



Engineering progress  
Enhancing lives

## RAUPIANO PLUS 17 dB quiet

Optimal sound insulation and fire protection  
[www.rehau.uk/raupiano](http://www.rehau.uk/raupiano)



Made in Germany

# Rely on tried-and-tested features – the basis of a perfect system.

## Complete, compatible and universal

The extensive range of pipes, moulded parts and accessories ensures suitability for use in everything from detached houses to commercial projects. All dimensions from DN 32 to DN 200 are compatible with conventional HT and sewer pipe systems. Their hydraulic drainage capacity is identical, which makes planning easier. RAUPIANO PLUS is suitable for gravity drainage, below-ground installation and central vacuum systems. The push-fit lock prevents the socket connection from coming apart. This ensures reliability under the pressure loads of internal stormwater pipes and enables the connection of small pump systems up to a dimension of DN 50.

## Robust and reliable

High ring stiffness enables the pipes to withstand transport, storage and processing. This simplifies installation and prevents horizontally installed pipes from sagging. Even below-ground installation isn't a problem thanks to exceptional rigidity.

## Cold-resistant

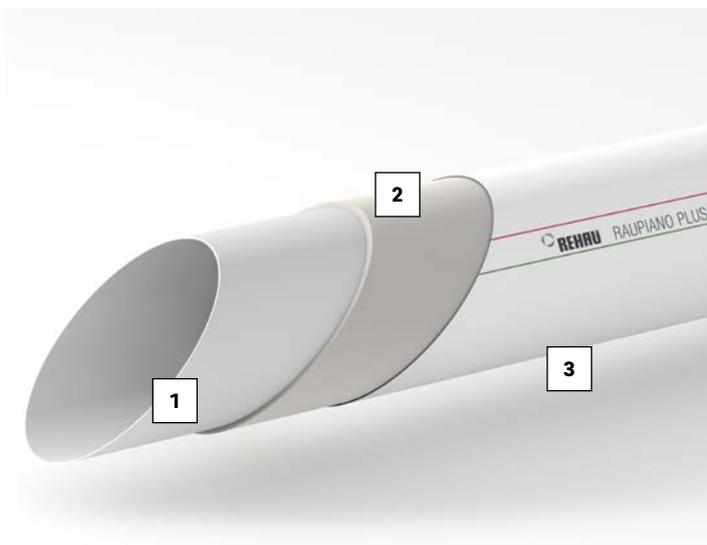
Outstanding cold impact resistance ensures optimal suitability for construction sites – even at low temperatures. Impact resistance down to  $-10\text{ °C}$  (as per DIN EN 1451) has been verified by SKZ Würzburg (tested in accordance with EN ISO 11173).

## Chemical resistance

The material offers high chemical resistance at pH values between 2 and 12. From acetic acid to soda solutions, hardly any media at all are able to harm the pipes.

## Sturdy and functional

The extremely smooth and abrasion-resistant inner wall of the pipes prevents deposits and scaling. A special coating reduces friction in the pipe system. The UV-stabilised outer layer boasts exceptional shock resistance and weathering resistance. This means that components can be stored outdoors for up to 2 years. The sense of quality is guaranteed thanks to their appearance.



### 1 Inner layer made of PP\*

- Abrasion-resistant and low-friction
- Chemical resistance

### 2 Middle layer made of mineral-reinforced PP

- Sound-absorbing
- Stabilising

### 3 Outer layer made of PP

- Impact-resistant and shock-proof
- UV-stable and weather-resistant

\*Polypropylene

# We offer more: System technology without compromise.

Our system impresses with a host of tried-and-tested properties. Real added value makes RAUPIANO PLUS the outstanding system solution on the market.



## Efficiency

# 30%

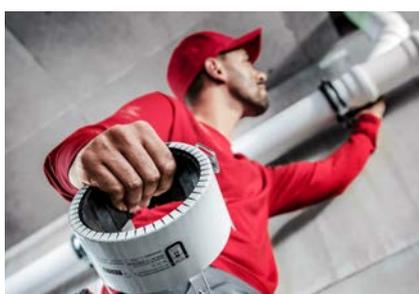
faster installation compared to SML cast iron pipes\*



## Sound insulation

# 17 dB

Install comfort as per P-BA 274/2016 at 4 l/s



## Fire protection

# R120

Protected from fire for up to 120 minutes



### Systematic premium sound insulation:

The RAUPIANO PLUS system is comprised of a pipe, moulded parts and fasteners – just as required by the Fraunhofer Institute – and guarantees premium sound insulation.

If RAUPIANO PLUS is installed alongside drinking water pipes, it pays to use the REHAU system solution. Combining it with RAUTITAN minimises the space required while retaining optimal planning and installation security.

\*Based on a time comparison as per the source for installation times: Innung Spengler, Sanitär- und Heizungstechnik, Munich, 2005

# Systematic premium sound insulation

When building or buying a property, alongside the location and living area, a host of quality features are deciding factors and have an influence on the valuation, including the utilities installed in the property. That's why the demand for sound insulation is growing when it comes to installation technology.



## Minimum sound insulation requirements: DIN 4109

This standard requires a sound insulation level which must be observed to protect people in living areas from the nuisance of noise. The minimum requirement for water installations is 30 dB(A).

In terms of public law, DIN 4109 constitutes a minimum requirement.

## Stricter sound insulation requirements: VDI Directive 4100

This directive defines three sound insulation levels and differentiates between apartments in apartment buildings, and semi-detached and terraced house dwellings, and also takes the residents' living space into account.

VDI Directive 4100 is not legally binding, but it provides guidance and, as such, enjoys a high degree of recognition from experts and beyond. Individual contractual agreements therefore allow for these tighter requirements to be included.

## Sound value definitions

The exact definition of a sound measurement and the associated regulations/standards are absolutely essential, particularly when comparing sound values. Whilst the term dB(A) is always used, the regulations and standards very often use different variables for sound measurement. As such, sound measurements that have not been converted cannot be compared and usually differ by more than 3 dB(A).

