

# company

## PhoNoFire®



building the future **together**

Technical manual 2017



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## PhoNoFire®

**PhoNoFire® is the best soundproof drainage system made of fire resistant copolymer polypropylene + reinforcing charges: the real plastic alternative to cast iron!**

The product line consists of a multilayer pipe and fittings ranging from 58 up to diam. 200mm diameter. The fittings are characterised by an innovative design and include special and exclusive elements.

### PATENTS

The technological innovation of PhoNoFire® is represented by **2 European patents**:

1. Ornamental, for the unique and innovative industrial design of fittings;
2. The gasket connection system on the ring which is mechanically inserted into the fitting socket.

PhoNoFire® pipes and fittings are certified according to the international standard UNI EN 1451-1

### PhoNoFire® MULTILAYER PIPE

- EXCEPTIONAL SOUNDPROOFING AGAINST DRAINAGE NOISE
- FIRE PERFORMANCE: PHONOFIRE IS CLASSIFIED B S3 D0 ACCORDING TO EUROPEAN STANDARD EN 13501
- PERFECT HYDRAULIC SEAL, EVEN DURING BACKFLOW, ENSURED BY A "MONO LIP" SEAL
- EXCELLENT CHEMICAL RESISTANCE FOR CONVEYING FLUIDS ACCORDING TO ISO/TR 10358

## SOUNDPROOFING

### Noise

A perceived noise (or sound) is only the final result of a series of natural phenomena (sound waves) that stimulate the eardrum.

To generate and spread noise (or sound), two components are necessary:

- an emitting source
- a means it can propagate through



The sound source is nothing but a body which, when it vibrates, is able to generate pressure variations with a certain frequency (measured in Hertz - Hz) and intensity (measured in Watts - W); sound waves need a sufficiently elastic medium of transmission to propagate, i.e. its particles must be able to mutually transmit the disturbing phenomenon.

Once it reaches the eardrum, the sound wave is captured and transmitted to the brain, which processes it.

It should however be emphasised that the means of transmission can be a fluid such as air (**air propagation Fig.1**) or a solid material such as a wall (**direct propagation Fig.2**). That is the reason why there may be very effective means of transmission (because they are sufficiently "elastic") such as air, concrete and wood which do not uphold particular resistance to the propagation of sound waves. There are also other means that are less "elastic" (water, for example) with high damping effects.

The human ear is able to perceive sounds in the frequency range of 20 up to 20.000 Hz that have a minimum amplitude of  $2 \times 10^{-5}$  Pa.

The human voice emits sound in the range of 300 up to 3.400 Hz.

### How is noise measured?

Rather than refers to power, intensity (amplitude) and frequency, the measurement of noise refers to a specific unit of measure, the decibel (dB), which is used to quantify the "Sound Power Level".

$$L_w = 10 \cdot \log(P_w/P_o) = [\text{dB}]$$

where:

- $P_w$  is the sound power under examination
- $P_o$  is the reference sound power ( $10^{-12}$  W).

The definition of Decibel is functional since the human ear is sensitive to Sound Pressure, but in a nonlinear way. True performance is very similar to a logarithmic curve.

This justifies and clarifies the reason why doubling acoustic power causes a change of only 3 dB.

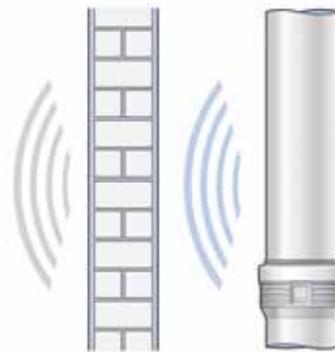


Fig. 1

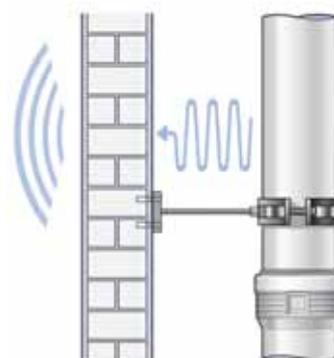


Fig. 2

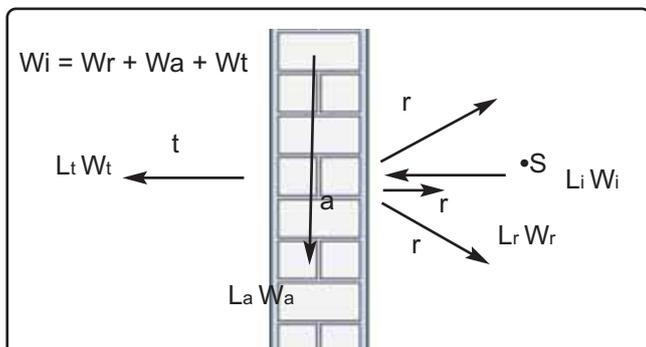
### Concepts of building acoustics

As mentioned previously, sound waves require a means, fluid, gaseous or solid, to propagate; sound does not propagate only in a vacuum.

When it comes to buildings, sound can spread via two means:

- fluids: for example, the air. In this case propagation takes place through atmospheric pressure changes generated by the vibration of the source
- solid: for example, the walls, where propagation takes place thanks to the vibration of component particles.

### Absorption, reflection and transmission of sound



$L_i, L_t, L_a, L_r =$  Incident, transmitted, absorbed and reflected sound levels.

$W_i, W_t, W_a, W_r =$  Incident, transmitted, absorbed and reflected sound power.

