

## Information booklet for Starmix special vacuum cleaners:



## Regulations for vacuum extraction of dust that is harmful to health in accordance with TRGS 559

- Legal requirements
- Safety measures
- Starmix special vacuum cleaners

starmix

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## Introduction

This Starmix information booklet is intended to give safety staff and users an insight into dealing with fine dust that is harmful to health.

Firstly, it is intended to explain some important information, in particular, how dangerous dealing with fine dust actually is. Secondly, it will enable you to make the right choice and to work professionally and safely with Starmix special vacuum cleaners. The details provided in this booklet are subject to change and we do not claim that they are complete. If you are uncertain about any matter, please contact the relevant authorities or professional associations, or send an e-mail to [spezialsauger@starmix.de](mailto:spezialsauger@starmix.de)

## 1 General

### 1.1. Dust - causes and effects

When using power tools in the workshop and on building sites, such as - wall chasers

- box cutters
- drills
- grinding machines, etc.

dust is created.

Usually this is wood dust, or mixed mineral dust that is created when working with wood-, sand-, limestone-, brick-, plaster-, cement or concrete, for example. Experience shows that this mix dust contains a proportion of quartz, the amount of which can vary according to the material.

#### *Why is dust harmful ?*

How harmful dust is for health depends, on the one hand, **on the size of the dust particles** and on the other, on the **quantity of dust** and the time periode in which the dust affects our bodies (lungs).

The smaller the dust particles, the deeper they can penetrate the lung tissue. Large dust particles are deposited more quickly than fine dust particles. As a result, fine dust affects the air we inhale for longer. Any type of dust can lead to diseases of the airways if exposure to it is high.

Moreover, quartz dust can cause silicosis and therefore lung cancer.

Examples of sizes of dust particles:

- Asbestos: 0,9 - 0,4 µm
- Tobacco smoke: 0,01 - 1,0 µm
- Cement dust: 5 - 100 µm
- Flour dust: 1 - 90 µm
- Pollen: 10 - 100 µm
- Limestone dust: 0.9 - 80 µm
- Bacteria: 0.8 - 20 µm

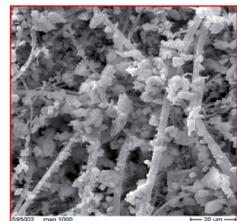
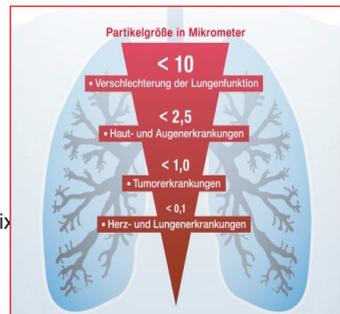


Abbildung zeigt Feinstaubpartikel auf Quarzfaserfilter

### *Asbestos and dust containing asbestos:*

Asbestos comprises a group of naturally occurring, anorganic, crystalline silicates, which appear in the form of fibres / bundles of fibres. The characteristic of asbestos is that the bundles of fibres become splayed under mechanical stress, which creates ever thinner bundles. If these are inhaled, they are deposited in the lungs and become encapsulated. As a result, they have an extremely carcinogenic effect.

Special safety measures and regulations must be observed when dealing with asbestos!

## **1.2. Dust classes and filter classes**

### 1.2.1. Dust classes

Dust that is harmful to health is divided into so-called dust classes. There are vacuum cleaners for each of these classes, which must meet special requirements. You can determine which types of dust belong in which classes from the relevant tables of materials. For a more precise definition of the material in the dust that you are dealing with, please contact the professional associations.