Whereas the sound values of DIN 4109 relate to individual components ( $L_{AFmax,n}$ ), VDI 4100:2012 takes the geometry of the space (spatial volume and partition wall area) and a defined reverberation time into account ( $L_{AFmax,nT}$ ). As such, they deal with fundamentally different assessment principles and performance indicators. In addition, rooms can be divided into those that require noise protection and those that do not depending on their size rather than their use if an agreement pertaining to VDI 4100:2012 is agreed. Noise at the source such as from opening a tap or pressing the flush button on a WC cistern as well as noise spikes must be considered together with the applicable sound insulation level for all spaces.

With this in mind, it is always advisable to involve an acoustic expert early on, particularly when dealing with a high level of sound insulation.

**Installation sound level for rooms requiring sound protection in apartment buildings**

Standards / guidelines	$L_{AFmax,n}$ component-related performance indicator		$L_{AFmax,nT}$ situation-related performance indicator (Taking reverberation into account)	
	Room requiring sound insulation diagonally below in an outside area	Own area	Room requiring sound insulation diagonally below in an outside area	Own area
Sound insulation in building construction DIN 4109:2016-07				
Minimum requirements according to part 1	30 dB(A)	-	-	-
Increased sound insulation as per part 5	25 dB(A)	-	-	-
Sound insulation in building construction, apartments VDI 4100:2012-10				
Sound insulation level I (SIL I)	-	-	30 dB(A)	-
Sound insulation level II (SIL II)	-	-	27 dB(A)	-
Sound insulation level III (SIL III)	-	-	24 dB(A)	-
SIL OOS I – own area	-	-	-	35 dB(A)
SIL OOS II – own area	-	-	-	30 dB(A)

**What needs to be taken into account when comparing sound values?**

With waste water systems, there is a good comparison base thanks to a standardised test set-up as per a European standard.

To determine the acoustic performance, RAUPIANO PLUS waste water system was tested by the independently certified Fraunhofer Institute for Building Physics in Stuttgart (IBP) in accordance with DIN EN 14366 "Laboratory measurement of noise from waste water installations".

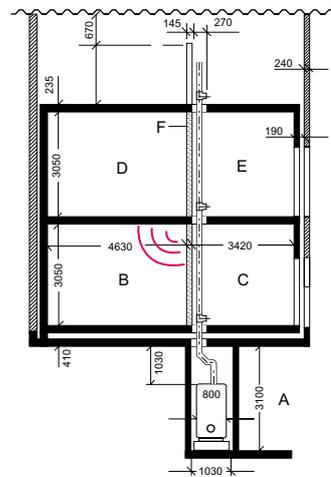
Sound measurements were carried out using a standardised installation set-up that has been derived from a real-life installation. Several different flow rates were tested as a realistic representation of a household with several family members.

The results proved that RAUPIANO PLUS produces a noise level well below the permitted maximum level of 30 dB(A) according to DIN 4109.

In comparison to standard pipe brackets, the sound levels generated with the REHAU structure-borne sound-dampening support bracket were very low indeed. Using this standard bracket option, the system produced sound values that were well below the maximum limits detailed in Part 5 (DIN 4109).

**Schematic layout of the test facility:**

Installation test facility of the Fraunhofer Institute for Building Physics (all dimensions in mm)



A = Basement · B = Lower floor, rear · C = Lower floor, front · D = Ground floor, rear · E = Ground floor, front · F = Installation wall (area weight: 220 kg/m<sup>2</sup>)

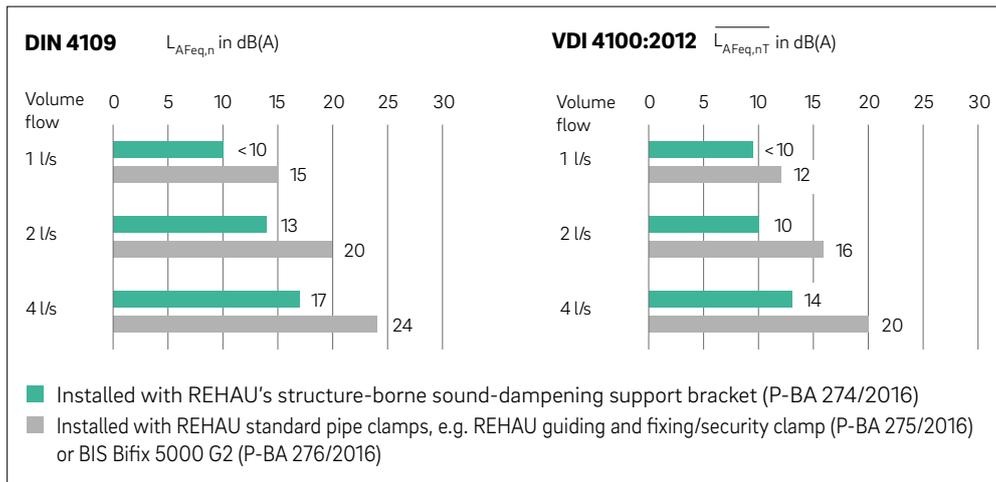
**Sound value definitions:**

Rules	Designation of installation sound level	Unit
DIN 4109 Component-related performance indicator	$L_{AFmax,n}$	dB(A)
VDI 4100:2012 Space-related performance indicator (taking reverberation into account)	$L_{AFmax,nT}$	dB(A)

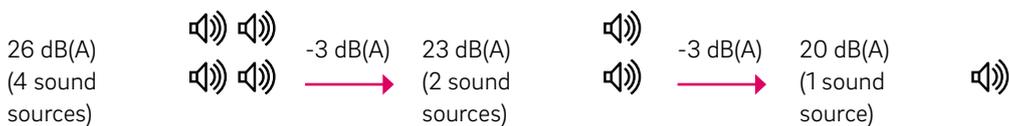


Fastening  
**makes the  
difference**

For comparison, different values result from identical tests (same volume flow and layout) based on the respective performance indicator. At the same time, these values document the major influence of the fastening technology used.



The differences in the sound values of different fastening technologies do not seem especially spectacular at first glance. To reduce the sound level by just 3 dB(A), however, one half of the sound sources have to be eliminated.