The apparent **Soundproofing Power  $R_t$**  of the wall is the difference between the incident and transmitted sound levels:

$$R_t = L_i - L_t \text{ (db)}$$

The **Coefficient of reflection** of the wall  $C_r$  is the ratio between reflected and incident power:

$$C_r = W_r / W_i$$

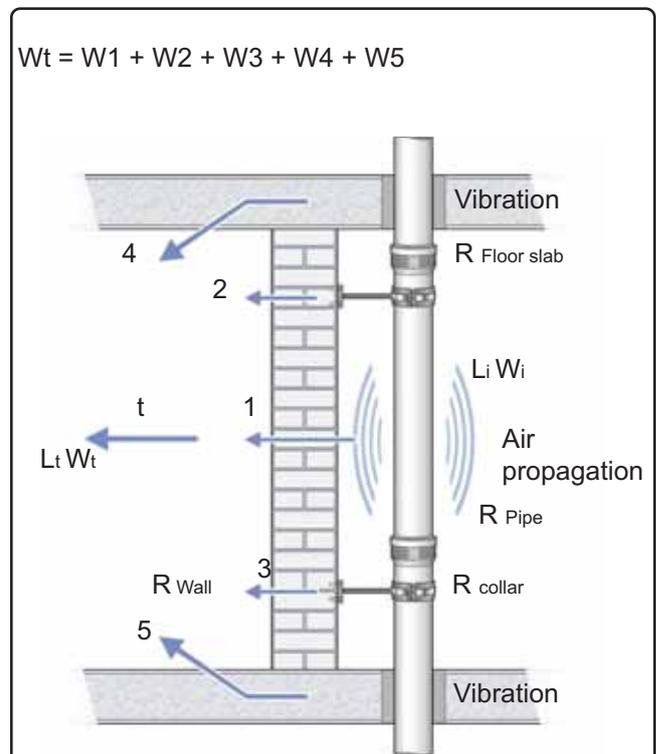
The **Coefficient of apparent absorption**  $C_a$  of the wall is defined:

$$C_a = 1 - C_r$$

In the case of drainage pipes, the water flow generates a vibration in the wall of the pipe. The vibration is transmitted to the surrounding air, resulting in the transmission of the sound wave through the air. The quality and the intrinsic characteristics of the materials the pipe is made of may lead to a reduction (damping) of the vibration caused by water flow.

Simultaneously, the vibration itself can be transmitted to the environment via solid means through the fastening elements (collars) and the elements used to protect the pipes where they pass through the walls and floor slabs. These create a direct bridge between the pipes and the environment. The sound vibration must be intercepted at the fastening points by particular collars, with specific seals that certify the soundproofing and by insulating materials in order to stop the propagation of sound waves.

### Wall with drainage pipes



Transmitted sound level  $L_t = L_i - R'$

Perceived noise in a room adjacent to a drain pipe with water flowing inside is the sum of the noise transmitted from the wall where pipe collars are fastened and the floor slabs where the drainage pipe passes through.

## Reference standards

Some standards define the minimum level of sound insulation required in buildings to protect people from noise disturbances. Among them:

- a) DIN 4109 relating to sound insulation in construction.
- b) Directive VDI 4100.
- c) The DPCM 5/12/97 establishes the criteria for noise pollution in Italy.

**DIN 4109** establishes the maximum noise value, expressed in decibels, that a water inlet and drainage system can produce. This value is equal to 30 dB(A).

Directive **VDI 4100** defines 2 levels of sound insulation, distinguishing between apartment blocks, duplexes and townhouses, and single dwellings. The limits for noise levels in the first instance is 25 dB, in the second 20dB. The **Italian code** only defines "passive acoustic requirements of buildings" for new systems, establishing the acoustic requirements of both external sources and building structures (floors, facades...)

Buildings subjected to discorde have been classified into 7 categories:

- Category A: residential buildings or comparable
- Category B: office buildings or comparable
- Category C: buildings for hotels, guest houses and comparable activities
- Category D: buildings for hospitals, clinics, care homes or comparable
- Category E: buildings for school activities (at all levels) or comparable
- Category F: buildings for recreation or worship or comparable
- Category G: buildings for commercial activities or comparable .The decree provides that the limits allowed for noise produced by systems are:
  - 35 dB(A) for discontinuous services (lifts, plumbing drains, faucets)
  - 25 dB(A) for continuously operating systems (heating and air conditioning, ventilation)

# THE OUTSTANDING SOUNDPROOFING OF PHONOFIRE®

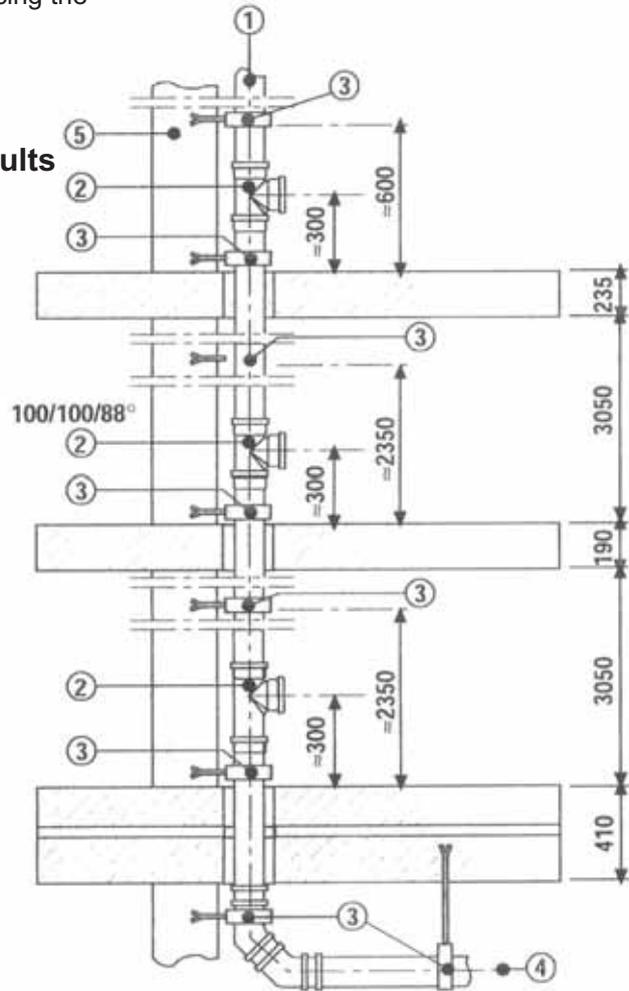
PhoNoFire® is a drainage system capable of greatly reducing the noise produced by the discharge of water.

