

Good products taken to the next level

ACO Passavant floor gully



The ACO system chain creates the drainage solutions needed for tomorrow's environmental conditions

The increase in extreme weather conditions requires more complex approaches to water drainage. ACO provides smart system solutions which work in both directions: they protect people from water - and vice versa. Each ACO product within the ACO system chain sends the water in the right direction, with the aim of being able to recycle it in a way that makes sense both ecologically and economically.

Within the ACO group it is ACO Haustechnik which supports the overall system chain, and combines system solutions for drainage, separation and pumping in order to create total drainage solutions for buildings.





collect

Collect and store

- Ground drainage
- Bathroom drainage
- Roof drainage
- Multi-storey parking deck drainage
- Balcony and terrace drainage
- Pipe systems



clean

Pre-clean and treat

- Grease separators
- Starch separators
- Light oils separators
- Process technology



hold:

Keep away from and

hold back

■ Backflow systems



release:

Pump, drain and re-use

- Lifting plants
- Pumping stations



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Cast iron material

Is cast iron an outdated material? And if so, why is it still around?

Because cast iron is more than just a proven material; it is not an artificial but a natural, recyclable material. It is non-flammable, robust and durable, which is why it has prevailed in drainage technology for centuries.

Drainage products made of cast iron are used nationally and internationally on streets, roads and squares and have proven themselves also in buildings innumerable times.

Their applications range from airports to public and commercial real estate such as clinics and hotels to private applications. Cast iron is an ideal material particularly in buildings which are subject to heavy strain and require a long service life.

The future of drainage is rooted in tradition

In Germany Passavant is the cradle of professional drainage technology. Back in 1890, the production of sewer castings was initiated at Passavant in close cooperation with the English engineer Lindley, who was commissioned to plan and build sewage systems for the cities of Hamburg and Frankfurt.

Passavant developed the first drainage parts for this project.

The first sewer castings catalogue, which contained over 1,000 drainage products by the turn of the 20th century, was also created at that time.

As early as 1895, cast iron floor gullies were manufactured, continuously refined and developed to a very high technical level at Passavant.

The company's commitment to combine modern technology and market-driven innovation was renewed when it was acquired by the ACO Group in 2000. This development has culminated in a product which is named after its inventor and is a synonym for drainage: the ACO Passavant floor gully.



Molten cast iron in an electric furnace



Insertion of the sand core



Sampling of the molten mass for spectral analysis



Sampling of cast iron for quality assurance



The finished cast: the ACO Passavant floor gully



ACO Passavant floor gully

Fire protection

The cast iron material belongs to building material class A1, Building material class A1 which is why no additional fire risk is introduced into the building with the ACO Passavant floor gully. The ACO fire protection set and smoke block guarantee maximum safety.

Technical specifications

- non-combustible material (building material class A1), melting point: 1,150°C
- Fire protection from above and below (R 30 R 120)
- Fire protection with smoke block without water seal
- from a ceiling thickness of 100 mm and above



Sound protection

In these fast-paced and often very noisy times, peace and quiet has become a fundamental requirement. This makes the integrated sound protection in the drainage all the more important. The ACO Passavant floor gully is designed in such a way that its components are completely decoupled to isolate noise.

Technical specification:

- Noise level L_{AFmax} ≤ 22 dB(A) that meets VDI 4100:2012 for the highest noise protection level (SSt III) for all processes
- high density cast iron material
- Integrated sound protection as standard



Odour protection and

hygiene

Odours can be a penetrating problem. With the ACO Passavant floor gully, a highly flexible membrane closes the access to the sewers acting as an odour and smoke block in addition to the water storage and only opens when water runs into it. Die schmutzabweisende Easy-to-clean Beschichtung sorgt für eine einfache Cleaning

Technical specifications

- Odour protection
 - odour sealed without water seal.
 - no mechanical parts
 - convertible and retrofittable
 - self-cleaning
- Hygiene
 - dirt-repellent, easy-to-clean coating

Assembly

The cast iron material has high compressive strength, which means the gully bodies can withstand pressure loads on a permanent basis. The new gully bodies require only one core bore of 160 mm in diameter.

Technical specifications

- simple installation by means of 160 mm
- secure assembly of the backflow safety valve using firmly positioned retaining and ring seal
- permanently withstands high loads
- flat flange



Safety through non-flammable material

DIN 4102-1 defines building material classes and specifies the official technical designation. With due regard to additional requirements, the adjacent classification is based on these definitions (see table). The ACO Passavant floor gully is made of non-flammable cast iron material.

It is a material

- of building material class A1 as defined in DIN 4102-1 and also DIN EN 13501-1
- with high compressive strength
- with an expansion coefficient similar to concrete
- which is completely recyclable
- which has proven itself in drainage technology for centuries

building material classes as defined in DIN 4102-1	Building Supervisory Name
A1	Non-flammable
A2	Non-flammable
B1	Low-flammable
B2	Normally inflammable
В3	Easily inflammable

- Currently only metallic materials of the floor gullies meet the requirements of building material classes A1 and A2. Metallic composite materials and plastics are assignable to the building material classes B1 B2.
- Every technical planner should strive to reduce the fire load in buildings as much as possible.

The ACO Passavant fire protection floor gully

The choice of material reflects the usability of the gullies for demanding requirements. Furthermore, the respective safety components are developed with consistent regard to the current state of technology. The suitability for fire protection was proven for the ACO Passavant floor gully with a fire rating of 30-90 or 120 minutes by fire protection tests as a basis for General Building Supervisory Authority approval (Gen. Build. Sup. Appr.).

For example when the gully is designed with a 90° socket inclination, active fire protection is achieved through the interaction of five components.

- 1 The housing of these floor gullies is absolutely non-flammable, building material class A1.
- 2 The foul odour trap with heat shield is automatically sealed against fire and smoke in the event of fire exposure from above (fire protection from above).
- 3 The fire protection cartridge in the outlet socket is automatically activated when a fire occurs below the ceiling. This prevents fire and smoke from entering the next storey (fire protection from below). A plastic coating protects the intumescent mass from the waste water
- 4 If in the event of fire the water storage in the floor gully is partially depleted, the smoke block (optional additional component) prevents the smoke from spreading until the fire protection cartridge is activated. The fire resistance class R 120 is achieved with a firmly grouted floor gully (minimum ceiling thickness 150 mm).
- 5 The Fit-in installation kit is used for core bores from a ceiling thickness of 100 mm.





"The issue of fire protec is frequently undere

Preventive fire protection in technical building equipment is still a controversial issue and poses a real liability risk for the trades involved in the construction project.

The requirements of preventive fire protection are stipulated in the respective state building code of the individual federal states of Germany as minimum requirements subject to public law for protection of life and limb during the use of buildings of all kinds.

These protective goals formulated in planning and building laws place high demands on the coordination and planning of increasingly complex buildings. However, practice clearly shows that inadequate coordination and insufficient detail planning are the rule.

Parallel to these processes, the requirements regarding the technical interior construction, e.g. sound, fire and moisture protection, of buildings of all kinds are changing as well. Particularly in drainage technology, the combination of different materials results in mixed-metal systems combined with open drainage systems. This leads to higher requirements with regard to preventive fire protection.

As defined in DIN EN 12056 "Drainage systems inside buildings", floor gullies are one of the starting points of a drainage system. Therefore the material combinations of the drainage system must be consistently considered with regard to fire protection.