Dust classes in accordance with IEC / EN 60335-2-69, Annex AA (extract)

Dust class	AGW-Werte*	Penetration (max.)	Disposal
<b>L</b>	$> 1 \text{ mg//m}^3$	$\leq 1 \%$ (nur Filtermaterial)	--
<b>M</b>	$\leq 1 \text{ mg//m}^3$	$< 0,1 \%$ (gesamtes System)	Low dust
<b>H</b>	$< 1 \text{ mg//m}^3$	$< 0,005 \%$ (gesamtes System)	Dust free
<b>H-Asbestos</b>	$< 1 \text{ mg//m}^3$	$< 0,005 \%$ (gesamtes System)	Dust free

\* AGW = General threshold limit values

#### **Dust class „L“ (light):**

Dusts of this class have general threshold limit values of  $> 1 \text{ mg/m}^3$ \*. With vacuum cleaners for dust class „L“, the filter material is tested. The maximum penetration value is  $< 1\%$ . There are no special disposal regulations.

#### **Dust class „M“ (moderate):**

Dusts of this class have general threshold limit values of  $\geq 1 \text{ mg/m}^3$ \*. Vacuum cleaners of this class are tested as complete machines. The maximum penetration value is  $< 1\%$ . Low-dust disposal is required.

#### **Dust class „H“ (high):**

This dust class includes dust with general threshold limit values of  $< 1 \text{ mg/m}^3$ \*, all dust that is carcinogenic and dust that contains pathogens. Vacuum cleaners of this class are tested as complete machines. The maximum penetration value is  $< 0.005\%$ . Dust-free disposal is required.

\* max concentration within one shift (8 h)

### Dust class „H-Asbestos“:

This class is the same as dust class H, with additional testing for dust-removing machines and equipment that is intended to collect and remove asbestos.

#### 1.2.2. Filter classes

Filters are also divided into various classes. There are a number of standards for determining the filtration performance of air filters: EN 1822, DIN 24183 and the MIL Standard 282. Filters in classes „L“, „M“ and „H“ are tested in accordance with the method prescribed by IEC/EN 60335-2-69 with different materials and particle sizes.

#### Filterklassen

Filter classes	Max. permitted penetration value	Max. penetration value of Starmix filters	Tested to
<b>L</b>	≤ 1 %	--	--
<b>M</b>	< 0,1 %	0,02 % - Cellulose 0,03 % - Polyester	EN 60335-2 - 69
<b>H</b>	< 0,005 %	0,001 %	EN 60335-2 - 69
<b>HEPA</b>	siehe unten	0,003 %	EN 1822-1:1998 H14



Starmix Filterkassette  
FKP 4300 HEPA

So-called HEPA filters are divided into various filter grades in accordance with the European standard EN 1822-1. The filtration performance varies from 95% to 99.999%. The particle sizes used for testing are approximately 0,1 µm - 0.3 µm.

	H 10	H 11	H 12	H 13	H 14	H 15	H 16	H 17
Filtration level	≥ 85 %	≥ 95 %	≥ 99,5 %	≥ 99,95 %	≥ 99,995 %	≥ 99,9995 %	≥ 99,99995 %	≥ 99,999995 %

**! Fitting one of the filters described here will not turn a standard vacuum cleaner into a safety vacuum cleaner !**

### 1.3. Safety measures and regulations when dealing with fine dust that is harmful to health

The German Federal Ministry of Employment (Bundesministerium für Arbeit (BMAS)) issued new Technical Regulations for Hazardous Materials (abbreviated to TRGS 559) on 01.06.2010. In these regulations, the legislators state that machines and equipment must be operated in such a way that they release as little dust as possible.

Extract from TRGS 559:

...

#### § 4.8 Cleaning of the operating equipment

(1) Dust deposits are to be avoided. If this is not possible, workshops, work areas, transportation routes, operating equipment, machines and devices must be cleaned regularly. The cleaning work is to be carried out in such a way that the release and resuspension of dust is kept to a minimum, e.g. using state-of-the-art damp or wet processes, or extraction with suitable vacuum cleaners or dedusters.

(2) This is achieved e.g. when:

1. fixed vacuum cleaning systems, dust removing machines or equipment are used, 2. damp wiping or wet cleaning is carried out, 3. sweepings are adequately mixed with a binding agent (such as water, white oil, magnesium chloride) during sweeping and 4. sealed transportation routes are swept with sweeping machines and the sweepings are collected. (3) Dust removing machines and equipment, such as dedusters, industrial vacuum cleaners and vacuum sweepers, are suitable if their design has been tested by an approved testing body. They must correspond to dust class „M“ as a minimum.