## Soundproofing tests: test conditions and results

The soundproofing tests were performed at the Fraunhofer Institute for Construction Physics in Stuttgart, according to the system diagram presented in DIN 4109 and EN 14366. The pipe was examined from a phono technique point of view in a standard system based on various volumes of drainage. The system diagram subjected to testing is shown in Figure 1.

## Test system specifications

- 1) PhoNoFire® is installed on a concrete wall with mass per unit area equal to 220 Kg/m<sup>2</sup>
- 2) Diameter of tested pipes and fittings is 110 mm.
- 3) The column goes from the mezzanine floor to the cellar, via groundfloor. The connections for service pipes are installed at cellar level.
- 4) The system is designed for flow rates of 0.5 - 1.0 - 2.0 - 4.0 l/s.



The results obtained and certified are shown in the following table:

Measurements were produced at the Fraunhofer Institute for Construction Physics in Stuttgart-Germany	The PhoNoFire® drainage system with Bismat 1000 fastening collars and swept-entry branch l/s dB (A)				
Sound level Lsc, A (dB(A)) measured at the base of the plant behind the wall, in accordance with standard EN 14366	l/s dB(A)	0,5 3	1 8	2 14	4 19

## REACTION TO FIRE IN ACCORDANCE WITH EUROPEAN STANDARD EN 13501.

PhoNoFire® is classified B S3 d0 in accordance with European standard EN 13501

### Class A a F

A2 = Non-combustible materials (only metal and inert materials)

B = combustible materials - very limited contribution to fire

C, D = Combustible materials

E = Easily combustible materials

F = Materials not subject to reaction to fire testing

### Classes S1 to S3

S1 = low emissions of fumes

S2 = emission of average intensity

S3 = emission of high intensity

### Classes d0 to d2

d0 = no dripping

d1 = slow dripping that is extinguished within 10 seconds

d2 = high dripping during testing with a small flame

## PHONOFIRE® PIPES

The PhoNoFire® pipe consists of three layers.

### Colour

White RAL 9018. The internal layer of the pipe is coloured white.

### Pipe marking

COES, PhoNoFire®, Multilayer Pipe, extruder no. , PP, DN x thickness, HTEM, certificates and reference name, production date.

### Chemical resistance

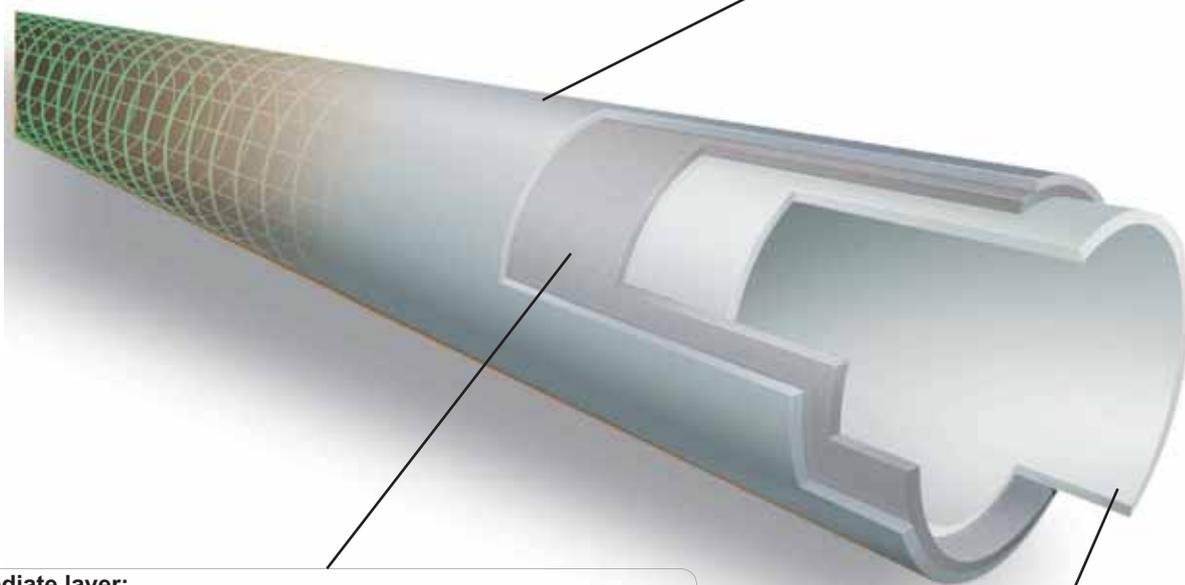
PhoNoFire® guarantees considerable resistance to a very large number of chemical agents. In particular to surfactants, even at high temperatures, according to ISO/TR 10358.

### Reaction to fire

PhoNoFire® is classified B S3 d0 according to European standard EN 13501.

### Range

From DN 32 to 200mm.



#### Outer layer:

##### PP-base fire resistant copolymer compound

- High impact resistance and weatherability, even at lower temperatures
- Low flame spread in case of fire

#### Intermediate layer:

##### PP-based fire resistant copolymer compound + reinforcing charges

- High strength and stiffness
- Excellent level of soundproofing

#### Inner layer: :

##### White coloured PP-based fire resistant copolymer compound

- Smooth flow of fluid without fouling
- Chemical resistance
- Simple internal inspection, thanks to the white inner layer

## PHONOFIRE® CONNECTIONS

They are produced using a PP copolymer compound plus reinforcing charges.