In compliance with the German Wiring Systems Directive, section 4.1, the following combinations can be implemented with classified barriers:

- Non-flammable drainage lines including non-flammable connecting cables and barriers with Gen. Build. Sup. Test/Gen. Build. Sup. Appr. as the starting point of the drainage system
- Flammable drainage lines including flammable connecting cables and barriers with Gen. Build. Sup. Appr. (fire protection sleeves) and flammable and non-flammable floor gullies with Gen. Build. Sup. Appr. as the starting point of the drainage system
- Mixed-metal systems, e. g. with non-flammable down trains and flammable connecting cables and barriers for mixed-metal systems with Gen. Build. Sup. Appr., and flammable and non-flammable floor gullies with Gen. Build. Sup. Appr. as the starting point of the drainage system

In compliance with the German Wiring Systems Directive, section 4.3 "Exemptions", the following combinations can be implemented with classified barriers:

Non-flammable drainage lines including non-flammable connecting cables (minimum length 500 mm) and cable bushings as defined by the exemptions of the German Wiring Systems Directive and non-flammable floor gullies with Gen. Build. Sup. Test/Gen. Build. Sup. Appr. as the starting point of the drainage system



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Manfred Lippe , chartered engineer, publicly appointed and sworn expert on structural and plant-specific fire protection and on the fitter, heating installer and ventilation fitter trades

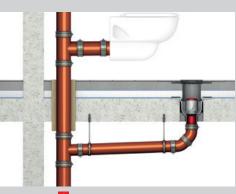
For all four named installation variants, the suitability for fire protection of ACO Passavant floor gullies with a fire rating of 30 – 90 or 120 minutes was proven by means of fire protection tests as a basis for General Building Supervisory Authority approval (Gen. Build. Sup. Appr.).

The figures below (Fig. 1-3) provide an overview of the protective goal assessment for three installation principles with classified barriers combined with preventive fire protection.

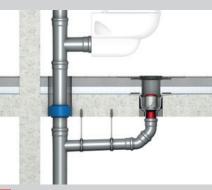
The principles of design and testing regarding the proof of usability for all barriers combined with mixed-metal systems (type 3) specified by the German Institute for Building Technology (DIBt) have been applicable to planning and assembly since 1 January 2013. The barrier types Type 1 and 2 will remain unchanged.

Both system requirements for the "pipe and floor gully" barriers must be harmonised by the technical planner with the protective goals under building law "fire protection, sound protection and hygiene" and the structural conditions on site. A design which meets the protective goals under building law can be achieved only if this responsibility is consistently recognised by the technical planner.

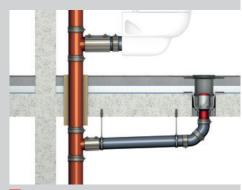
Manfred Lippe www.MLPartner.de







2 Flammable drainage lines



3 Mixed-metal systems

Fire barriers

The following figures show the function of the two fire barriers (foul odour trap with heat shield and fire protection cartridge). In the normal operating state waste water flows freely through the foul odour trap with heat shield into the waste water line.

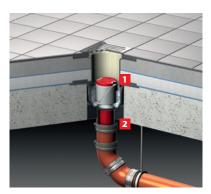
In the event of fire below the ceiling, hot temperatures of up to 1,000° C can develop. As a result, the intumuscent material in the fire protection cartridge is activated and

seals the floor gully to prevent fire and smoke from spreading to the next storey. During the closing period, the water storage prevents smoke passage until the gully is sealed off by the fire protection cartridge.

The use of an odour and smoke block are recommended in gullies where water is rarely drained and the water storage can evaporate. It prevents smoke passage into

the next storey instead of the water storage.

If a fire occurs above the floor gully, the foul odour trap with heat shield automatically seals off the ACO Passavant floor gully against fire and smoke.



ACO Passavant floor gully with fire protection kit



ACO Passavant floor gully with activated fire protection cartridge against fire from above



ACO Passavant floor gully with activated heat shield in the foul odour trap against fire from above

- 1 Foul air trap with heat shield
- 2 Fire protection cartridge

Fire protection classifications

ACO Passavant floor gullies ND 50 – ND 100, 90° socket inclination:

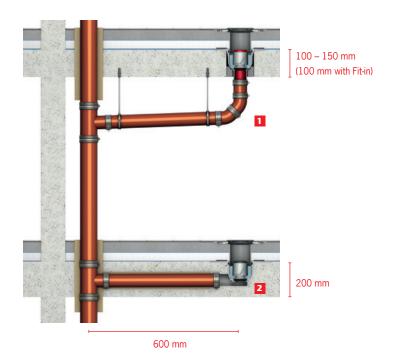
minimum ceiling thick- ness [mm]	Nominal width	Grouted	with Fit-In	Fire resistance class
100	ND 50	-	Х	R 30 – R 90
100	ND 70	-	Х	R 30 – R 90
100	ND 100	_	Х	R 30 – R 90
150	ND 50	Х	Х	R 30 – R 120
150	ND 70	Х	Х	R 30 – R 120
150	ND 100	Х	Х	R 30 – R 120

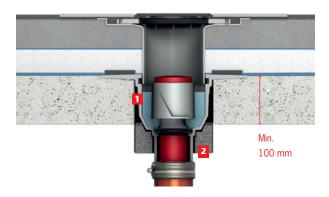
ACO Passavant floor gullies ND 50 – ND 100, 1.5° socket inclination (floor gully at least 600 mm away from downpipe):

minimum ceiling thick- ness [mm]	Nominal width	Grouted	Fire resistance class
200	ND 50	Х	R 30 – R 120
200	ND 70	Х	R 30 – R 120
200	ND 100	Х	R 30 – R 120

The ACO Passavant floor gullies are available in two versions:

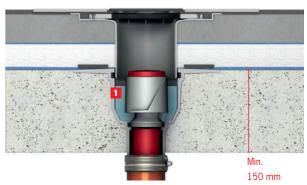
- With 90° socket inclination if the connecting cable is installed below the ceiling. In this case the floor gully is equipped with the fire protection kit.
- With 1.5° socket inclination if the connecting cable is installed below the ceiling. For this version the ceiling thickness must be at least 200 mm, and the floor gully must be installed 600 mm away from the downpipe. Under these conditions a foul odour trap with heat shield is not required.







- 1 ACO Passavant floor gully
- 2 ACO Fit-in



ACO Passavant floor gully ND 70, 90° socket inclination firmly grouted, with ACO Fit-in, ceiling thickness 150 mm





Integrated sound protection

Sound protection without additional components

In these fast-paced and often very noisy times, peace and quiet has become a fundamental requirement. Modern buildings must therefore also meet much higher sound protection requirements whose implementation is frequently enforced by legal action retrospectively.

Sound protection also plays an important role in drainage technology which must meet much higher standards in private as well as public areas. The ACO Passavant floor gully complies with current regulations such as VDI 4100 and is at highest sound protection level (SSt III).

Sound protection which helps to promote reliable and effective reduction of structure-borne noise is already integrated at the factory. It is ensured by the high density of the cast iron material as well as structurally integrated sound isolation systems.

Therefore sound protection integrated at the factory means that the specialised tradesman can carry out the easy and fast assembly of ACO Haustechnik products without any additional expenditure for sound technology and without any additional components at the building site.

For the planner it means that he can rely on maximum safety during the planning phase.

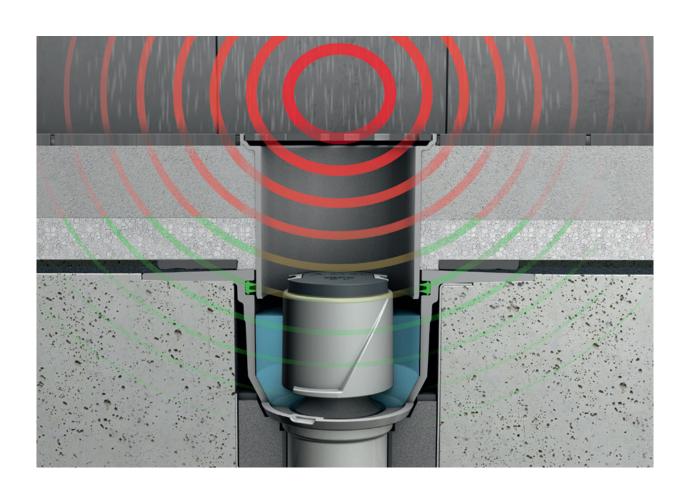
Because the ACO Passavant floor gullies have special sound protection properties, the complete product range can be used without hesitation in sensitive objects such as hospitals, hotels or senior residences.

