bomaksan®
ENDÜSTRİYEL HAVA FİLTRASYON SİSTEMLERİ

KMA


# Exhaust air purification and heat recovery

## for die casting machines

# A strong
partner

For over 30 years, KMA's environmental engineers have been developing custom-made systems for smoke extraction, exhaust air purification and heat recovery in foundries. Since its market launch, more than 2,000 systems have been installed in the die casting industry worldwide. The reason for this is not only the reliable performance but also the energy efficiency, unique in the competition.

Two-part, open hoods for maintenance work

# We combine environmental protection
and economic efficiency

All players in the die casting industry face the major challenge in how to treat production exhaust air sustainably and in compliance with legal requirements. The professional exhaust air purification system KMA ULTRAVENT® solves the exhaust air situation in every foundry - thanks to its modular principle tailor-made to customer-specific requirements. The system is characterized by its high separation efficiency, long service life and very low energy consumption. The integrated heat recovery technology achieves energy savings of up to 80 % compared to conventional exhaust air technology. Therefore, KMA systems contribute significantly to reduce $CO_2$ emissions in foundries.

# Effective
smoke extraction

KMA recommends the extraction of smoke directly at the emission source, as an extraction below the hall roof would require the extraction of a significantly larger exhaust air volume. The greater the exhaust air volume, the higher the energy consumption and in turn the operating costs. KMA offers two different systems for smoke extraction at the emission source. The KMA product managers will be happy to advise you in choosing the ideal smoke extraction system for your production hall.

### Extraction hoods

ULTRAVENT® extraction hoods are available for large die casting cells. Its modular system ensures a flexible and custom-made fitting of the extraction hood. This makes your hood as individual as your foundry, while taking advantage of a rational series production. You benefit from short delivery periods and a mature design. The extraction hoods can be moved on rails making the area above the casting machine fully accessible. Moving the hood can be done either manually or by using a hood motor drive. Whether the hood is manufactured in one or two parts depends on your situation. Due to the special design inside the hood (deflector plates) even strong and intermittent smoke emissions can be securely extracted and removed from the exhaust air. Flow baffle plates ensure that the main air suction effect is focused on emission-critical areas of the hood's bottom edges.

### Air curtain system

Air curtain systems are used when the installation of extraction hoods is hindered by limited space or other obstructions at the workstation. KMA air curtain systems consist of two elements. On one side of the production machine, a blower unit is generating an adjustable horizontal air current above the emission source. On the other side, the extraction unit contains the air current including the contaminated exhaust air from the production machine. However, when compared to an extraction hood this method of exhaust air purification is more energy-intensive.

Decentralized filter systems in energy-efficient circulation mode

Extraction hoods above DCM's connected to a central filter system in exhaust air operation

# High-grade
## exhaust air filtration

### Flexible modules for a highly effective exhaust air treatment

ULTRAVENT® exhaust air filtration systems have a modular design and are therefore extremely flexible in their application: Depending on the exhaust air, the appropriate filter units are combined and, if required, equipped with a heat recovery system. To adapt to increased requirements, it is possible to retrofit existing KMA filtration systems.

KMA exhaust filtration systems are available in different sizes. The module sizes are staggered and are determined according to the occurring exhaust air volume. The largest modular unit has a capacity of 30,000 m³/h. To filter even higher exhaust air volumes, two or more filter modules can be put in sequence.

### Centralized or decentralized design

KMA ULTRAVENT® filtration systems can be installed either centrally or decentrally. For a decentralized exhaust air treatment, each die casting machine is equipped with an individual exhaust air filtration system. This installation requires no expensive and complex exhaust pipes, furthermore the system remains flexible, especially with regard to possible extensions of existing production capacities. For a centralized exhaust air purification several die casting machines are connected to a single filtration system. The investment costs for a central exhaust air filtration system are generally lower than for several smaller filtration systems. However, the costs for the installation of exhaust pipes has to be taken into account.

### Air circulation or air extraction mode

KMA ULTRAVENT® exhaust air filtration systems are characterized by their high energy efficiency in both air extraction mode and exhaust air mode. In both cases, the total energy consumption can be reduced by up to 80 % when compared to conventional exhaust ventilation systems. The KMA consultants will be happy to advise you on the right solution for your exhaust air filtration system.