The **design of the fittings**, with innovative grooves, gives greater compactness and strength even at low temperatures.

The **double lipseal** is co-moulded onto on a polypropylene ring inserted mechanically into the fitting socket.

The first sealing lip stops dust and any dirt, so that the second sealinglip, which acts as a hydraulic seal, always has a clean and protected work surface.

In addition to facilitating the insertion of the pipe into the fitting, the bi-material seal cannot be removed.

This ensures a perfect hydraulic seal, even during backflow, and total safety during installation.



### PLUS

**Objectification of the presence of the gasket in its seat, even after completing the installation.**

**Resistance to misalignment between the pipe and the socket: the rigidity of the socket and the stability of the seal reduce the ovalisation of the fitting under mechanical stress.**

**The vacuum seal is guaranteed by the presence of a sealing lip, that makes the pipe suitable for negative pressure drainage systems, such as naval systems.**

**The range has special and exclusive elements such as the swept-entry branch available in diam. 110/90 and 110/110 mm**

The fitting socket reports the following information:

Plate 1: Corporate brand

Plate 2: Product brand, article description, reference standards



All fittings are supplied with adhesive labels containing a bar code, part number and description of the element



## THE AESTHETIC VALUE OF PHONOFIRE®

Drainage systems are usually designed to be functional and practical.

COES, on the other hand, has come up with a "beautiful" product, not just aesthetically speaking. The attention paid to the design of the details aimed to define new quality standards for transportation, storage and installation of pipes.

### PLUS

#### Fittings

- Industrial Design and compactness of the pieces
- Plate with Logo
- Adhesive label with bar code and part description
- Packaging

#### Pipes

- Marking
- Packaging



PhoNoFire® obtained the **Design Plus 2005 award** run by the Frankfurt Trade Fair in collaboration with the German Design Council, for its product concept and innovative industrial design.



## “SOCKET” CONNECTION

Socket connection is fast and easy:

1) Clean the ends of pipe and fitting

2) Check the integrity of the socket seal (Fig.1)



Fig. 1

3) Lubricate the part to be inserted with COES lube (Fig.2)



Fig. 2

4) Insert the pipe up to the abutment of the socket; then slide it out 10 mm (Fig.3).

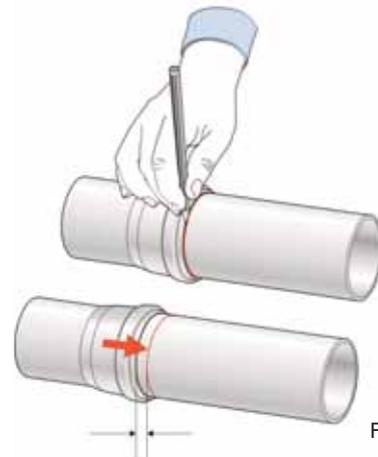


Fig. 3

5) PhoNoFire® pipes and fittings have perfectly bevelled ends to facilitate insertion. If using pipe sections, make a clear and perpendicular cut (Fig.4). Therefore, in order not to damage the seal during insertion, make sure to perform bevelling using the appropriate tool (Fig. 5).

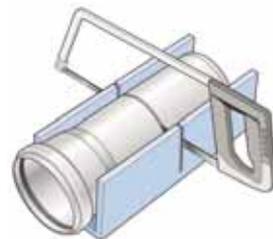


Fig. 4



Fig. 5

## CONNECTION TO OTHER MATERIALS

The PhoNoFire® program includes a series of connection sleeves for other existing materials, making any type of installation easy

## FASTENING SYSTEMS

The design and sizing of sewage and rainwater systems must take into account standard UNI 12056-1-2-3-4-5. For the installation and use of PhoNoFire® system, please take into account of any national provisions or laws.

The socket system ensures the hydraulic seal. Any mechanical stress must be taken into account during design and assembly, so as not to affect the integrity of the system's hydraulic seal.

Pipes must be fastened using bracelets, placed under the socket, in order to prevent it from slipping (Fig. 1).

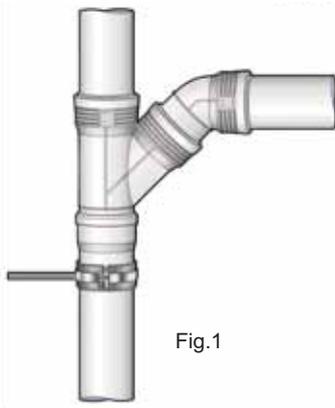


Fig.1

The maximum distance between the bracelets must not exceed:

- 10 times the diameter of the pipe for horizontal pipes;
- 15 times the diameter of the pipe for vertical pipes.

Moreover, all fittings which involve a change in direction of the system must be properly clamped to prevent the socket from slipping in the event of accidental excess pressure. The water column should not exceed a maximum height of 5 metres.

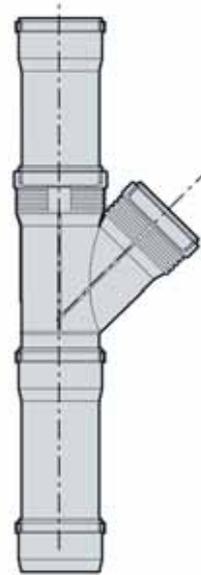


Fig.2

The socket length has been calculated to absorb thermal expansions of pipes of 2 meters maximum length. It is normal practice to estimate thermal expansion as 5 mm per metre for waste water drainage and 2 mm per metre for downpipe columns. **The system must be built in such a way that thermal expansion is not prevented.**

A fixed point that blocks that part of the system must be installed under the socket of each pipe. The rest of the system is free to expand.