Benefits

- high density cast iron material
- Sound pressure level LAF max ≤ 22 dB(A) for all designs
- at the highest sound protection level (SST III) as per VDI 4100:2012
- Sound protection integrated at the factory – can be assembled on site without additional components

Tested by:





"Sound protection in buildings – a performance goal in contracts for

In the field of sound protection, comprehensive technical regulations are accompanied by proven and well-conceived solutions for sound technology which only need to be planned and properly implemented.

In these fast-paced and often very noisy times, peace and quiet in one's own home and living area as well as in public areas such as hotels, schools and clinics has become a fundamental requirement for many people which is perceived very consciously and whose implementation is demanded insistently.

Excellent examples of well-conceived solutions are the cast iron Passavant floor gullies from ACO Haustechnik, which only need to be planned and properly installed.

However despite these good conditions, in no other area of construction or of building modernisation/renovation and the required building technology systems and installations are there so many discussions, complaints and legal disputes through all levels of jurisdiction up to the Federal Court of Justice (BGH) than in sound protection.

In the following it is shown that it is only apparently difficult and actually relatively easy to find solutions for "sound protection in construction architecture and in technical building equipment systems", although the explanations are restricted to the questions and problems which arise in connection with noises in the waste water area. First of all, it is essential that sound protection is stipulated in contracts for work and services according to the Construction Tendering and Contract Regulations (VOB/B) or the German Civil Code (BGB) and the bindingly stipulated acoustic parameters are met. DIN 4109 has been used as the standard regulation for sound protection until today.

In a leading decision of the Federal Court of Justice in 2009, it was initially pointed out that DIN 4109 is an "Established Technical Building Regulation"(ETB) and is therefore applicable to the public-law sector.

However it was also clearly stated in the decision of 4 June 2009 (File number VII Central register 54/07) that this standard has become totally meaningless for the civil-law sector because as a rule it is not possible to achieve sound pressure levels in currently accepted quality and comfort standards so that the standard cannot be effectively stipulated in contracts for work and services.

People's current needs for improved sound protection in residences and buildings are – according to the decision of the Federal Court of

Table 1 Admissible sound pressure levels in rooms in need of protection for noises from technical installations in residential buildings and commercial operations (according to Table 4 of DIN 4109/A1)

Noise source	Characteristic acoustic value	Type of rooms in need of protect	
	Sound protection level in dB(A)	Living space and bedrooms	Classroom and workrooms
Water installations (water supply and waste water plants together)	L _{In}	≤ 30 ^{a,b}	≤ 35 ^a
Other technical installations in residential buildings Systems	- L _{AFmax}	≤ 30 °	≤ 30 °
Businesses in the daytime from 6:00 a.m. to 10:00 p.m.	L _{AFmax}	+ 35	\leq 30 c
Businesses during the night from 10:00 p.m. to 6:00 a.m.	L _{AFmax}	+ 25	≤ 30 °

- ^a Single, brief peaks which occur during operation of fittings and equipment according to Table 6 of DIN 4109 (opening, closing, switching, stopping etc.) currently do not have to be taken into account.
- b Conditions in contracts for work and services for compliance with the admissible installation sound pressure level.
- c In ventilating systems, 5 dB(A) higher values are admissible if the noises are continuous noises without noticeable single tones.

very important work and services"



Bernd M. Hanel, chartered engineer, independent expert on heat, moisture, sound and fire protection

Justice (BGH) – illustrated more appropriately by VDI 4100 "Sound protection in residences" in the sound protection levels SSt II and SSt III. These higher requirements also apply to buildings such as hotels, clinics and senior residences.

In other words, with regard to acoustic performance goals, it is required to exactly distinguish whether only the minimum requirements according to DIN 4109 or the requirements for increased, modern sound protection according to VDI 4100 must be met. When a building, a residence or only one component of the building technology is given the rating "Comfort" or "Integrated sound protection", it must consequently meet the requirements for sound protection level SSt II or even SSt III of VDI 4100.

That is the only way to meet the requirements and expectations of building and residence owners and to maintain the expected acoustic quality or promised suitability for use.

In the waste water area, not only sewage pipes, roof drainages, bath and shower tubs but primarily floor gullies are required. However free-fall flows, water gushing out of tapping points, water jets hitting floor gullies in tiled showers, etc. make the waste water area very hard to handle due to excitation and transmission of struc-

ture-borne noise. That means floor gullies not only have to guarantee fire protection properties and durable, sustainable stability and functional reliability but also must have integrated sound protection. Every single detail matters because even the tiniest sound bridge can noticeably reduce the isolation of structure-borne noise in the waste water area from the structure by up to approx. 10 dB(A) or increase sound transmission.

The ACO Passavant floor gullies were tested at the well-known Institute for Building Physics of the Fraunhofer Society in Stuttgart. Acoustic test certificates, which can be included in the sound technology installation plans and specifications as proof of usability, are available. The sound pressure levels of the ACO Passavant floor gully for all dimensions are ≤ 22 dB(A) and therefore meet the SSt III of the new VDI 4100 : 2012.

Dr. Bernd M. Hanel

Table 2 Characteristic values of sound protection levels in multiple-family dwellings (excerpt from VDI 4100: 2012)

Sound protection criter	rion	Characteristic acoustic value in dB(A)	SSt I or SSt EB I	SSt I or SSt EB I	SSt III
Multiple-family dwelling	gs				
Building technology systems (including wa- ter supply and waste water plants together)	Multiple-family dwelling	L _{AFmax, n} T	+ 30	+ 27	+ 24
Duplexes and terraced	houses				
Building technology systems (including wa- ter supply and waste water plants together)	Duplexes and terraced houses	L _{AFmax, nT} a	+ 30	+ 25	+ 22

^a Single brief noise peaks which occur during operation (opening, closing, switching, stopping, etc.) of fittings and equipment of water installations should not exceed the characteristic values of SSt II and SSt III by more than 10 dB(A). Normal usage is assumed.





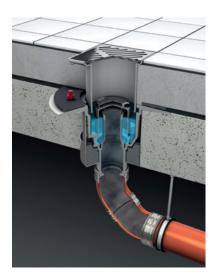
Odour protection

Odours – a penetrating problem

People can differentiate between 10,000 odours. The active area of the olfactory glands is not larger than that of two 1 cent coins. The olfactory sense is completely developed even in newborns. In all living creatures the primary function of the olfactory sense is connected with the identification of food. The olfactory and gustatory senses

work closely together and are directly connected to the brain and nervous system. This also serves the protection of the respiratory system. The olfactory sense always functions and cannot be "switched off". An odour cannot be avoided, and based on associations partially stored in the subconscious mind, an odour is directly classified as pleasant or unpleasant.