**Difference between  $L_{AFmax}$  and  $L_{AFeq}$**

The sound insulation requirements from noise produced by building service installation specified in DIN 4109 and VDI 4100 refer to the maximum level  $L_{AFmax}$ . At the test facility, all tests measuring the noises from soil & waste system according to EN 14366 are recorded in an average value, which is expressed in the test reports as  $L_{AFeq}$ .

While  $L_{AFeq}$  denotes the sound level at a continuous flow rate (e.g. 1.0 l/s, 2.0 l/s and 4.0 l/s),  $L_{AFmax}$  constitutes the maximum sound level of an installation during a single operation, e.g. flushing the toilet.

# Holistic sound insulation in endurance testing.

## Not in theory – in real practice.

RAUPIANO PLUS even complies with the strict VDI Directive 4100 with ease. The challenge here, however, is that the entire installation has to meet the sound insulation requirements. The values of the drainage system can be so good, only to be negated again by the drinking water installation.

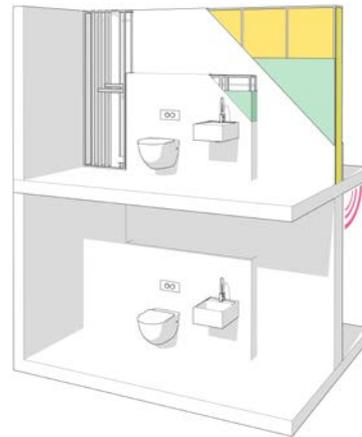
In sound measurements at the renowned acoustics laboratory of the Fraunhofer Institute for Building Physics, installation examples from practice were set up in four different wall and front-wall arrangements as they are seen thousands of times in residential buildings today. The measurements of the installation sound level were taken during intended use of the sanitary objects in a room located diagonally below.

### Front-wall installation in front of drywall partition (Knauf W 112)

Installation sound level  $L_{AFmax,n} = 19 \text{ dB(A)}$   $L_{AFmax,nT} = 15 \text{ dB(A)}$   
incl. flushing technology

DIN DIN 4109 Part 1	<input checked="" type="checkbox"/>
DIN 4109 Part 5	<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL I	<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL II	<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL III	<input checked="" type="checkbox"/>

Test report number P-BA 43-1/2012

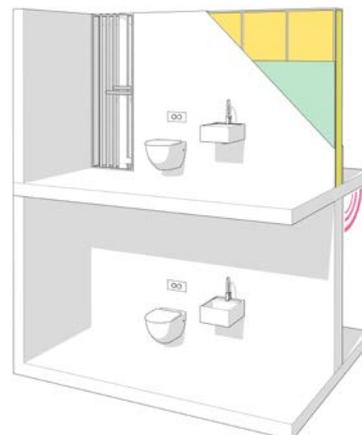


### Embedded installation in drywall (Knauf W 116)

Installation sound level  $L_{AFmax,n} = 22 \text{ dB(A)}$   $L_{AFmax,nT} = 19 \text{ dB(A)}$   
incl. flushing technology

DIN DIN 4109 Part 1	<input checked="" type="checkbox"/>
DIN 4109 Part 5	<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL I	<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL II	<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL III	<input checked="" type="checkbox"/>

Test report number P-BA 44-1/2012





**The results are based on:**

- Objective and independent tests carried out in the Fraunhofer Institute test facility in Stuttgart
- Construction and installation done by independent local installers and builders
- Variety of wall structures (light and/or heavy weight)
- Toilet fixtures includes flushing technology (7 l flush volume)
- RAUTITAN drinking water installation (riser and distributor pipes of floor)
- RAUPIANO PLUS drainage (downpipe and collecting pipe)

The result: RAUPIANO PLUS and RAUTITAN offer system-tested sound insulation to meet the highest standards.

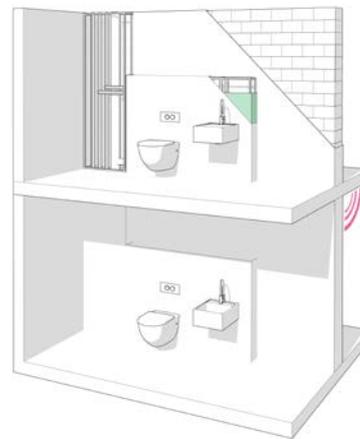


**Sound insulation for the highest standards**

**Front-drywall installation in front of solid partition wall**

Installation sound level	$L_{AFmax,n} = 25 \text{ dB(A)}$	$L_{AFmax,nT} = 22 \text{ dB(A)}$
DIN 4109 Part 1	<input checked="" type="checkbox"/>	
DIN 4109 Part 5	<input checked="" type="checkbox"/>	
VDI 4100: 2012 SIL I		<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL II		<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL III		<input checked="" type="checkbox"/>

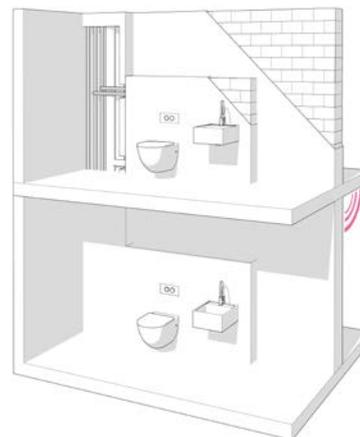
Test report number P-BA 42-1/2012



**Front-solidwall installation in front of solid wall**

Installation sound level	$L_{AFmax,n} = 30 \text{ dB(A)}$	$L_{AFmax,nT} = 27 \text{ dB(A)}$
DIN 4109/A1	<input checked="" type="checkbox"/>	
DIN 4109/Part 5	<input type="checkbox"/>	
VDI 4100: 2012 SIL I		<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL II		<input checked="" type="checkbox"/>
VDI 4100: 2012 SIL III		<input type="checkbox"/>

Test report number P-BA 41-1/2012



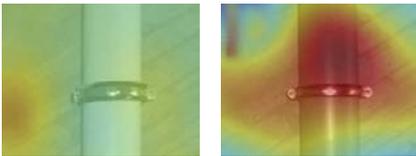
# How sound insulation works: Innovative solutions to your advantage.

## Multi-layer technology

The exceptionally rigid middle layer with sound-absorbing filler materials increases the mass (pipe density 1.9 g/cm<sup>3</sup>), reducing the sound level considerably.