**In any event, slipping under maximum test pressure should not exceed 10mm.**



## COLLARS FOR FIXING THE PIPES



The PhoNoFire® system comes with special pipe fastening collars for optimal soundproofing.

The main characteristics are the following:

- The collar is made of two parts,
- The two locking screws allow correct installation even with pipes that have different tolerances,
- The blue DÄMMGULAST® soundproofing seal meets B1 class reaction to fire rating, according to DIN 4102, with no dripping in case of fire,
- By removing the spacers, the collar can be used as a fixed fastening point.



## FIRE RESISTANCE ACCESSORIES: FIRE PROTECTION SLEEVE



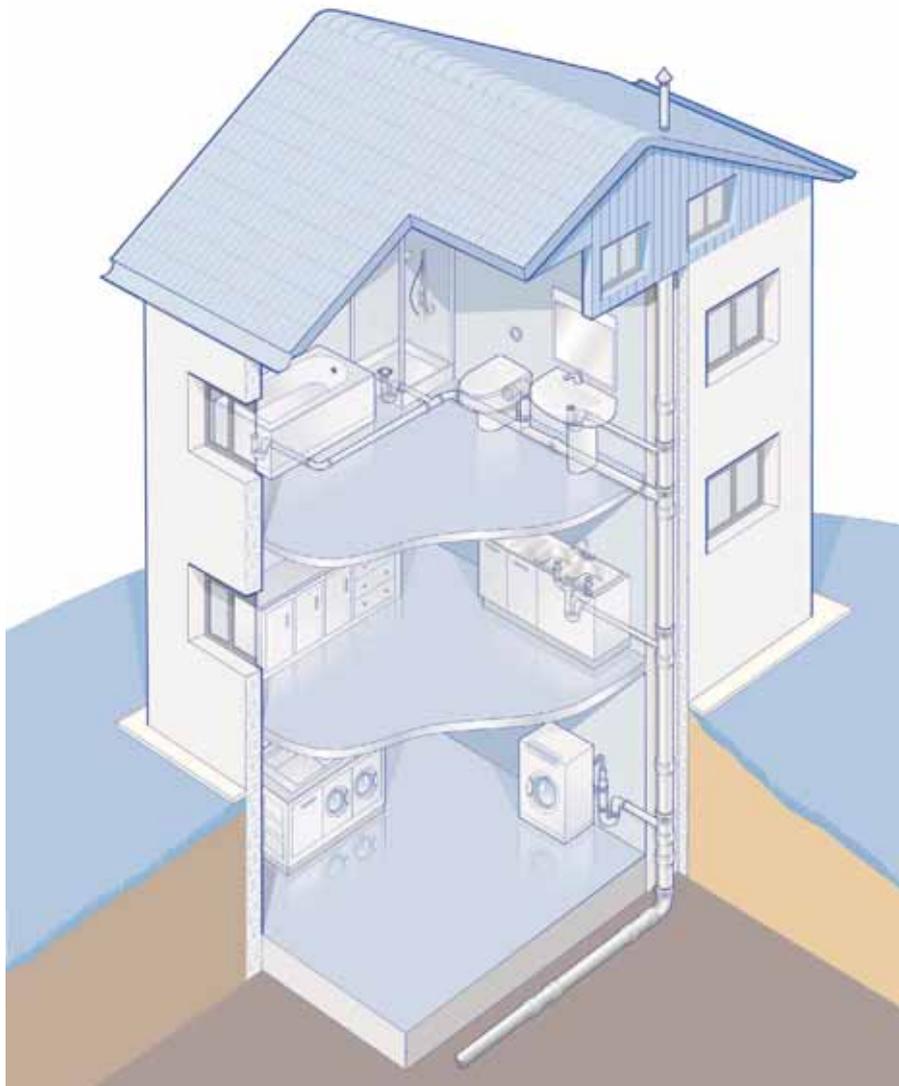
To operate and install the fire protection sleeve, consult the Coestilen® system installation instructions



## FIELDS OF USE

Due to its outstanding strength and soundproofing characteristics, PhoNoFire® is particularly suitable for the following uses:

- **Private residential buildings** (apartment blocks, single and multi-family housing)
- **Private commercial buildings** (hotels, shopping centres, offices, ships)
- **Public buildings** (schools, hospitals)



## TRANSPORT

In event of pipes being removed from their factory packaging avoid disorderly transportation, (Fig.1).

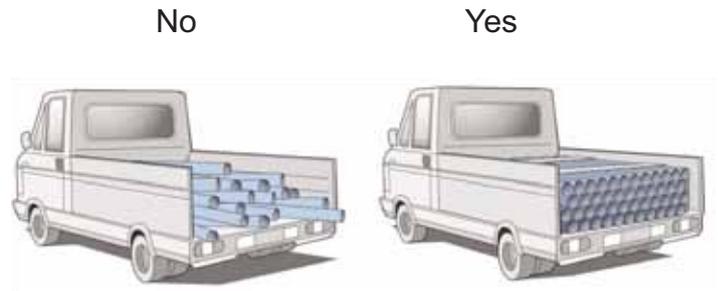


Fig. 1

Avoid dragging pipes on the ground or against the sides and tailgate of the vehicle (Fig.2).