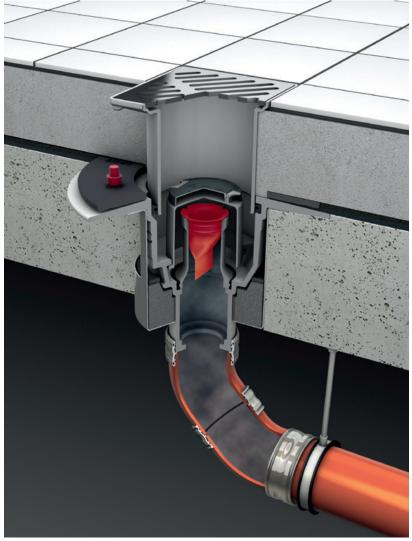
Particularly in areas open to the public, an odour problem can quickly lead to the restriction of the use of rooms or circulation areas.



Foul odour trap with water storage



Dry foul odour trap



Odour and smoke block: no odour problem despite dry foul odour trap

Odour and smoke block

The standard DIN EN1253 defines a water storage quantity of 50 mm as a necessary safety barrier against the sewage system for a floor gully. Naturally all foul odour traps in the Passavant series with or without fire protection meet this requirement. Therefore all legal requirements for the safe planning of a building are met. In practice it can however occur that a floor gully is not used regularly. Typical applications can be, for example, emergency showers and rooms with air conditioning units. In areas where occasional damp cleaning is sufficient, the water storage in the gully is not regularly replenished either. and it can be depleted by evaporation. To prevent the penetration of sewer gases, sometimes a temporary seal (e.g. plastic bag) is placed below the grating as a stopgap. Such solutions not only make a poor optical impression but also inhibit the actual function of the gully: the intake of water.

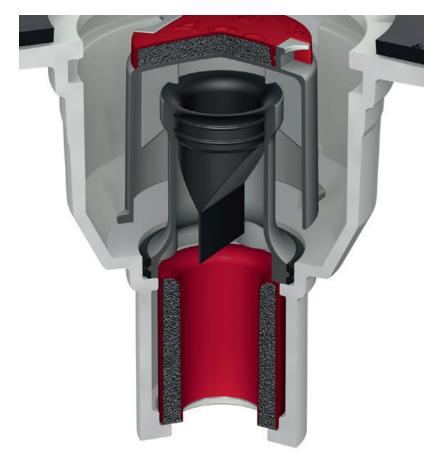
ACO Haustechnik has therefore developed a self-cleaning odour and smoke block for all gullies in the Passavant series. A highly flexible membrane closes the access to the sewage system without any mechanical parts and only opens when water runs into it, thus ensuring full protection against sewer gases even without water storage. In the event of fire, the system also prevents smoke from spreading until heat development has activated the fire protection function in the ACO Passavant floor gully.

The odour and smoke block proves itself immediately after installation of the gully. Drainage technology is frequently not used during the interior construction phase. Nevertheless rooms are often heated intensively to speed up drying. When they are used regularly, the odour and smoke block can be retrofitted at any time.

If during later use additional odour protection proves to be necessary, an existing ACO Passavant floor gully can quickly be retrofitted with the odour and smoke block without any tools.



Top: Odour and smoke block Right The odour and smoke stop can be used with or without a fire protection kit



Hygiene

Cast iron material and easy-to-clean coating -

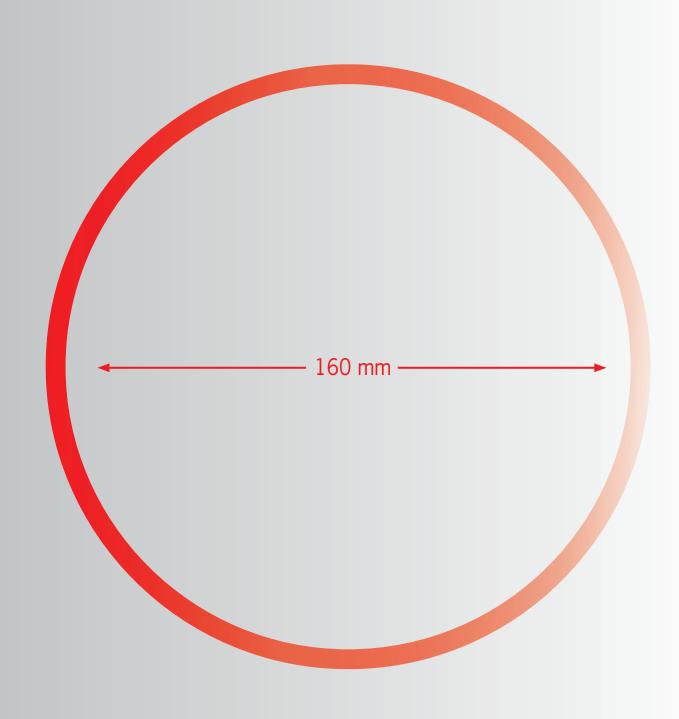
a powerful combination

To eliminate annoyance caused by sewer gases as well as dirt deposits, ACO Haustechnik combined durable cast iron material with a special easy-to-clean coating. The easy-to-clean powder is applied in a coating process at over 200° C. The technology has proven itself in medical technology and also in components exposed to the elements such as parking meters and letter boxes.

In tests carried out by an independent test institution, the average dirt removal after exposure time of 25 minutes was tested (test certificate located at: Whilst only 15% of the dirt can be removed from an untreated surface, up to 80% of the soiling can be removed from cast iron gullies with an easy-to-clean surface by simply rinsing it off.



ø 1 6 0 mm



Assembly-friendly

Small 160 mm core bore diameter

Supply cables as well as supply and disposal lines are unavoidable in commercial and private buildings. Sound and fire protection requirements are frequently neglected on site in the required ducts and openings. That can lead to severe defects or deficiencies in the construction, or in the event of fire even to danger to life and limb. A specialised tradesman can usually drill core bores up to Ø160 mm in diameter using manual core drills. Particularly in building renovation and modernisation, core bore drilling is an excellent alternative to time-consuming chiselling work. Core bore

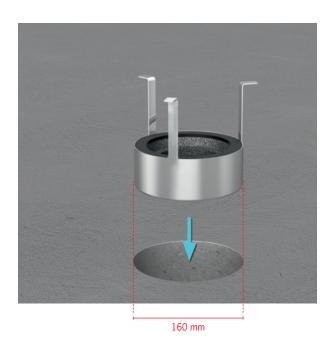
drilling is vibration-free, quiet and virtually dust-free, so it is possible to continue building operation during the work.

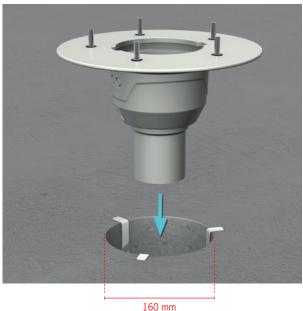
Another benefit of core bore drilling is its high dimensional accuracy.

The entire ACO Passavant ND 50 – ND 100 floor gully range is adapted to the 160 mm core bore combined with the Fit-in.

Benefits

- Small Ø 160 mm core bore diameter for all floor gullies
- Quick and easy assembly without reworking





Easy sealing

The ACO Fit-in installation kit enables easy, tool- and mortar-free core bore sealing. There are no waiting times due to concrete formwork and mortar drying times which delay pipeline connection.

The ACO Fit-in installation kit ensures easy and safe fulfilment and implementation of installation requirements with regard to fire protection technology.

Benefits

- Tool-free and mortar-free core bore sealing
- No waiting times during installation due to concrete formwork and drying times
- Easy and safe implementation of installation requirements with regard to fire protection technology



Easy

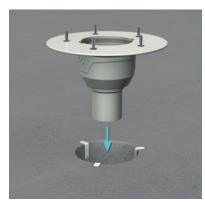
All ACO Passavant floor gullies – with an adhering flange or a clamping flange – feature a smooth flange underside and a flat flange design, so no additional chiselling work is required. The floor gullies can be installed directly into the concrete ceiling.