(Für die Gefährdungsbeurteilung müssen für das System mindestens die in dem Pkt.7.8, aufgeführten Grenzwerte unterschritten bzw. eingehalten werden) ...

In addition, the Hazardous Materials Authorities of the regions of Bavaria, Berlin and Hessen, in collaboration with the Berufsgenossenschaft Energie und Textil Elektro Medienerzeugnisse (Professional Association for Energy and Textiles Electrical Media Products) and with the support of the Fachverbandes Elektrowerkzeuge im ZVEI - Zentralverband Elektrotechnik- und Elektro-Industrie e.V (Professional Association for Electrical Tools in the Central Association for the Electrical Technology and Electronics Industry) and the Berufsgenossenschaft für Bauwirtschaft (Professional Association for the Building Industry), have carried out a testing campaign in this area. By means of this joint campaign, the standard of equipment used in the electrical trade as protection in dust-emitting work on building sites was determined. The results were published in the final report of the GISBAU „Bewertung des Staubemissionsverhaltens handgeführter Maschinen und Geräte für die Bearbeitung mineralischer Werkstoffe“. Further there is a [Branchenregelung for electronic installations](#) „Staub bei Elektroinstallationsarbeiten“ (Dust in electrical installation work) and serve as the basis for the new industry regulation. The final report can be downloaded from: [www.gisbau.de](http://www.gisbau.de)  
The [Branchenregelung for electronic installations](#) from: [www.bgetem.de/praev/praev\\_gefahrstoffe.html#mauernut](http://www.bgetem.de/praev/praev_gefahrstoffe.html#mauernut)

Extract from the final report:

...

When using technical equipment, care should be taken to ensure that coordinated systems are used. If systems of this type are available on the market, they should always be used. (See the list in the Appendix) If coordinated systems are not available, it should be ascertained whether the manufacturer can supply a detection device to be used in combination with an approved deduster of dust class „M“....

**These industry regulations and the systems tested in them are only recommendations. Of course, by no means all systems have been tested. All Starmix special vacuum cleaners comply with the legal requirements and can be used to extract dust that is harmful to health with nearly any suitable power tools. If you have any questions, please contact your professional association, or ring us on: +49 (0)7153 / 982 - 317 or send an e-mail to: [spezialsauger@starmix.de](mailto:spezialsauger@starmix.de)**

### **How to protect yourself! (safety measures)**

1. Use low-dust materials !
2. Use low-dust processes !
3. Extract the dust directly at the location where it is created !
4. Ensure workshops are adequately ventilated !
5. Check and service dust collection machines and equipment at regular intervals !
6. Damp down dust with water !
7. Clean work areas and workshops at regular intervals !  
Use vacuum cleaners or sweepers - do not dry sweep !
8. Prevent resuspension or spreading of dust !

If, for technical reasons, the measures listed above cannot be carried out, personal protective equipment (face masks, etc) is to be worn.

#### **1.4. Technical testing standards for vacuum cleaners for dust class „M“ and „H“**

- Suitable protection against the penetration of water  
Equipment must meet protection class IP X4
- Parts that carry electricity must be out of reach
- Type plate specifying dust class M or dust class H
- Leakage current test at working temperature and in cold state
- Resistance to high voltage at working temperature and in cold state
- Resistance to moisture
  - Testing in damp room
  - Testing with spray water and jet water (depending on IP protection class)
  - Testing of overfilling of the reservoir
- Subsequent high voltage test
- Continuous testing
- Improper use
  - Test with blocked motor
  - Test for overfilling with blocked valve
- Design
  - Test of penetration value < 0.1 % (for M) < 0.005 % (for H)
  - Test of volume flow monitoring
  - Test of low-dust / dust-free disposal
  - Test for damage from sharp objects (upholstery nails)
  - Discharge velocity must not exceed max. 1 m/s (50 mm above the ground)
  - Main filter must be in the negative pressure area
  - Main filter must only be replaceable using tools (only for H)
  - No release of dust when the equipment is not in operation
  - Cover must be secure
- Complete shutdown
- Creepage paths and air gaps must not be too small
- Materials must be resistant to heat, fire and creepage current
- Materials must be resistant to corrosion. No hazardous substances must be released by the equipment.