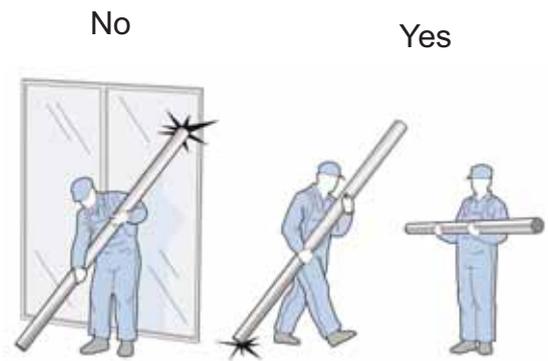
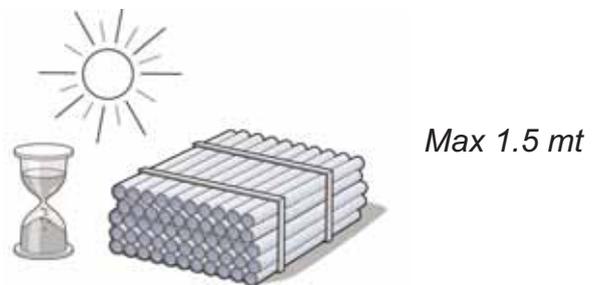


Fig. 2

## STORAGE

### Pipe Stacking

- Place smooth pipes on flat surfaces; socketed pipes are packaged using special frames to prevent warping.
- Do not exceed 1.5 m in height when stacking.
- Outdoor storage must not exceed 2 years.



Max 2 years

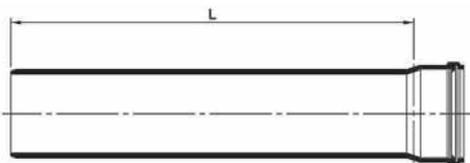
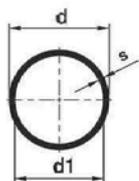
Fig. 3

### Fittings storage

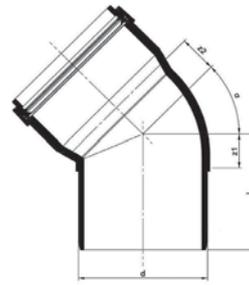
- The same criteria used for pipes also apply to fittings; they should be stored with care and protected from sunlight.
- Avoid contact with petrol or Benzene.



## PIPE WITH ONE SOCKET HTEM, WITH MONO-LIP GASKET

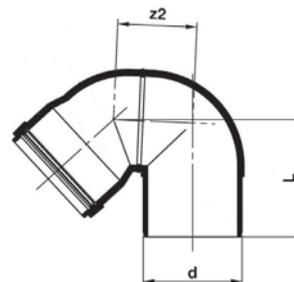


code	d	d1	L	s		
105802W	58	49,4	250	4,0	4	800
105805W	58	49,4	500	4,0	12	480
105810W	58	49,4	1000	4,0	12	wooden frame
105820W	58	49,4	2000	4,0	12	wooden frame
105830W	58	49,4	3000	4,0	12	wooden frame
107802W	78	69,4	250	4,2	4	480
107805W	78	69,4	500	4,2	12	144
107810W	78	69,4	1000	4,2	12	144
107815W	78	69,4	1500	4,2	12	144
107820W	78	69,4	2000	4,2	12	144
107830W	78	69,4	3000	4,2	12	144
100902W	90	80,6	250	4,2	4	320
100905W	90	80,6	500	4,2	9	108
100910W	90	80,6	1000	4,2	9	108
100915W	90	80,6	1500	4,2	9	108
100920W	90	80,6	2000	4,2	9	108
100930W	90	80,6	3000	4,2	9	108
101102W	110	99,8	250	6	4	160
101105W	110	99,8	500	6	9	81
101110W	110	99,8	1000	6	9	81
101115W	110	99,8	1500	6	9	81
101120W	110	99,8	2000	6	9	81
101130W	110	99,8	3000	6	9	81
101302W	135	123,4	250	5,6	2	160
101305W	135	123,4	500	5,6	8	wooden frame
101310W	135	123,4	1000	5,6	8	wooden frame
101315W	135	123,4	1500	5,6	8	wooden frame
101320W	135	123,4	2000	5,6	8	wooden frame
101330W	135	123,4	3000	5,6	8	wooden frame
101602W	160	148,4	250	5,6	2	80
101605W	160	148,4	500	5,6	2	40
101610W	160	148,4	1000	5,6	4	36
101615W	160	148,4	1500	5,6	4	36
101620W	160	148,4	2000	5,6	4	36
101630W	160	148,4	3000	5,6	4	36
102002W	200	187,6	250	6,2	1	40
102005W	200	187,6	500	6,2	1	15
102010W	200	187,6	1000	6,2	4	wooden frame
102020W	200	187,6	2000	6,2	4	wooden frame
102030W	200	187,6	3000	6,2	4	wooden frame



**BEND HTB**

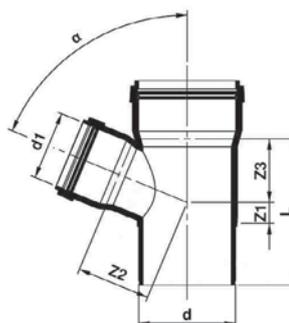
code	d	α	z1	z2	L	
115815W	58	15°	6	15	67	4
115830W	58	30°	8	20	70	4
115845W	58	45°	12	22	75	4
115867W	58	67°30'	20	30	83	4
115887W	58	87°30'	28	40	98	4
117815W	78	15°	7	15	77	4
117830W	78	30°	10	20	82	4
117845W	78	45°	15	26	88	4
117867W	78	67°30'	23	37	98	4
117887W	78	87°30'	32	51	113	4
110915W	90	15°	8	15	75	4
110930W	90	30°	14	20	85	4
110945W	90	45°	21	28	88	4
110967W	90	67°30'	34	40	100	4
110987W	90	87°30'	50	56	117	4
111115W	110	15°	9	20	88	4
111130W	110	30°	16	28	93	4
111145W	110	45°	25	35	100	4
111167W	110	67°30'	41	47	116	4
111187W	110	87°30'	60	70	128	4
111315W	135	15°	12	22	104	4
111330W	135	30°	18	30	113	4
111345W	135	45°	30	40	126	4
111367W	135	67°30'	48	58	143	4
111387W	135	87°30'	70	80	165	4
111615W	160	15°	12	20	103	1
111630W	160	30°	23	30	117	1
111645W	160	45°	36	45	128	1
111667W	160	67°30'	58	64	151	1
111687W	160	87°30'	84	90	176	1
112045W	200	45°	48	90	176	1
112087W	200	87°30'	100	118	205	1