Benefits

- High inherent stability
- Rib-free flat flange (8 mm)
- No additional chiselling work required



Smooth flange underside



Easy assembly



No additional chiselling work

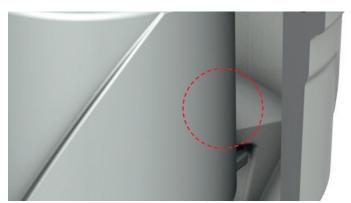


A groove integrated all around the gully body ensures that sealing ring or retaining are firmly fixed and that neither ring can be moved when the top section is inserted, thus guaranteeing reliable assembly.

Benefits

- The sealing ring as well as the retaining ring are firmly fixed and facilitate insertion of the top section
- Prevention of leaks





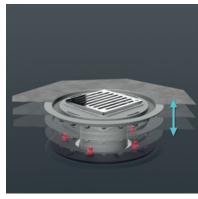
Secure grip thanks to firmly fixed sealing ring

Flexible

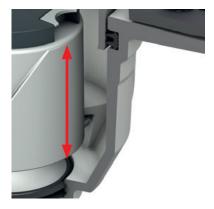
The same continuous height adjustment of the top section is possible with a vertical or also horizontal floor gully version.

Benefit

Ample height adjustability of the top section



Height adjustability







Product overview for ACO Passavant floor gully



Gully bodies

32

Floor gullies with a modular design are gully constructions that can be adapted to existing or planned floor structures by using continuously height adjustable top sections.

Thanks to this flexible combination, it is possible to choose the optimum configuration for every floor structure/floor covering.

The dirt-repellent, easy-to-clean coating makes cleaning the floor gully very simple.



Top sections

38

The selection of the top section which is placed on the floor gully depends on the type of floor structure, the required load class and optional selection of floor sealing.

The top sections must be selected for compound sealing or sealing by floor covering depending on the floor structure; a slip-proof finish is also possible for top sections for compound sealing or foil sealing.

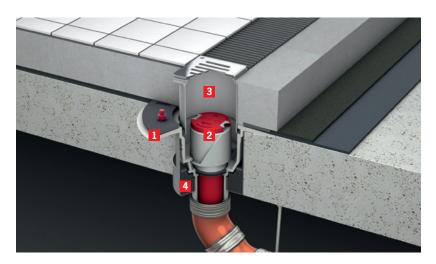


Accessories 43

The fire protection kit can optionally be used to achieve the necessary structural conditions in order to meet fire protection requirements.

During the assembly of vertical gullies, the assembly effort can be minimised by using a Fit-in installation kit.

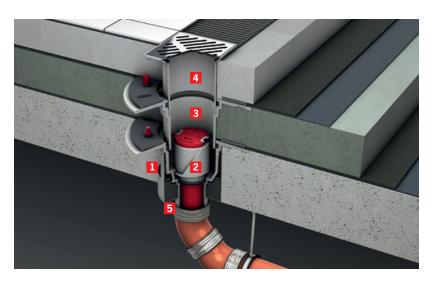
Extension pieces enable levelling in very high floor structures. They can optionally be used to seal an additional sealing membrane or to connect an inlet line.



Call for tender text

ACO Passavant floor gully ND 70 floor gully coated in white epoxy according to DIN EN 1253 Non-flammable according to Building material class A1 Tested noise insulation according to VDI 4100:2012 ≤22 dB(A) With easy-to-clean coating With clamping flange and earth connection With fire protection kit and Fit-in For core bores 160 mm in diameter With MEKU top section, with stainless steel frame and grating, screwed

1 5171.60.20 **2** 5170.10.35 **3** 5150.81.22 **4** 5170.10.60



Call for tender text

ACO Passavant floor gully ND 70 floor gully coated in white epoxy according to DIN EN 1253 Non-flammable according to Building material class A1 Tested noise insulation according to VDI 4100:2012 ≤22 dB(A) With easy-to-clean coating With clamping flange and earth connection With upper part With fire protection kit and Fit-in For core bores 160 mm in diameter Stainless steel top section with slot grating, screwed

1 5171.60.20 **2** 5170.10.35 **3** 5145.57.50 **4** 5141.89.22 **5** 5170.10.60



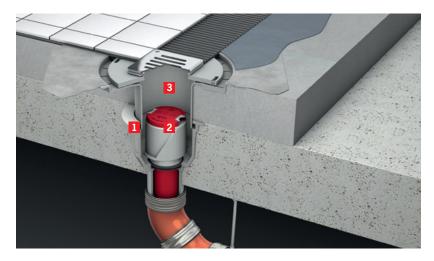
1 5571.60.20 **2** 5570.10.35 **3** 5141.86.22 **4** 5570.10.60

Call for tender text

ACO Passavant floor gully ND 100 floor gully coated in white epoxy according to DIN EN 1253 Non-flammable according to Building material class A1 Tested noise insulation according to VDI $4100:2012 \le 22$ dB(A) With easy-to-clean coating With clamping flange and earth connection With fire protection kit and Fit-in For core bores 160 mm in diameter Top section for PVC floor covering

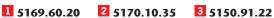
ACO

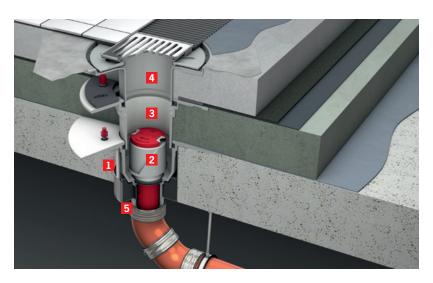
Suggested installations for thin bed sealing



Call for tender text

ACO Passavant floor gully ND 70
Cast iron white epoxy coating
conforms to DIN EN 1253
Non-flammable according to
Building material class A1
Tested noise insulation according to
VDI 4100:2012 ≤ 22 dB(A)
With easy-to-clean coating
With bracket and earth connection
With fire protection kit
For core bores 160 mm in diameter
AV-Selecta MEKU top section, screwed
Screwed

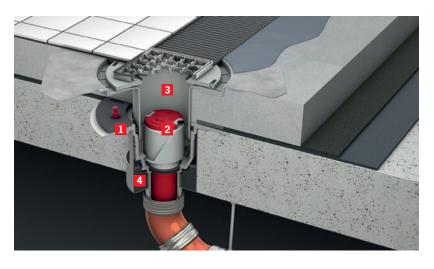




Call for tender text

ACO Passavant floor gully ND 70 Cast iron white epoxy coating conforms to DIN EN 1253 Non-flammable according to Building material class A1 Tested noise insulation according to VDI 4100:2012 \leq 22 dB(A) With easy-to-clean coating With adhering flange and earth connection With upper part With fire protection kit and Fit-in For core bores 160 mm in diameter AV-Selecta top section, lockable

1 5170.60.20 **2** 5170.10.35 **3** 5145.57.50 **4** 5141.91.22 **5** 5170.10.60



Call for tender text

ACO Passavant floor gully ND 70
Cast iron white epoxy coating
conforms to DIN EN 1253
Non-flammable according to
Building material class A1
Tested noise insulation according to
VDI 4100:2012 ≤22 dB(A)
With easy-to-clean coating
With clamping flange and earth connection
With fire protection kit and Fit-in
For core bores 160 mm in diameter
AV-Selecta top section
with mesh grating

1 5171.60.20 **2** 5170.10.35 **3** 5141.97.22 **4** 5170.10.60



Range overview

Top sections for conventional sealing









Art. No. 5150.87.22

Art. No. **5141.81.22**

Art. No. 5141.89.22

Art. No. **5141.92.22**

Accessories Foul air trap



Art. No. **5128.10.55**



Fire protection set

Art. No. (ND 50) 5150.10.35 Art. No. (ND 70) **5170.10.35** Art. No. (ND 100) **5570.10.35**



Odour and smoke block

Art. No. **5128.10.75**

Gully body ND 50

Bracket Adhering flange Clamping flange

Art. No. **5150.10.20**

Art. No. **5150.60.20**

Art. No. 5149.10.20 Art. No. 5149.60.20

°06

1.5°

Socket inclination



Art. No. 5150.30.20 Art. No. **5150.80.20**

Art. No. 5151.10.20 Art. No. 5151.60.20



Art. No. 5151.40.20 Art. No. **5151.90.20**

Bracket

Art. No. **5169.10.20** Art. No. **5169.60.20**



Art. No. 5169.20.20

☐ Art. No. **5169.70.20**



☐ Art. No.