RAUPIANO PLUS

Standard HT-PP



Lowest noise level

Highest noise level

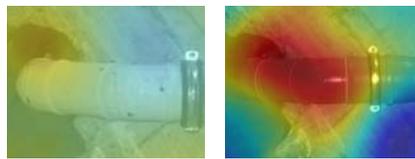


## Pipe bend with air-borne sound-dampening mass optimisation

Reinforced-wall moulded parts with optimised fluidics reduce impact noises in the critical bend areas of downpipes to a minimum.

RAUPIANO PLUS

Standard HT-PP



Lowest noise level

Highest noise level



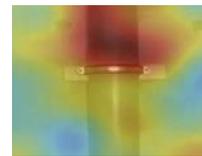
**Structure-borne sound-dampening fastening**

The fastening technology sets up the joint to the installation wall. For this reason, particular importance is attached to it. Through the use of the highly insulating fastening clamp, consisting of a supporting clamp and a fixing bracket, structureborne sound transmission to the installation wall is significantly reduced. The critical factor here is the even and defined starting torque provided by the clamp lock and the spacer. The special geometry of the rubber lining also favours centred alignment of the pipe, thereby ensuring even spacing from all sides of the bracket clamp.



RAUPIANO PLUS

Standard HT-PP



Lowest noise level

Highest noise level

The RAUTITAN pipes, which are already pre-insulated, also ensure excellent sound insulation in addition to heat insulation. This is optimised by the use of innovative insulating boxes for a multitude of RAUTITAN fittings. The confirmation of excellent results in terms of sound level reduction (sound level improvement of 13 dB(A)) by the Fraunhofer Institute is unique.



Our sound insulation is systematic: You can rely on the REHAU system solution, too. By combining RAUPIANO PLUS and RAUTITAN, you're installing unbeatable technology.



Plan  
with  
security

## Sound measurement at suspended ceilings and drywall shafts

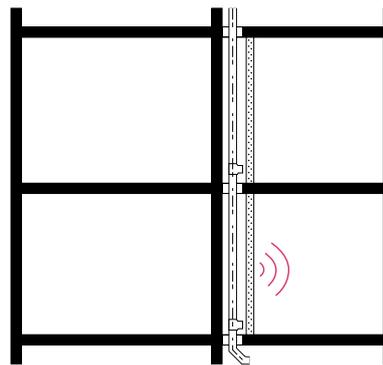
Sound measurements carried out by the Fraunhofer Institute are generally performed in accordance with DIN EN 14366. This standardised test set-up stipulates that the sound measurements of waste water noise are carried out on the back of the installation wall, that is, behind a solid wall.



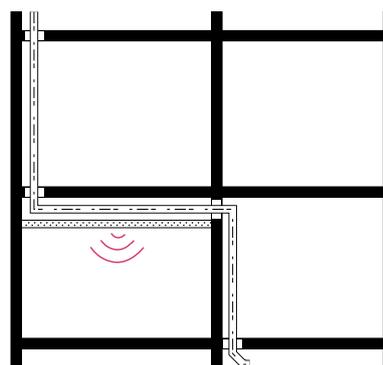
Due to the demand for more flexible interior design, modern architecture is happy to fall back on dry construction systems and lightweight partition walls which behave differently in terms of sound. This means that statements cannot be made on the noise behaviour of pipes in suspended ceilings using "standard measurements" as per EN 14366.

To provide answers to these questions and enable planners to plan better, measurements were carried out with shafts clad in different ways in cooperation with the Knauf Messungen company.

Shafts on a solid wall and on a lightweight wall were tested, as was a pipe in a suspended ceiling. Measurement was carried out in the room shown here in each case:



Schematic representation  
for measurement with  
a shaft



Schematic representation  
for measurement with  
a suspended ceiling

The results of RAUPIANO PLUS combined with Knauf Silentboard are impressive. Even the strict requirements for increased sound insulation in accordance with DIN 4109, Part 5 were met. Plan with security based on verifiable test certificates!

# Systematic fire protection

The transfer of fire and smoke to other fire partitions (apartments, service units etc.) is impermissible for a specified fire-resistance duration which is generally determined by the walls and ceilings of a building.

## Requirements for components of fire-resistance classes fire retardant to fire resistant or 120 minutes

### Solid walls

- Masonry
- Concrete/reinforced concrete
- Aerated concrete
- Min. 100 mm thick

### Lightweight partition walls

- Post-and-beam construction with steel substructure
- Two-layer panelling on both sides as per German general design certification specifications
- Min. 100 mm thick

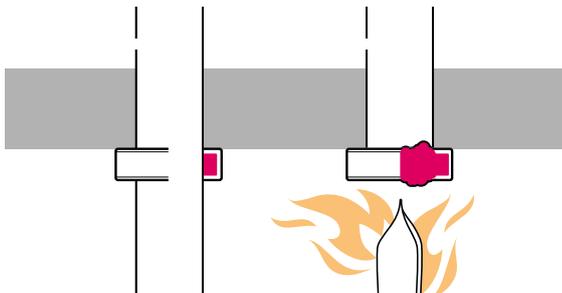
### Ceilings

- Concrete/reinforced concrete
- Aerated concrete
- Min. 150 mm thick

Many pipes, such as drinking water, waste water and heating pipes, must pass through these components with requirements on the fire-resistance duration. Suitable protective measures are required for this component penetration by pipes to rule out the associated risks here.

### Fire protection solutions for RAUPIANO PLUS make it easy to meet this obligation:

In case of a fire, the special intumescent material of the fire protection solutions (fire stop collars or fire stop tape) expands up to 18 times its volume beginning at temperatures of approx. 160 °C. Upward spreading to areas up above is reliably prevented, as the ducts are completely sealed off against fire, smoke and gas.



### The system solution also pays off when it comes to fire protection:

Combined with RAUTITAN, RAUPIANO PLUS offers complete planning security with minimal space requirements.



Optimal  
**planning**  
**security**  
**guaranteed**

# Space savings & fire protection

## RAUPIANO PLUS and RAUTITAN make it possible.

To use fire protection solutions with different design certification/certificate numbers, the minimum spacing must be assessed using an elaborate process.

