic precipitator. The special construction ensures that no electric discharges occur on the insulator to provide high reliability in the long term also in the presence of emulsifying oils.

ELECTROSTATIC PRECIPITATOR

INTEGRATED ELECTRONICS



ELECTRONIC CIRCUIT



LED



POWER SUPPLY CONNECTOR



JUNCTION CONNECTOR



FINAL COVER CONNECTOR



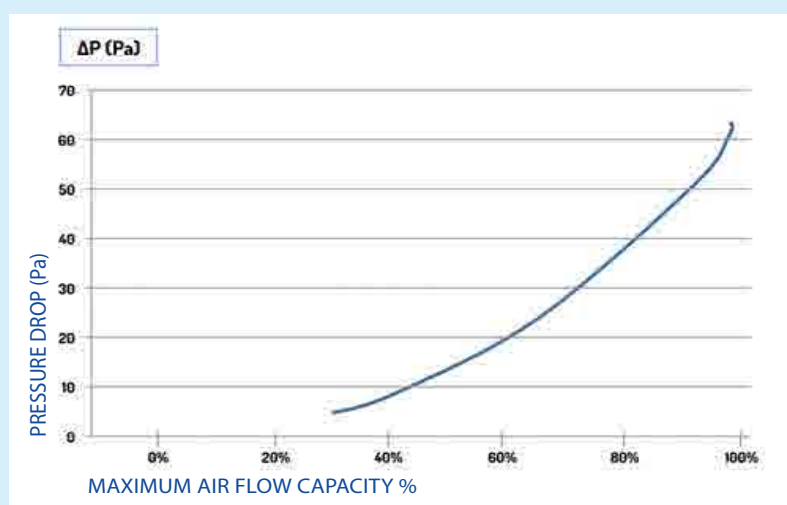
PRODUCT SPECIFICATION

Electrostatic Precipitator (Third Stage of Filtration)

ESPs are built-in with pre-filter with aluminium mesh and stainless steel frame, used as equalizer, for air distribution in the electrostatic precipitator. The ESPs are with minimum 7m² of surface area for effective filtration and 17 wires for ionization for filter size of 592x592mm and similarly for filter size 592x287mm shall have 3m² of surface area for efficient filtration and 8 wires for ionization.

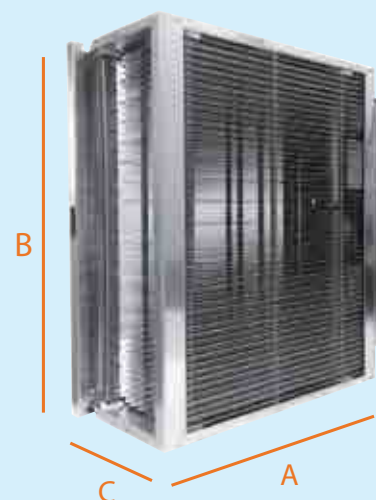
The electrical power supply connections of the alarm and operation are performed by suitable multi-polar connector equipped with a numbered multi-polar cable and provided with cable for the development of yellow-green colour grounding system. The power supply is between 210V/240V at a frequency of 60 / 50Hz single-phase type.

The ESPs have IP 55 electrical box made up of polycarbonate for the connection of electrostatic Precipitators, which are within the same Ecology unit. The control board have status display of electrostatic cell system consisting of a green/red two-colour LED. The electrical box contains terminals to allow connection from one to three power supply lines for the ESPs. NO/NC contacts available for sending the filtration status to supervision system. The electrical box is designed to connect 9 ESPs in line for at maximum 3 rows for a total of 27 ESPs. (within the same Ecology unit)



TECHNICAL DETAILS

MOD.	COD.	AirflowCapacity min/max m³/h	Accumulation Capacity g	Electrical Power W	Dimensions AxBxC mm	Weight Kg
XFEL	XFE250L	480 ÷ 1200	370	9	287 x 490 x 218	8
XFEL	XFE300L	650 ÷ 1600	470	9	287 x 592 x 218	10
XFEL	XFE450L	840 ÷ 2100	623	16	490 x 490 x 218	14
XFEL	XFE500L	1070 ÷ 2760	823	16	490 x 592 x 218	16
XFEL	XFE550L	960 ÷ 2560	750	16	592 x 490 x 218	16
XFEL	XFE600L	1300 ÷ 3400	1000	16	592 x 592 x 218	19