**VENTILATION BEND**

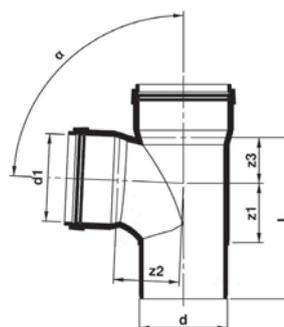
code	d	z2	L	
591100W•	110	86	133	4

•Prefabricated



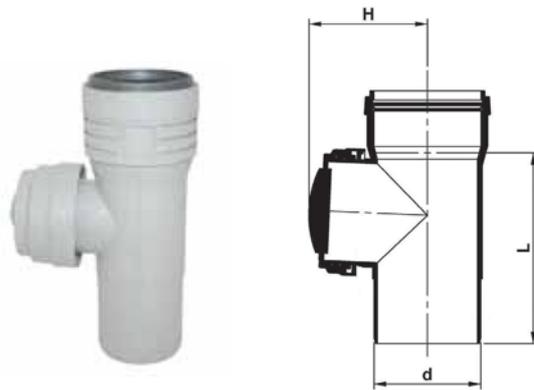
**BRANCH HTEA**

code	d/d1	α	z1	Z2	Z3	L	
205858W	58/58	45°	13	75	75	150	4
255858W	58/58	67°30'	24	48	48	132	4
305858W	58/58	87°30'	36	40	40	136	4
207858W	78/58	45°	6	92	89	164	4
207878W	78/78	67°30'	16	99	99	186	4
257858W	78/58	45°	24	58	53	146	4
257878W	78/78	67°30'	29	63	63	162	4
307858W	78/58	87°30'	37	49	40	146	4
307878W	78/78	87°30'	46	47	47	162	4
209058W	90/58	45°	1	97	90	157	4
309058W	90/90	87°30'	36	53	40	142	4
209090W	90/90	45°	21	109	109	196	4
309090W	90/990	87°30'	51	53	53	169	4
201158W	110/58	45°	-7	115	104	179	4
251158W	110/58	67°30'	14	84	65	150	4
301158W	110/58	87°30'	35	62	40	147	4
201178W	110/78	45°	21	124	116	192	4
251178W	110/78	67°30'	24	86	76	171	4
301178W	110/78	87°30'	45	64	52	169	4
201111W	110/110	45°	25	134	134	232	4
251111W	110/110	67°30'	42	89	89	201	4
301111W	110/110	87°30'	60	66	66	200	4
201311W	135/110	45°	15	159	149	255	4
301311W	135/110	87°30'	64	78	66	219	4
201313W	135/135	45°	32	168	168	292	4
301313W	135/135	87°30'	71	81	81	243	4
201611W	160/110	45°	0	176	160	255	1
201616W	160/160	45°	36	193	193	322	1
301616W	160/160	87°30'	84	89	89	265	1
202016W	200/160	45°	20	231	223	343	1
202020W	200/200	45°	47	240	240	385	1



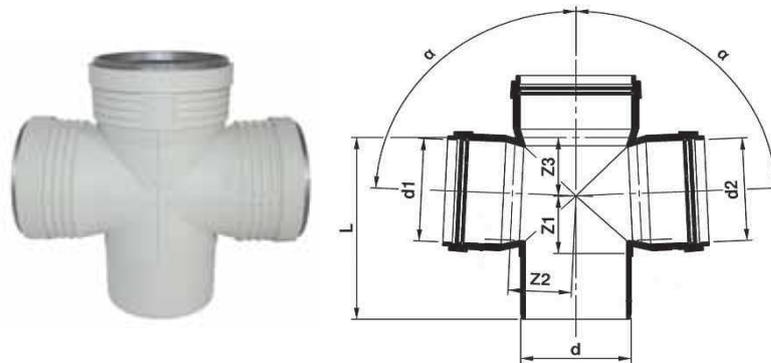
**SWEPT-ENTRY BRANCH**

code	d/d1	z1	z2	z3	L	
221190W	110/90	57	57	82	188	4
221111W	110/110	73	61	82	207	4



**INSPECTION TEE HTRE**

code	d	H	L	
325858W	58	82	150	4
327878W	78	82	157	4
320909W	90	86	157	4
321111W	110	95	195	4
321313W	135	112	225	4
321616W	160	126	238	2



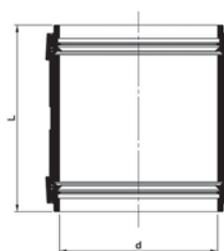
**DOUBLE BRANCH HTDA**

code	d/d1/d2	$\alpha$	Z1	Z2	Z3	L	
381111W	110/110/110	87°30'	60	66	66	200	2



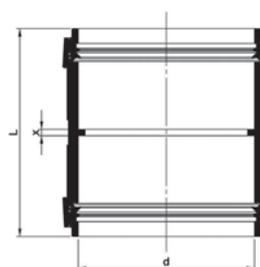
**FITTING FOR PHONOFIRE-PE/PP/PVC CONNECTION**

code	d1/d2	L	L1	
635805W	58/50	155	100	24
637807W	78/75	155	96	12
631312W	135/125	197	121	8