To make this process simpler, REHAU had the RAUPIANO PLUS and RAUTITAN systems assessed together. The corresponding expert's reports open up new possibilities for you:

- Optimal planning security
- Minimal space requirement for compliance with fire-resistance class R 90 as per DIN 4102-11



You can find the details of the fire protection solutions for the RAUTITAN domestic plumbing system in the technical information for the RAUTITAN domestic plumbing system.

### Compilation of the fire protection certificates and characteristic values of the pipe systems

Proof of application	Fire protection solution	Pipe designation/type of pipe	Approved outer pipe diameter
German general building approval no. Z-19.53-2459	REHAU plus	RAUPIANO PLUS soil & waste	DN 40–DN 200
German general building approval no. Z-19.53-2311	REHAU compact	RAUPIANO PLUS soil and waste pipe	DN 50–DN 125
German general building approval no. Z-19.53-2304	REHAU angled fireproofing collar	RAUPIANO PLUS soil and waste pipe	DN 75–DN 125
German general building approval no. Z-19.53-2403	REHAU fire stop tape	RAUPIANO PLUS soil and waste pipe	DN 32–DN 110
German general building test certificate no. P-3494/1820- MPA BS	RAUTITAN stabil pipe Intumescent firesleeve	RAUTITAN stabil multilayer pipe  stabil  - Rock wool insulation - Melt point $\geq 1,000$ °C - Apparent density $\geq 90$ kg/m <sup>3</sup> - Wall thickness 30 mm e.g. Rockwool 800	16 mm–40 mm
German general building test certificate no. P-3726/4140-MPA BS	Fireproofing collar for flammable pipelines (Rockwool Conlit® 150 U)	RAUTITAN stabil multilayer pipe  stabil  RAUTITAN flex PE-X pipe  flex	$\leq 110$ mm
German general building test certificate no. P-3725/4130-MPA BS	Fireproofing collar for non-flammable pipelines (Rockwool Conlit® 150 U)	Non-combustible pipes	$\leq 108$ mm
German general building inspection test P-2401/079/19-MPA BS	REHAU RAUTITAN fireproofing collar	RAUTITAN stabil multilayer pipe  stabil  RAUTITAN flex PE-X pipe  flex	16 mm–63 mm

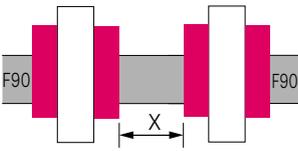
**We would be happy to provide you with the reports. Simply request them from a sales office in your area!**

The regulations shown in the table regarding spacing are based on the expert's report GA-2014/117c and to some extent go beyond the regulations included in the proofs of application. This expert's report can be used by the installer of the fire stop collar as the basis for evaluating a minor deviation in the declaration of compliance. We also recommend consulting the respective consultant or expert before execution. The following is not applicable to REHAU fireproofing collars in mixed installations according to the German general design certification no. Z-19.53-2425 and the REHAU RAUTITAN fireproofing collar according to the German general test certificate from the building authorities P-2401/079/19-MPA BS.

**The fire stop tape has the following limitations:**

**Zero distance not possible for wall penetrations; distance  $X \geq 100$  mm**

**Zero distance in ceilings for adjacent fire stop collars with RAUPIANO PLUS pipes is only possible up to DN 110; for neighbouring pipes  $\geq 110$  mm: distance  $X \geq 100$  mm**

	RAUPIANO PLUS	RAUTITAN stabil	RAUTITAN stabil/ RAUTITAN flex	Non-combustible pipes	
	 <p>With REHAU plus fire stop collar<sup>1)</sup></p>  <p>With compact fire stop collar</p>  <p>With fire stop tape<sup>2)</sup></p> 	<p>With mineral fibre fire sleeves, e.g. Rockwool 800</p> 	<p>With Conlit® 150 U from Rockwool</p> 	<p>With Conlit® 150 U from Rockwool</p> 	
RAUPIANO PLUS	<p>with REHAU plus fire stop collar<sup>1)</sup></p>  <p>With compact fire stop collar</p>  <p>With fire stop tape<sup>2)</sup></p> 	<p>Ceiling and wall penetrations<sup>1)</sup>  <math>X = 0</math> mm</p> <p>(The fire stop tape has limitations)</p>			
RAUTITAN stabil	<p>With mineral fibre fire sleeves, e.g. Rockwool 800</p> 				
RAUTITAN stabil/ RAUTITAN flex	<p>With Conlit® 150 U from Rockwool</p> 				
Non-combustible pipes	<p>With Conlit® 150 U from Rockwool</p> 				
RAUPIANO PLUS	<p>with angled fire stop collar</p> 	<p><math>X = 100</math> mm</p>			

<sup>1)</sup> REHAU PLUS DN 200 for ceiling only; distance  $X = 100$  mm / <sup>2)</sup> Fire stop tape DN 110 for ceiling only  
 Additionally, the specified limitations apply.

# We provide fire protection – No ifs or buts.

Optimal  
planning  
security

## RAUTITAN



### RAUTITAN stabil and flex fireproofing collars with Conlit® 150 U

- For pipe dimensions 16 to 63
- For installation into ceiling and walls
- For installation in lightweight and solid walls/ceilings
- Fire-resistance duration of at least 90 minutes via the Conlit® 150 U fire protection pipe shell
- Thermal insulation as per EnEV 50%
- German general test certificate from the building authorities no. P-3726/4140-MPA BS



### RAUTITAN stabil fireproofing collar

- For pipe dimensions 16 to 40
- For installation into ceiling and walls
- For installation in lightweight and solid walls/ceilings
- Fire-resistance duration of at least 90 minutes via mineral-fibre shells with a melting point over 1,000 °C, minimum insulation thickness of 30 mm
- Thermal insulation as per EnEV 100%
- German general test certificate from the building authorities no. P-3494/1820-MPA BS



### RAUTITAN stabil and flex fireproofing collars

- For pipe dimensions 16 to 63
- For installation in solid ceilings
- Fire-resistance duration up to 120 minutes via mineral-fibre shells made of Rockwool 800 or ISOVER U Protect Pipe Section Alu 2, minimum insulation thickness of 20 mm
- German general test certificate from the building authorities P-2401/079/19-MPA BS