Art. No.

☐ Art. No.

ND

Adhering

Paint finish

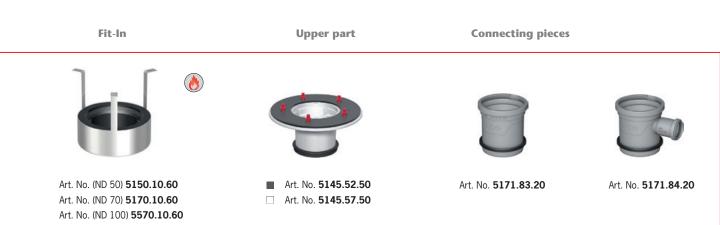
□ Coated in white epoxy

Art. No. **5149.30.20**

Art. No. 5149.80.20

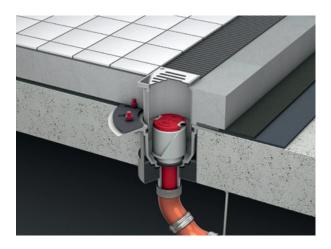
Top sections for thin bed sealing







Gully body ND 50, socket inclination 90°



ACO product benefits

- Building material class: A1
- Tested and practical fire protection solutions
 - ☐ Minimum ceiling thickness for Fit-in installation: 100 mm
- Sound protection tested to DIN EN 4109/VDI 4100:2012
 - Sound pressure level: $L_{AFmax} \le 22 \text{ dB(A)}$
- Core bore: 160 mm diameter

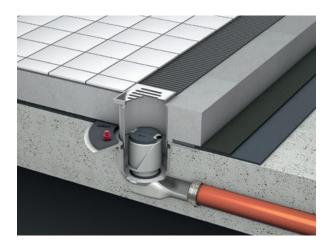
Product information

- Material: Cast iron, material grade EN-GJL-200
- GTested according to: DIN EN 1253
- Fire protection: Fire resistance class R 30 R 120 tested, Gen. Build. Sup. Appr. requested*
- Odour protection: optional accessory Passavant odour and smoke block
- Surface: Coated in white epoxy
- Sealing membrane connection: Connects to all widely available sealing systems
- Pipe connection SML according to: DIN EN 877

		Flange design	Recess	Flow rate	Surface	Item number
			[mm]	[l/s]		
400	Ø180 Ø155				Painted	5149.10.20
	197	With bracket 170 x 200	1.0	Coated in white epoxy	5149.60.20	
Ø360 Ø155	Ø360 Ø155	With adhering flange	180 x 360	1.0	Painted	5150.10.20
	47				Coated in white epoxy	5150.60.20
Ø300 Ø155 H	Ø300 Ø155	With clamping	100 000		Painted	5151.10.20
	With clamping flange	180 x 320	1.0	Coated in white epoxy	5151.60.20	



Gully body ND 50, socket inclination 1.5°



ACO Product benefits

- Building material class: A1
- Tested and practical fire protection solutions
 - ☐ Minimum ceiling thickness for Fit-in installation: 100 mm
- Sound protection tested to DIN EN 4109/VDI 4100:2012
 - Sound pressure level: $L_{AFmax} \le 22 \text{ dB(A)}$

Product information

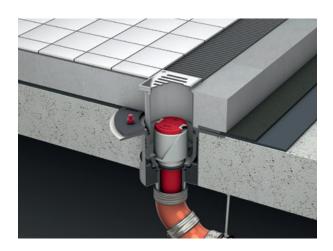
- Material: Cast iron, material grade EN-GJL-200
- GTested according to: DIN EN 1253
- Fire protection: Fire resistance class R 30 R 120 tested, Gen. Build. Sup. Test requested*
- Odour protection: optional accessory Passavant odour and smoke block
- Surface: Coated in white epoxy
- Sealing membrane connection: Connects to all widely available sealing systems
- Pipe connection SML according to: DIN EN 877

	Flange design	Recess	Flow rate	Surface	Item number
		[mm]	[l/s]		
Ø180 Ø155 155	With horselve	170 x 360	1.0	Painted	5149.30.20
	With bracket		1.0	Coated in white epoxy	5149.80.20
74 0360 Ø360 Ø360	With adhering flange	180 x 360	1.0	Painted	5150.30.20
				Coated in white epoxy	5150.80.20
Ø300 Ø155 B Ø155 155	With clamping		1.0	Painted	5151.40.20
	flange	1 180 x 360 1		Coated in white epoxy	5151.90.20

^{**} Installation according to the General Building Supervisory Authority test certificate



Gully body ND 70, socket inclination 90°



ACO product benefits

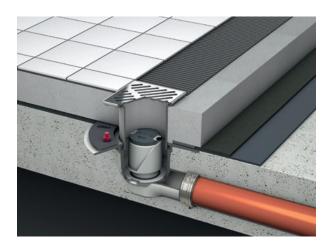
- Building material class: A1
- Tested and practical fire protection solutions
 - Minimum ceiling thickness for Fit-in installation: 100 mm
- Sound protection tested to DIN EN 4109/VDI 4100:2012
 - Sound pressure level: $L_{AFmax} \le 22 \text{ dB(A)}$
- Core bore: 160 mm diameter

Product information

- Material: Cast iron, material grade EN-GJL-200
- GTested according to: DIN EN 1253
- Fire protection: Fire resistance class R 30 R 120 tested, Gen. Build. Sup. Appr. requested*
- Odour protection: optional accessory Passavant odour and smoke block
- Surface: Coated in white epoxy
- Sealing membrane connection: Connects to all widely available sealing systems
- Pipe connection SML according to: DIN EN 877

	Flange design	Recess	Flow rate	Surface	Item number
		[mm]	[l/s]		
Ø180 Ø155	With hypothesis	170 200	2.0	Painted	5169.10.20
100	With bracket 170 x 200 2.0	2.0	Coated in white epoxy	5169.60.20	
Ø360 Ø155	With adhering flange	180 x 360	2.0	Painted	5170.10.20
197				Coated in white epoxy	5170.60.20
Ø300 Ø155 H H H	With clamping	100 000		Painted	5171.10.20
747	With clamping flange	180 x 320	2.0	Coated in white epoxy	5171.60.20

Gully body ND 70, socket inclination 1.5°



ACO Product benefits

- Building material class: A1
- Tested and practical fire protection solutions
- Sound protection tested to DIN EN 4109/VDI 4100:2012
 - Sound pressure level: $L_{AFmax} \le 22 \text{ dB(A)}$

Product information

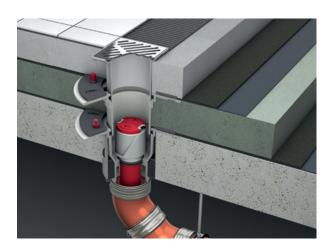
- Material: Cast iron, material grade EN-GJL-200
- GTested according to: DIN EN 1253
- **Fire protection:** Tested to fire resistance class R30-R 120, general building authority (AbP) test sought**
- Odour protection: optional accessory Passavant odour and smoke block
- Surface: Coated in white epoxy
- Sealing membrane connection: Connects to all widely available sealing systems
- Pipe connection SML according to: DIN EN 877