#### **1.5. Additional technical testing standards for vacuum cleaners for dust class „H-Asbestos“**

- Type plate with details of airflow volume and weight
- Marking with „Asbestos“ adhesive label for vacuum cleaners and dust collection equipment
- Main filter category „H“
- The vacuum cleaner must be suitable to extract water by suction
- If particles can be deposited in the cooling air section and/or the bodyshell, the vacuum cleaner may only be used in the uncontaminated area if it has been completely decontaminated beforehand.

**! All safety vacuum cleaners must have a volume flow monitoring device to ensure a minimum air velocity of  $V_{min} = 20$  m/s !**

## 2 Starmix special vacuum cleaners

### 2.1. Vacuum cleaners for dust class „M“, „H“ and „H-Asbestos“

Schutzklasse I 	 ISP ARM-1435 EW	 ISP ARH-1435 EW	 ISP ARH-1035 Asbest EW
Article No.	01 11 10	01 17 76	01 19 36
<b>Technical data</b>			
Nominal capacity (max.)	watt 1400	1400	1000
Volume flow (max.)	l/s 42*	42*	42*
Vacuum (max.)	mbar 220*	220*	220*
Container volume (max.)	l 35	35	35
Power cable length	m 8 (rubber)	8 (rubber)	6 (rubber)
Sound level	db(A) 69	69	69
Dimensions	LxBxH 55 x 40 x 55	55 x 40 x 55	55 x 40 x 55
Weight	kg 13.0	13.0	13.0
<b>Equipment</b>			
Pulse filter cleaning	yes- with Permanent Clean	yes- with Permanent Clean	yes- with Permanent Clean
Appliance socket	yes	yes	yes
Preselection switch volume flow / hose Ø	yes / 27; 36; 38; 50	yes / 27; 36; 38; 50	yes / 27; 36; 38; 50
Filter controll lamp	yes	yes	yes
Signal tone	yes	yes	yes
Rotary switch for use of the PE bag	yes	yes	yes
Fastener for intake socket	yes	yes	yes
Gentle start / after-running	yes	yes	yes
Water level detection	yes	yes	yes
Antistatic prepared	yes	yes	yes
Push handle	no, (optional)	no, (optional)	no, (optional)
Accessories storage	yes	yes	yesa
<b>Filter</b>			
Main filter	FKP 4300 (Polyester) Dust retention: 99,99 %	FKP 4300 HEPA (Polyester) SDust retention: 99,995 %	FKP 4300 HEPA (Polyester) Dust retention: 99,995 %
Additional filter	Special PE bag	Special PE bag	Special PE bag
Fleece filter bag	(optional)	(optional)	(optional)
<b>Accessories</b>			
Module EW	suction hose (Ø 35mm; 5m) rubber sleeve (graduated)	suction hose (Ø 35mm; 5m) rubber sleeve (graduated)	suction hose (Ø 35mm; 5m) rubber sleeve (graduated)
BGIA Prüfnummer			

\* measured at the end of the hose

## 2.2. Types of vacuum cleaners

The BGIA distinguishes between two types of dust removal machines:

### - *Industrial vacuum cleaners*

Industrial vacuum cleaners are used exclusively to extract deposits of dust by suction.

### - *Dedusters for movable operation*

Dedusters for movable operation are used exclusively to extract suspended dust by suction, which is created in machining and processing materials, for example (with grinders, saws, drills)

**Starmix special vacuum cleaners are designed and equipped as combined industrial vacuum cleaners/dedusters!**

## 2.3. Advantages of Starmix special vacuum cleaners

### a) „Permanent Clean“ patented, permanent pulse filter cleaning

!! Filter cleaning during operation of the vacuum cleaner !! During operation of the vacuum cleaner, one of the two separate filter cassettes is always being cleared by the airflow and alternately cleaned by the tried and tested electromagnetic pulse filter cleaning technology, without any loss of performance.