## RAUPIANO PLUS



### REHAU Plus fire stop collar

- For pipe dimensions DN 40 to DN 200
- For installation into the ceiling/wall or attachment below the ceiling/in front of the wall
- Fire-resistance duration of at least 90 minutes
- Easy installation thanks to self-fixing and quick closure
- Variable installation depth according to identification marking
- Technical sound isolation
- German general building authority approval no. Z-19.17-1662
- German general design certification no. Z-19.53-2459



### REHAU compact fire stop collar

- For pipe dimensions DN 50 to DN 125
- For attachment below the ceiling/in front of the wall
- Fire-resistance duration of at least 90 minutes
- Minimal installation height of just 30 mm
- Easy installation thanks to quick closure
- Technical sound isolation
- German general building authority approval no. Z-19.17-1363
- German general design certification no. Z-19.53-2311



### Angled fireproof sleeves for REHAU system

- For pipe dimensions DN 75 to DN 125
- For surface-mount installation below the ceiling
- Fire-resistance duration of at least 90 minutes
- Suitable for confined spaces, including downpipes running diagonally through the ceiling and moulded parts
- Easy installation
- Technical sound isolation (including over push-fit socket connections)
- German general building authority approval no. Z-19.17-1363
- German general design certification no. Z-19.53-2304



### REHAU fire stop tape

- For pipe dimensions DN 32 to DN 110 for flush-mounted (underside of ceiling) installation in ceilings
- For pipe dimensions DN 32 to DN 90 for flush-mounted installation in walls
- Easy one-person installation with no drilling or dowels
- Technical sound isolation
- German general building authority approval no. Z-19.17-2139
- German general design certification no. Z-19.53-2403

**Optimal planning security guaranteed: Install fire protection from REHAU and forget about laborious cross-comparisons.**

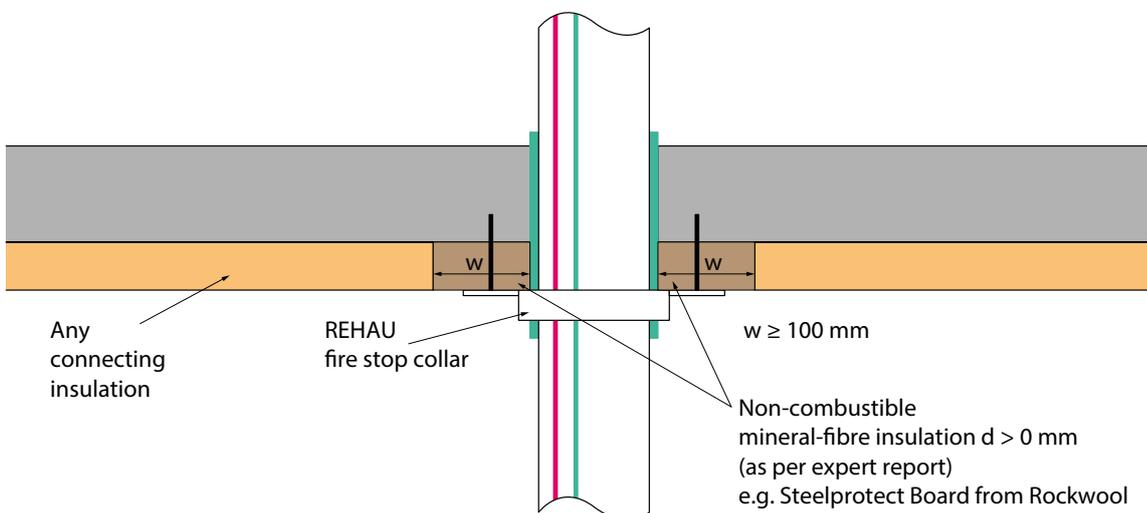


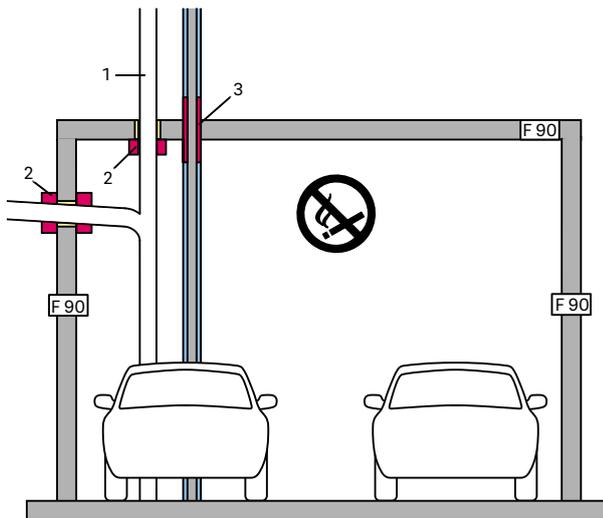
# Fire protection solutions made for use in practice.

## Meeting thermal insulation and fire safety requirements for insulated ceilings:

In buildings with underground car parks or unheated cellars, it is common that thermal insulation in accordance with energy saving regulations must be installed on the underside of the ceiling. Until now, it was not possible to meet fire safety requirements with combustible sewer pipes without compromising the performance of the thermal insulation.

This issue has been solved for fully compliant planning with RAUPIANO PLUS. According to the expert's report GA-2013/161-Mey dated 5 June, 2018, it is possible to meet both fire safety and thermal insulation requirements using appropriate insulation materials.