	Flange design	Recess	Flow rate	Surface	Item number
Ø180 Ø155				Painted	5169.20.20
135	With bracket	170 x 360	1.6	Coated in white epoxy	5169.70.20
Ø360 Ø155 #	With adhering flange	180 x 360	1.6	Painted	5170.30.20
135				Coated in white epoxy	5170.80.20
Ø300 Ø155 B B B	With clamping flange	1 180 v 360	1.6	Painted	5171.40.20
135				Coated in white epoxy	5171.90.20

^{**} Installation according to the General Building Supervisory Authority test certificate



Gully body ND 100, socket inclination 90°



ACO product benefits

- Building material class: A1
- Tested and practical fire protection solutions
 - ☐ Minimum ceiling thickness for Fit-in installation: 100 mm
- Sound protection tested to DIN EN 4109/VDI 4100:2012
 - Sound pressure level: $L_{AFmax} \le 22 \text{ dB(A)}$
- Core bore: 160 mm diameter

Product information

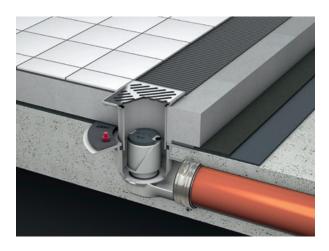
- Material: Cast iron, material grade EN-GJL-200
- GTested according to: DIN EN 1253
- **Fire protection:** Fire resistance class R 30 R 120 tested, Gen. Build. Sup. Appr. requested*
- Odour protection: optional accessory Passavant odour and smoke block
- Surface: Coated in white epoxy
- Sealing membrane connection: Connects to all widely available sealing systems
- Pipe connection SML according to: DIN EN 877

	Flange design	Recess	Flow rate	Surface	Item number
		[mm]	[l/s]		
Ø180 Ø155 Aco	With breaket			Painted	5569.10.20
16	With bracket 170 x 200	170 x 200	2.0	Coated in white epoxy	5569.60.20
Ø360 Ø155 ——————————————————————————————————	With adhering flange	180 x 360	2.0	Painted	5570.10.20
				Coated in white epoxy	5570.60.20
Ø300 Ø155 H H H	With clamping	100, 200		Painted	5571.10.20
161	flange	180 x 320	2.0	Coated in white epoxy	5571.60.20

^{*} when a fire protection kit is used: 5570.10.35



Gully body ND 100, socket inclination 1.5°



ACO Product benefits

- Building material class: A1
- Tested and practical fire protection solutions
- Sound protection tested to DIN EN 4109/VDI 4100:2012
 - Sound pressure level: $L_{AFmax} \le 22 \text{ dB(A)}$

Product information

- Material: Cast iron, material grade EN-GJL-200
- GTested according to: DIN EN 1253
- Fire protection: Fire resistance class R 30 R 120 tested, Gen. Build. Sup. Test requested*
- Odour protection: optional accessory Passavant odour and smoke block
- Surface: Coated in white epoxy
- Sealing membrane connection: Connects to all widely available sealing systems
- Pipe connection SML according to: DIN EN 877

Floor gully ordering information

	Flange design	Recess	Flow rate	Surface	Item number
Ø180 Ø155 Ø155				Painted	5569.20.20
135	With bracket	170 x 360	1.6	Coated in white epoxy	5569.70.20
Ø360 Ø155	With adhering flange	180 x 360	1.6	Painted	5570.30.20
135				Coated in white epoxy	5570.80.20
Ø300 Ø155 B B B	With clamping flange	100, 260	1.6	Painted	5571.40.20
135		180 x 360	1.6	Coated in white epoxy	5571.90.20

^{**} Installation according to the General Building Supervisory Authority test certificate



Ordering information for top sections

		Version	Height adjustability	Description	Item number
			[mm]		
	1111 150 1125	 MEKU Retaining ring Stainless steel frame 111 x 111 mm 	55-/115+	■ Screwed	5150.81.22
		Slot grating made from stainless steel 104 x 104 mm K 3	33-7113+	ScrewedSlip-proof finish: Class C	5150.81.33
952	0125 0125	PlasticRetaining ringPlastic frame111 x 111 mm	45-/110+	Loosely inserted	5150.87.22
		Slot grating made from stainless steel 104 x 104 mm K 3	45*/ 110 +	Loosely insertedSlip-proof finish:Class C	5150.87.33
	149 0125	■ Plastic ■ Retaining ring ■ Plastic frame ■ 149 x 149 mm ■ Slot grating made from stainless steel ■ 140 x 140 mm ■ K 3	42-/130+	Loosely inserted	5141.87.23
				Loosely inserted Slip-proof finish: Class C	5141.87.33
	149 150 0125	 Plastic Retaining ring Plastic frame 149 x 149 mm 	42-/130+	■ Lockable	5141.71.22
		 Slot grating made from stainless steel 140 x 140 mm K 3 		Lockable Slip-proof finish: Class C	5141.71.33
	MEKU Retaining ring Stainless steel frame 149 x 149 mm Slot grating made from stainless steel 140 x 140 mm K 3	Retaining ringStainless steel frame	40 (120	■ Lockable	5141.81.22
		42-/130+	Lockable Slip-proof finish: Class C	5141.81.33	

		Version	Height adjustability	Description	Item number
	0125 S	MEKU Retaining ring Stainless steel frame 149 x 149 mm	42-/130+	■ Screwed	5141.81.52
	© 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	 Slot grating made from stainless steel 140 x 140 mm K 3 		ScrewedSlip-proof finish: Class C	5141.81.53
	□148 □148 □125	Stainless steel Retaining ring Stainless steel frame 148 x 148 mm	45-/115+	Screwed	5141.89.22
	(a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	Slot grating made from stainless steel 140 x 140 mm K 3	45*7 115 +	Screwed Slip-proof finish: Class C	5141.89.33
8	0200 0150 0125	 Plastic Sealing ring PVC frame 150 x 150 mm Slot grating made from stainless steel 140 x 140 mm K 3 	40 - / 105 +	■ Loosely inserted	5141.86.22
	Ø225 Ø157 Ø125	Stainless steel Sealing ring Stainless steel frame 0: 157 mm Slot grating made from stainless steel K 3	23-/98+	■ Screwed	5141.96.22
	□150 □138 ⊗ Ø123 Ø170	 Stainless steel Retaining ring Stainless steel frame 150 x 150 mm Stainless steel mesh grating 142 x 142 mm L 15 	55-/130+	Loosely insertedNon-slip	5141.92.22
	□150 □140 □125 □22 □25	Stainless steel Retaining ring Stainless steel frame 150 x 150 mm Stainless steel mesh grating 142 x 142 mm M 125	55-/130+	Loosely insertedNon-slip	5141.93.22



		Version	Height adjustability	Description	Item number
			[mm]		
	- 150 	 Stainless steel Sealing ring Stainless steel frame 150 x 150 mm Stainless steel sieve grating and sealing cover L 15 	35-/90+	Loosely inserted	5141.94.22
	240 197 9 9125	 Cast iron with paint finish Retaining ring Cast iron frame 197 x 197 mm Cast iron slot grating 170 x 170 mm M 125 	90-115	Loosely inserted	5141.83.22
Extended version					
	©1111 900 0125	MEKU Retaining ring Stainless steel frame 111 x 111 mm Slot grating made from stainless steel 104 x 104 mm K 3	50-/290+	- Screwed	5150.81.23
	Ø8 80 80 80 80 80 80 80 80 80 80 80 80 80	Plastic Retaining ring Plastic frame 110 x 110 mm Slot grating made from stainless steel 104 x 104 mm K 3	45-/280+	Loosely inserted	5150.87.23