- + demand-driven, permanent filter cleaning without loss of airflow
- + cleaning using electromagnetic pulses (unrivalled efficiency)
- + maximum productivity by avoiding unintended breaks in operation
- + saves time and money
- + filters are clear at all times

### b) Patented rotary valve in the intake port

!! Uses special PE collection bag thanks to the patented rotary valve !! Turning the rotary valve in the intake port of the container creates negative pressure between the inner wall and the bag. As a result, the special PE collection bag is sucked against the inside wall of the container. This shows how the special PE dust collection bag is sucked against the inner wall of the container.



Position I: for special PE collection bag

Position II: for fleece filter bags

- + PE sacks and filter bags can be used  
(only with special vacuum cleaners for class M, H and H Asbestos)
- + clean, safe dust extraction
- + safe disposal of fine dust containing minerals
- + special PE collection bag has a capacity of up to 20 kg of dust  
(corresponds to 3-4 fleece filter bags)
- + with the special PE collection bag, the dust can be shaken  
from the filter cassettes directly into the bag

### c) Intelligent electronics

#### + Elektronische Anlauf- und Nachlaufelektronik

A microprocessor controls the smooth start-up and subsequent operation of the vacuum cleaner. The start-up current is reduced to protect the motor fan and safety fuse. And when the vacuum cleaner is switched off, the suction hose is sucked clean.



#### + water-level monitoring with electronic sensor cut-off

As soon as the maximum fill level for the water vacuum is reached, the vacuum cleaner switches off automatically.

### d) Antistatic prepared

As a result of the extremely high velocity of the dust particles and the resulting friction, electronic charges are always being created in the suction hose and are discharged in the form of sparks. These discharges lead to unpleasant electric shocks and the sparks can ignite explosive substances.



The antistatic preparation of Starmix safety vacuum cleaners makes it possible to discharge static electricity by means of the anti-static vacuum hose.

#### + no dangerous creation of sparks

#### + no unpleasant electric shocks

#### + earthed suction hose prevents dirt from accumulating

### e) Appliance socket with automatic starting

!! For use with power tools !!

#### + dust and chips are extracted as they are produced.

Whenever the connected power tool is started up or shut down, the vacuum cleaner switches on or off automatically and only runs for as long as it is needed. This saves energy.



### f) Unique filter concept

#### o optimal filter position parallel to the motor axis

#### o 2 x 4300 cm<sup>2</sup> filter surface area

#### o extremely robust filter construction

#### o optimised, certified filter material with a dust retention capacity of 99.999 %.

BGIA certified filters for dust classes „M“ and „H“.

#### + filter is protected by its positioning, thereby preventing damage

#### + extremely powerful dust extraction by the filters

#### + perfect cleaning results

#### + low system costs thanks to longer filter lifetimes

#### + protects your health



## **2.4. Special operating features of Starmix special vacuum cleaners**

### **a) Dust disposal**

The filter bags and cassettes contaminated with dust must normally be treated as special waste and must be disposed of accordingly. The relevant national regulations and laws must be observed during disposal.

### **b) Maintenance of equipment**

In accordance with TRGS 519 (§7.2 paragraph 7), equipment of category ÒH AsbestosÓ must be serviced as required, but at least once a year, by a company approved and certified under the Ordinance on Hazardous Substances, and repaired as necessary.

For this purpose, we have set up a servicing agreement for Starmix „H-Asbestos“ vacuum cleaners with the following company:

SES Sanierungs- und Entsorgungssysteme GmbH  
In der Struth 16  
65620 Waldbrunn-Fussingen  
Tel. 06479/91082  
Fax. 06479/91084  
e-mail: [info@ses-germany.de](mailto:info@ses-germany.de)

There are no special maintenance regulations for special vacuum cleaners in categories „M“ and „H“.

**ELECTROSTAR GmbH**  
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