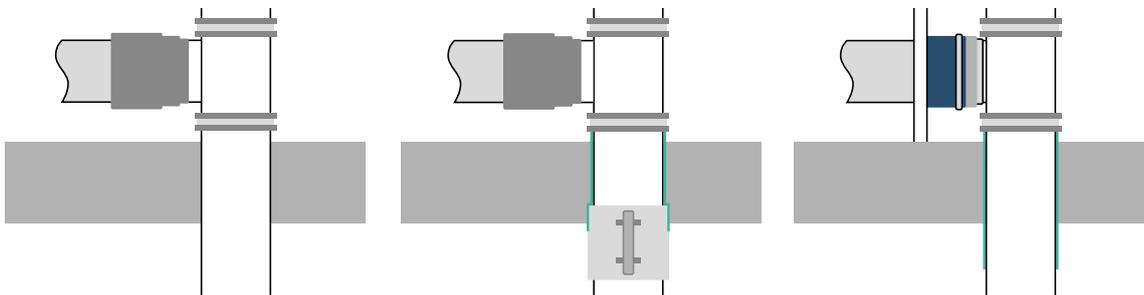




- 1 RAUPIANO PLUS
- 2 Fire stop collar for RAUPIANO PLUS
- 3 Fireproofing collar for flammable pipes, e.g. RAUTITAN

### Stricter fire protection requirements for mixed installations:

Stricter requirements on construction-related fire protection took effect on 1 January, 2013. These requirements apply in particular to mixed installations (metal downpipes with branching collecting pipes or single connecting pipes made of plastic). In the case of drainage systems designed as mixed installations, it is no longer sufficient to only insulate against heat transmission and thermal expansion as before. In case of fire, underpressure or overpressure could build up in a metal downpipe due to enormous heat generation. This promotes the spread of fire and smoke from fire partition to fire partition. This fact now has to be taken into account.



Impermissible installation not compliant with requirements on fire protection

Solutions for mixed cast iron/plastic pipe installation with fire protection solution (fire stop collar) in the metal downpipe (left) or at the branch/adaptor (right)

### Mixed cast iron/plastic pipe installation: No planning security, laborious installation and more space required.

So-called mixed installation is to be carried out in such a way that an R90 fire protection solution must be installed in the metal downpipe or in the area of the branching plastic pipe according to the currently required certificate of usability. This absolutely requires more space and more laborious installation. There is also a risk that the planned systems may not be approved at all – or not clearly approved – due to the combination of materials used. This results in uncertainty and increased space, installation, planning and documentation expenditure. Compared to a mixed installation or even all-metal downpipes (cast iron), installing RAUPIANO PLUS with REHAU fire stop collars has many convincing advantages:

- System-tested security: Easy and secure planning, minimal coordination and documentation expenditure
- Clear technical specifications thanks to German general design certification
- Cost-effective and therefore economical
- Minimal space required (zero spacing)
- Customised design possible, e.g. using the REHAU angled fire stop collar



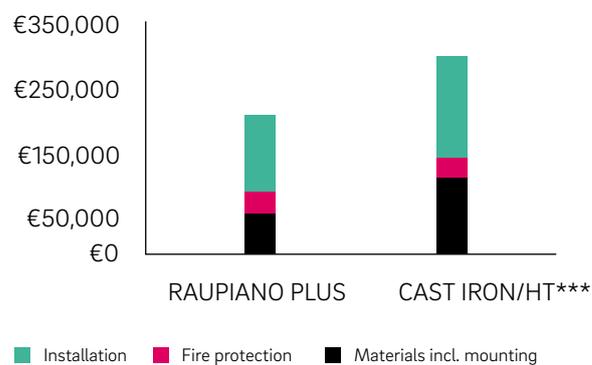
# Clear economic benefits

## Less space required – Faster installation.

RAUPIANO PLUS is not just the better technical solution, it is the economical choice, too. This applies to both detached houses and commercial projects.

The cost benefits for installation, fire protection and materials have been demonstrated in a commercial project with 313 residential units. The investor and contractor assessed installation with cast iron/HT pipes.

Commercial project with 313 residential units



Source for installation times: Innung Spengler, Sanitär- und Heizungstechnik, Munich, 2005

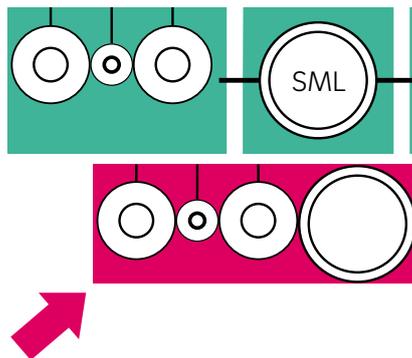
\*The stricter requirements on construction-related fire protection for mixed installations which came into effect on 1 January, 2013 did not yet apply during the original planning of the commercial project. To meet the new specifications of the German Institute of Civil Engineering (DIBt) today, greater installation and financial expenditure are to be expected with mixed installations (cast iron/HT pipe).



**Zero spacing**

When RAUTITAN and RAUPIANO PLUS are combined, a great amount of space can be saved thanks to the zero-spacing aspect. The downpipe supports which are absolutely required by the manufacturer at least every five floors for cast iron pipes and in case of warping are also no longer unnecessary – an expense that should not be underestimated.

In the case of the commercial project with 313 residential units, it is possible to gain 10.3 m<sup>2</sup> of additional living area – assuming only one installation shaft per residential unit. Converted, that is 31,000 Euros (at a price of €3,000/m<sup>2</sup>, the national average in Germany)



Cast iron/RAUTITAN:  
Space requirement:  
0.096 m<sup>2</sup>

RAUPIANO PLUS/  
RAUTITAN:  
Space requirement:  
0.063 m<sup>2</sup>



**The economical system of choice, too:**  
Greater revenue thanks to more living space sold,  
30% cheaper than cast iron/HT and 1/3 faster to  
install.



# The answer to many planning questions

## An interview with technical building services planner, Thomas Herp



Thomas Herp, technical building services engineer in Salach, Germany for more than 25 years.

Thanks to innovative ideas and sophisticated technical solutions, the specialist firm has made a good name for itself. Time after time, REHAU systems are used.

**Question: The number of complaints due to noise in domestic plumbing has risen considerably in recent years. How do you avoid these types of difficulties in your planning?**

**Thomas Herp:** Most commonly, these problems occur with drainage pipes. That's why we already choose components which also satisfy the highest demands for sound during the planning phase. They even go beyond the minimum requirements of the applicable standards. RAUPIANO PLUS is always a good choice here, both for detached houses and commercial projects.

**Question: Fire protection plays an important role in larger projects in particular. What has your experience been in this area?**

**Thomas Herp:** REHAU systems are perfect here, too. Their space-saving and easy-to-install fire protection collars offer additional planning and installation freedom. Smart and reliable solutions like this offer advantages to the building owner, the fitter and us, too.