In circulating air mode, the purified exhaust air is transferred back into the work area, avoiding exhaust air fans and high heat losses in the winter months as much as possible. However, very strict regulations apply when using circulating air mode, as the filtered air is inhaled directly. To achieve the required air quality, KMA combines a demister with two electrostatic precipitators.

In air extraction mode, on the other hand, the purified exhaust air is transferred outside and replaced by fresh air. Individual national regulations regulate the quality of the exhaust air. Depending on the legal situation and exhaust air composition, a demister or a demister combined with an electrostatic precipitator is used. If required, fresh air from outside is heated via a heat exchanger and transferred into the production hall.

# Filter modules
## for pure air

### Demister

ULTRAVENT® demister units consist of robust 25 mm or 50 mm thick stainless steel mesh wire elements. This wire is held in position by expanded metal mesh, both on the incoming and outgoing side of the gas flow. The special rolling of the wire allows for a high separating capacity of aerosols, droplets and mist. The demister cells do not need to be replaced.

### Electrostatic precipitator

ULTRAVENT® electrostatic filter cells highly effectively separate the exhaust air of smoke, dust and fine mists. The electrostatic precipitators are characterized by their very robust construction: Frames, electrodes and support rods made out of stainless steel, collectors either in aluminum or stainless steel, insulators in an oil-resistant ceramic design and a filter design optimized for the separation of liquid and viscous substances make the electrostatic precipitator an extremely economical and durable filter medium for numerous applications.

# Integrated
## heat recovery

Especially in regions with lower temperatures, the heating of fresh air is very energy- and cost-intensive. KMA heat recovery systems recover valuable process waste heat from the exhaust air and use it to heat the hall air.

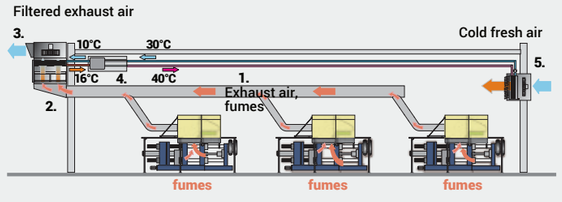
### Heat exchangers

Finned heat exchangers consist of numerous fins, which are pressed to core tubes to form a connection. Finned heat exchangers are designed based on the gas/liquid principle. The heat-conducting liquid – either brine or refrigerant – flows through the core tubes, while the gas or warm exhaust air flows through in-between the fins. The heated fluid is then used to heat the supply air. Due to their efficient heat transfer and the large surfaces, finned heat exchangers reach a high coefficient of performance (COP).

### Heat pump

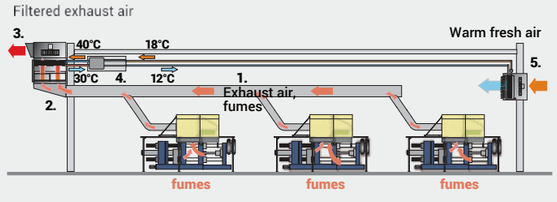
In case of low-temperature process waste heat, an Ambitherm® heat pump can be used to increase the COP and to generate process heat with temperatures of 30 °C to 60 °C. The Ambitherm® system ensures a direct energy transfer to follow up processes without requiring a buffer tank. Its coefficient of performance (COP > 6) is significantly higher than for many other comparable systems. The system can also be used in reverse to cool the production halls during the warmer months.

**Winter operation**
**Heating the hall with waste heat**




1. Fumes and exhaust air from die casting machines
2. Central filter cleans exhaust air and extracts heat from it via heat exchanger
3. Filtered and cooled air is blown outside
4. Heat pump generates hot water (40 ° C)
5. Air heat exchanger heats fresh air

**Summer operation**
**Cooling the hall with exhaust air heat**




1. Fumes and exhaust air from die casting machines
2. Central filter cleans exhaust air which absorbs waste heat via heat exchangers
3. Filtered and heated air is blown outside
4. Heat pump produces cold water (12 ° C)
5. Air heat exchanger cools fresh air

(Data are exemplary)

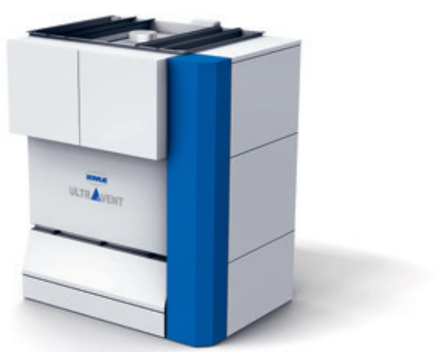
Decentralized exhaust air filter systems in recirculation mode