Ordering information for top sections with thin bed sealing

		Version	Description	Item number
	307	 AV-Selecta Plastic Sealing ring Stainless steel frame 111 x 111 mm 	Screwed	5150.91.22
		Slot grating made from stainless steel 104 x 104 mm K 3	Screwed Slip-proof finish: Class C	5150.91.33
	307 □148 00 0125	 AV-Selecta Plastic Sealing ring Stainless steel frame 148 x 148 mm 	■ Lockable	5141.91.22
		Slot grating made from stainless steel 140 x 140 mm K 3	Lockable Slip-proof finish: Class C	5141.91.33
	307 □148 0 0 0 0 125	AV-Selecta Plastic Sealing ring Stainless steel frame 148 x 148 mm Slot grating made from stainless steel 140 x 140 mm K 3 With sliding frame (slides laterally up to 36 mm)	■ Screwed	5141.91.52
	0000		Screwed Slip-proof finish: Class C	5141.91.53
	307 □150 91/81	AV-Selecta Plastic Sealing ring Stainless steel frame 150 x 150 mm Stainless steel mesh grating 142 x 142 mm L 15 With sliding frame (slides laterally up to 36 mm)	Loosely insertedNon-slip	5141.97.22



		Version	Description	Item number
	0350 0252 149 15 0125	 Plastic Sealing ring Stainless steel frame 148 x 148 mm Stat grating made from 	Loosely inserted	5141.29.22
		 Slot grating made from stainless steel 140 x 140 mm K 3 	■ Lockable	5141.30.22

Ordering information for top sections with sanded flange for thin bead sealing

		Version	Height adjustability	Description	Item number
			[mm]		
	271 148 140 07 07 07 07 07 07 07 07 07 0	 Stainless steel Sealing ring Stainless steel frame 148 x 148 mm 	20. (65	- Screwed	9406.89.22
	211111111111111111111111111111111111111	Slot grating Stainless steel 140 x 140 mm K 3	30-/65+	Screwed Non-slip	9406.89.33
	0271 0150 0140 0125 0125 E	Stainless steel Sealing ring Stainless steel frame 150 x 150 mm Stainless steel mesh grating 140 x 140 mm L 15	30 - / 75 +	Loosely insertedNon-slip	9406.92.22
	0271 0150 0140 0125 E	Stainless steel Sealing ring Stainless steel frame 150 x 150 mm Stainless steel mesh grating 140 x 140 mm M 125	30-/75+	Loosely insertedNon-slip	9406.93.22

Ordering information for accessories

		Description	Suitable for	Description	Item number
	Ø287 Ø145 A A B SO TO	Upper section	 All Passavant gully bodies DN 50 – DN 100 	Made of cast iron Not inflammable as for building material class A1 Socket diameter 125 mm With sealing ring With clamping flange With seepage openings Adjustable height: 50 – 104 mm Weight: 7.3 kg Painted Coated in white epoxy	5145.52.50 5145.57.50
9	Ø140	Extension	All upper parts and top sections Socket diameter 125 mm	 made from stainless steel, material grade 304 Extension to max. 110 mm With sealing ring Weight: 1.2 kg 	5145.50.50
	Ø125	Connecting piece	All upper parts and top sections Socket diameter 125 mm	Plastic With sealing ring	5171.83.20
	Ø125	with inlet	All upper parts and top sections Socket diameter 125 mm	PlasticWith sealing ringWith lateral inletDN 50	5171.84.20



	Description	Suitable for	Description	ltem number
14 ₉	Fit-in installation kit*	 Passavant gully body Socket inclination 90° 	 Not inflammable as for building material class A1 For mortar free inser- tion in core bores: 160 mm diameter Height: 150 mm 	
1 N 159 N		DN 50		5150.10.60
		ND 70		5170.10.60
		ND 100		5570.10.60
987	Foul air trap	Passavant gully body DN 50 – DN 100	consisting of:Bell and pilot tube	5128.10.55
	Odour and smoke block*	Foul air trap Fire protection kits	Made of rubber 0.3 l/s	5128.10.75
	Fire protection kit*	 Passavant gully body DN 50 Socket inclination: 90° 	 consisting of: Foul air trap with heat shield Fire protection car- tridge 	5150.10.35
	Fire protection kit*	Passavant gully bodyDN 70Socket inclination: 90°	 consisting of: Foul air trap with heat shield Fire protection cartridge 	5170.10.35
	Fire protection kit*	 Passavant gully body DN 100 Socket inclination: 90° 	 consisting of: Foul air trap with heat shield Fire protection cartridge 	5570.10.35

⁴⁴

		Description	Suitable for	Description	Item number
0	Ø141 Ø125	Sealing ring	All Passavant top sectionsDN 50 – DN 100	 For sealing between top section and gully body Ring colour: black 	5150.90.20
0	Ø141 Ø125 D 1 0	Retaining ring	 All Passavant top sections DN 50 – DN 100 	As seepage ring between top section and gully body Ring colour: grey	5150.81.45
	Ø93 _	Hose section DN 70/ DN 80	Passavant gully bodyDN 70	■ To connect DN 70 gully bodies to DN 80 SML-pipe	5170.70.80
0	Ø154 Ø145	Clamping ring	• Top sections • 5141.96.22	For homogeneous PVC dimpled covers With sprayed-on PU sealing rim Thickness of useful layer: 2 mm	5141.96.26
		Hair strainer	• Top sections • 5141.71.xx • 5141.81.xx • 5141.87.xx • 5141.91.xx	Made of plastic	5141.00.19
	Ø124 95	Bucket:	 Top sections 5141.71.xx 5141.81.xx 5141.86.xx 5141.87.xx 5141.89.xx 5141.91.xx 	 made from stainless steel, material grade 304 Minimum surface structure above gully adhering flange 50mm 	
	083		• 5141.92.xx • 5141.93.xx • 5141.97.xx	Slot width: 8 mm	7000.03.00
			• 9406.89.xx • 9406.92.xx • 9406.93.xx	Slot width: 6 mm as per EU Regulation No. 1774/2002	7000.03.19



		Description	Suitable for	Description	Item number
		Vacuum lifter	■ Top section ■ 5141.94.22	To open sealing cover	5141.94.09
	□197 \$4	Top frame	• Top sections • 5141.83.22	Painted cast iron Frame dimensions: 197 x 197 mm Graduated height adjustment in 46 mm steps Weight: 3.6 kg	5095.80.00
	Ø131 °C	Adjustable height	Top sections made from plastic5141.91.22/33	Made of plastic For height adjustment Per ring by: 6 mm	5141.30.15
	□150 □10 □7	Top frame	• Top section • 5141.97.22 • 5141.91.52 • 5141.91.53	Made of plastic Graduated height adjustment For screen size: 150 x 150 mm For tile thickness from: 11 mm or 16 mm	
				Height: 3 mm	5141.91.15 5141.91.25
	c110	Top frame	• Top sections • 5150.91.22/33	Made of plastic Graduated height adjustment For screen size: 110 x 110 mm For tile thickness: from 11 mm or 16 mm	
				Height: 3 mm	5150.91.15
				Height: 9 mm	5150.91.25



Every product from ACO Haustechnik contributes to the ACO system chain

collect

- Floor drainage systems
- Bathroom drainage
- Roof drainage
- Multi-storey parking deck
- drainage
 - Balcony and terrace
- drainage
 - Pipe systems

clean

- Grease separators
- Starch separators
- Light oil separators
 - Process technology

hold

Backflow systems

release

Lifting plants

Pumping stations