**Question: What has your experience been in terms of cost-effectiveness when comparing conventional drainage systems?**

**Thomas Herp:** Every project is different, which is why it's hard to make blanket statements. But when you look at the system components, accessories, installation times and flexibility of the different systems, you see cost differences of up to 25 per cent, depending on the individual case. Potential like this can't be ignored by planners or building owners.

**Question: Where else do you see decisive advantages compared to other systems?**

**Thomas Herp:** I find the wide variety of choice and ability to combine different systems together to be especially convincing. For dimensions from DN 32 to DN 200, there is a comprehensive range of moulded parts with a host of special moulded parts available. With the standardised dimensions, transitions to sewer pipes of the main pipe can be created any time with no additional connecting components. High ring stiffness even makes below-ground installation possible in individual cases. This represents an overall system which can be used in nearly limitless ways and for which all the necessary components are generally available on site at short notice.

Over the past few years, REHAU have continually been improving their tried-and-tested concepts in a targeted way with RAUPIANO and other systems without an unmanageable "mixed bag" having resulted or compatibility having suffered.

**Question: What other REHAU components do you use?**

**Thomas Herp:** Improving energy efficiency lays a key role for us. REHAU offer a broad choice of systems in this area. This makes our job as technical building services planners much easier. In addition to the RAUTITAN domestic plumbing system and the RAUPIANO PLUS drainage system, customised REHAU systems are also used for underfloor heating and underfloor cooling, as well as for geothermal and solar systems in our projects. Thanks to their sophisticated and comprehensive range, REHAU are a leading system supplier.

# RAUPIANO PLUS DN 90

**The tried-and-tested, noise-damping RAUPIANO PLUS waste water system from REHAU opens up new dimensions:**

## **Greater safety margin**

- Up to 20% higher flow rate with comparatively larger internal diameters than a cast iron DN 80 pipe
- Increase in performance thanks to hydraulically optimised branching
- Optimal self-cleaning capability, even with small flush volumes

## **More space**

- 2 cm less prewall depth thanks to pipe diameters smaller than DN 110
- Increased space and flexibility

## **More for the money**

- Up to 10% lower material costs compared to DN 110
- Differentiation from HT DIY store product

## **More connection options than expected**

- Broad spectrum of use and high load-bearing capacity
- DN 90 and DN 50 sufficient in detached/semi-detached house construction



**RAUPIANO PLUS Single branch max flow**  
with hydraulically optimised inner radius



**Broad  
spectrum  
of use**



# RAUPIANO PLUS

## Millions of tried-and-tested uses over many years.

No compromises – The waste water system for every area of use: residential buildings, hotels, schools, hospitals, office buildings and commercial kitchens. For more than four decades, REHAU have been producing pipes and moulded parts for building drainage. Millions of metres of installed pipe speak for itself. If you would like to see practical examples related to your project, feel free to contact your REHAU representative.

- 1 Amber Gardens · Romania
- 2 Hotel Lomnica · High Tatras, Slovakia
- 3 Hotel Centreville · Podgorica, Montenegro
- 4 Apartment Sacre Coeur 2 · Prague, Czechia





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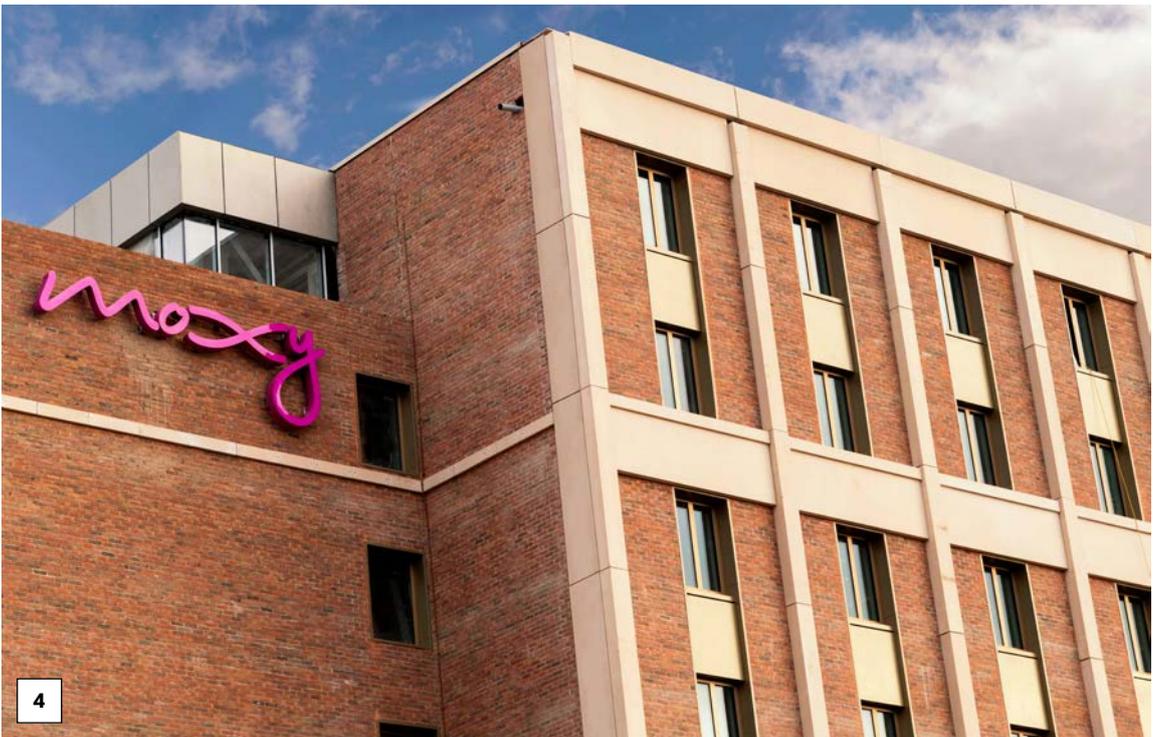


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- 1 Kallithea · Greece
- 2 Carpe diem Villa · Samsun, Turkey
- 3 Sinpas Cakmak Palas · Istanbul
- 4 Moxy Hotel · Scotland





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Hill Court, Walford  
Ross-on-Wye,  
HR9 5QN

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