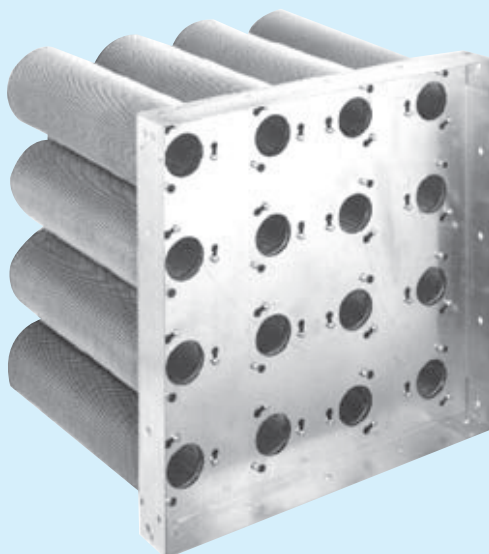


PRODUCT SPECIFICATION**Fourth stage of filtration**

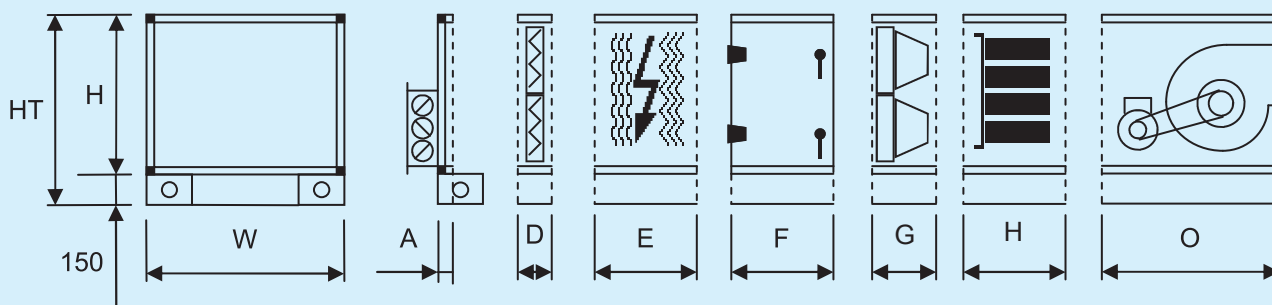
Bag filter class F8 according to EN 779:2012. Pockets are with optimized shape for high dust holding capacity (DHC). Filter media to be laminated with glass microfiber on a high resistance fabric support. Construction of galvanized steel frame with rounded edges.

**Fifth stage of filtration**

Activated carbon filters to be cylindrical cartridge type to remove odour and the chemical-physical adsorption of gaseous pollutants. The design of a purification system to be activated carbon requires the knowledge of the chemical composition of pollutants, the relative concentration and the thermo-hygrometric conditions of the air to be treated. Filter media Micro-granules of mineral activated carbon type CA1- for organic odour. Construction of galvanized steel supporting plate equipped with holes for the quick cartridge installation. Rechargeable cylindrical cartridges, with supporting expanded steel meshes and neoprene gasket on the connection edge.



DIMENSIONS



23MK	W	H	HT	A	D	E	F	G	H	O
0304	730	570	720	45	160	480	640	320	640	800
0404	730	730	880	45	160	480	640	320	640	800
0405	890	730	880	45	160	480	640	320	640	800
0406	1050	730	880	45	160	480	640	320	640	800
0407	1210	730	880	45	160	480	640	320	640	960
0408	1370	730	880	45	160	480	640	320	640	960
0409	1530	730	880	45	160	480	640	320	640	960
0410	1690	730	880	45	160	480	640	320	640	960
0411	1850	730	880	45	160	480	640	320	640	960
0412	2010	730	880	45	160	480	640	320	640	960
0413	2170	730	880	45	160	480	640	320	640	960
0505	890	890	1040	45	160	480	640	320	640	960
0506	1050	890	1040	45	160	480	640	320	640	960
0507	1210	890	1040	45	160	480	640	320	640	960
0508	1370	890	1040	45	160	480	640	320	640	960
0509	1530	890	1040	45	160	480	640	320	640	1120
0510	1690	890	1040	45	160	480	640	320	640	1120
0511	1850	890	1040	45	160	480	640	320	640	960
0512	2010	890	1040	45	160	480	640	320	640	960
0513	2170	890	1040	45	160	480	640	320	640	960
0608	1370	1050	1200	45	160	480	640	320	640	1120
0612	2010	1050	1200	45	160	480	640	320	640	1120
0613	2170	1050	1200	45	160	480	640	320	640	1280
0708	1370	1210	1360	45	160	480	640	320	640	1120
0712	2010	1210	1360	45	160	480	640	320	640	1280
0713	2170	1210	1360	45	160	480	640	320	640	1280
0808	1370	1370	1520	45	160	480	640	320	640	1120
0809	1530	1370	1520	45	160	480	640	320	640	1280
0810	1690	1370	1520	45	160	480	640	320	640	1280
0811	1850	1370	1520	45	160	480	640	320	640	1280
0812	2010	1370	1520	45	160	480	640	320	640	1440
0813	2170	1370	1520	45	160	480	640	320	640	1440
1012	2010	1690	1840	45	160	480	640	320	640	1600
1013	2170	1690	1840	45	160	480	640	320	640	1600
1212	2010	2010	2160	45	160	480	640	320	640	1600
1213	2170	2010	2160	45	160	480	640	320	640	1760
1214	2330	2010	2160	45	160	480	640	320	640	1760
1216	2650	2010	2160	45	160	480	640	320	640	1920
1220	3290	2010	2160	45	160	480	640	320	640	2080
1224	3930	2010	2160	45	160	480	640	320	640	2080
1416	2650	2330	2480	45	160	480	640	320	640	2080
1420	3290	2330	2480	45	160	480	640	320	640	2080
1424	3930	2330	2480	45	160	480	640	320	640	2080
1428	4570	2330	2480	45	160	480	640	320	640	2080



MEKAR s.r.l. • Viale Caduti sul Lavoro, 25 • 37063 ISOLA DELLA SCALA (VR)
Tel. +39 045 6630536 • Fax +39 045 6630513 • info@mekar.it • www.mekar.it
Regional Office: Mekar Air Handling Units L.L.C • PO Box 24583 • DUBAI • UAE
Tel +971 4 3574469 • Fax +971 4 3574479