# High standards for ULTRAVENT® exhaust air filtration systems

Due to their low filter resistance, KMA ULTRAVENT® exhaust air filter systems are particularly energy-saving. In addition, the fans are equipped with energy-saving motors. Further savings can be achieved through intelligent controlling: the fans run continuously at a constant speed and therefore deliver a constant output. In practice, however, only 70 to 90 % of the power, and for fluctuating loads even less, is required. The ECO+ technology is a standard feature of ULTRAVENT® filtration systems. Controlling the fan speed using a frequency converter helps to ensure the optimum speed, as even a small speed reduction results in significant energy savings. By connecting to the control of the manufacturing machine, a permanent speed adjustment is possible. This can result in additional energy savings of up to 50 %.

The ULTRAVENT® filter system offers a high series standard:

- New fan technology significantly quieter
- Possible synchronization of fan output with spraying cycle of die casting machine (energy savings of up to 25 %)
- Improved automation technology
- Advanced filter cleaning system (CIP)
- More service comfort and improved maintenance options



# Additional equipment for an economical and safe operation

### Automatic filter cleaning system (CIP)

The ULTRAVENT® can be combined with an automatic filter cleaning system (CIP) for all exhaust air purification and heat recovery modules. The filter cleaning system (CIP) runs fully automatic most of the time and does not require the presence of personnel. The start can be pre-programmed or started manually using the remote control. The automatic filter cleaning system (CIP) is unmatched in comfort and cleaning results, due to its nozzle block moving back and forth between the individual filter cells during the washing process. Its intelligent control system simultaneously reduces the consumption of water and as well as cleaning agents.

### Intelligent control system

ULTRAVENT® exhaust air filtration systems are available with either contactor control or PLC. At KMA, the Siemens S7 is installed as standard PLC. It ensures the permanent monitoring and logging of all filter functions. Furthermore, it allows for monitoring of connection media and, when using the CIP filter cleaning system, for the convenient programming of cleaning times, wash water temperatures and many other parameters. The PLC also ensures the connection of the filter system to central control systems (BMS) as well as remote monitoring or service routines, which is an important aspect of ISO 14001 certification.

### Fire protection and fire-extinguishing systems

In case of fire potential, all KMA ULTRAVENT® exhaust air filtration systems can be equipped with fire sensors and fire extinguishing systems, if necessary. In the event of a fire, the filtration systems are flooded with an extinguishing gas to avoid further damage.

# Realizing cost efficiency through decentralized KMA filter system in circulating air mode

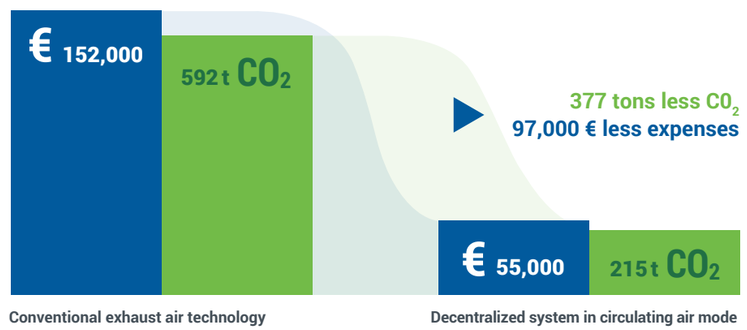
The most energy-efficient exhaust air treatment process is circulating air mode.

The high-performance filter technology ensures such a high pure air quality that the purified air at the filter outlet can be transferred to the working area within the production hall. This way, the purified air circulates inside the production hall without any heat loss during the winter period, which would occur in case of an exchange with cold supply air. Therefore, this method offers the greatest savings potential.

- Reducing operating costs by approx. € 97,000 per year
- Reducing $CO_2$ emissions by 377 tons per year
- Amortization period of the system: approx. one year*

* Additional investment compared to conventional exhaust air technology

This calculation is based on a foundry in Central Europe with ten die casting machines (1100 t each) and an exhaust air volume of 80,000 m³/h. During the heating period (3,600 h), the average outside air temperature is 2.9 °C. The desired hall temperature is 18 °C (Δt = 15.1 °C). The applied price for gas is € 0.50 and for electricity 15.50 euro cent/kWh.



**Please feel free to contact us for Die Casting Solutions.**

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