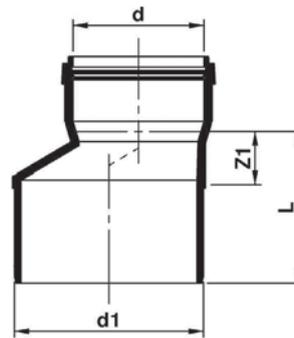
**SLEEVE COUPLER HTU**

code	d	L	
405810W	58	120	4
407810W	78	135	4
400910W	90	132	4
401110W	110	132	4
401310W	135	174	4
401610W	160	180	4
402010W	200	192	1



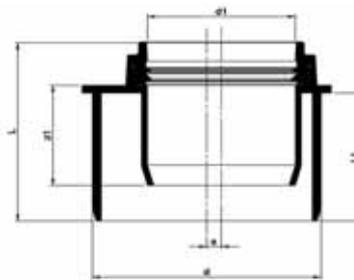
**SLEEVE WITH SHUTTER HTMM**

code	d	X	L	
405820W	58	4	120	4
407820W	78	4	135	4
400920W	90	4	132	4
401120W	110	4	132	4
401320W	135	5	174	4
401620W	160	5	180	4
402020W	200	-	192	1



**INCREASE HTR**

code	d/d1	Z1	L	
155878W	58/78	20	91	4
155809W	58/90	28	97	4
155811W	58/110	42	116	4
157809W	78/90	16	84	4
157811W	78/110	30	104	4
150911W	90/110	20	95	4
151113W	110/135	28	123	4
151116W	110/160	43	138	1
151316W	135/160	29	124	1
151620W	160/200	35	138	1



**FITTING FOR PE/PP-PHONOFIRE CONNECTION**

code	d1/d	L	Z1	L1	
625804W	40/58	67,5	41	45	80
625805W	50/58	65,5	39	45	24
627805W	50/78	70	39	50	36
627807W	75/78	69	43,5	50	48
621312W	125/135	99	47	69	8



**CLOSING PLUG HTM**

code	d	L	
395800W	58	40	4
397800W	78	45	4
390900W	90	50	4
391100W	110	50	4
391300W	135	60	4
391600W	160	70	1



**P TRAP**

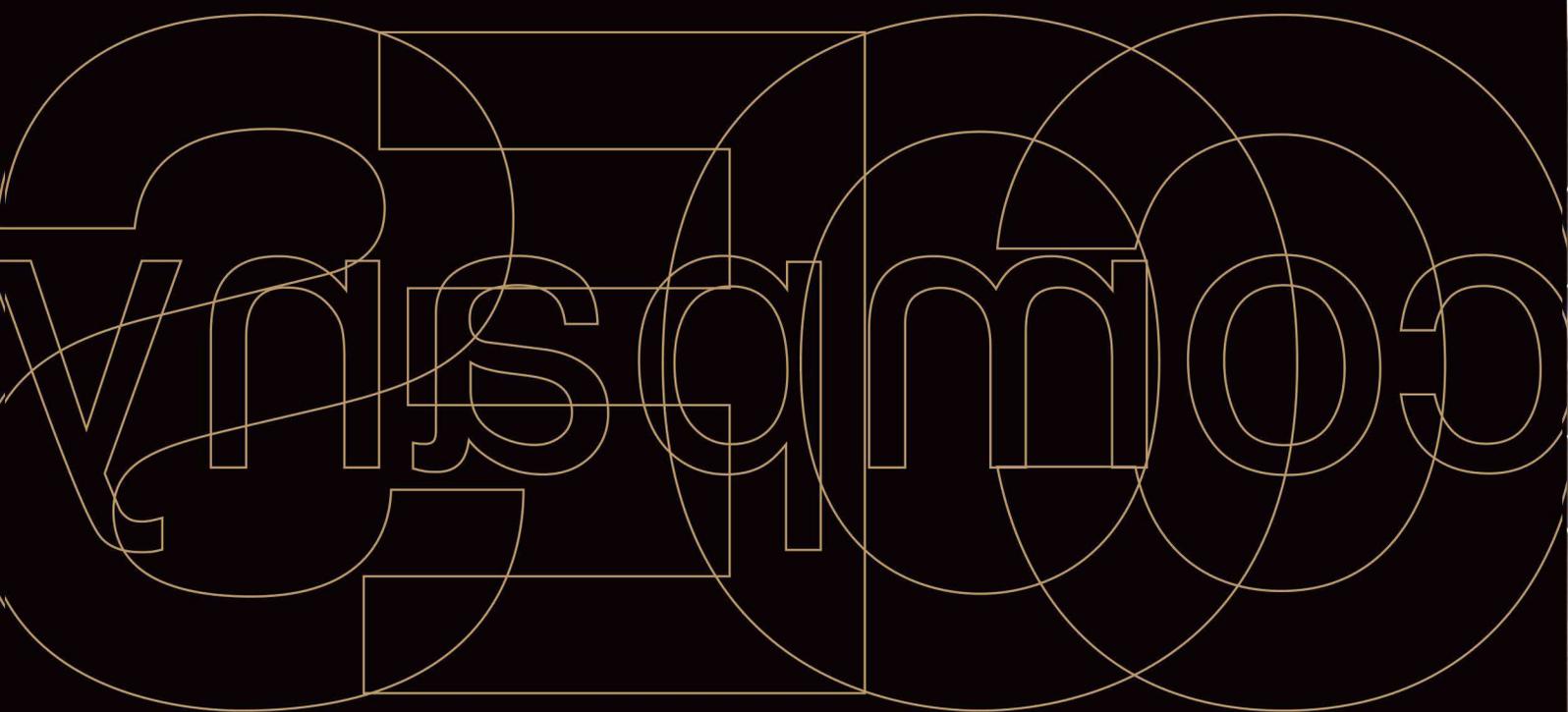
code	d	ventilation•	
FPH701158VPTW (with ventilation)*	110	58	1
FPH7011PTWP (without ventilation)**	110		1



**S TRAP**

code	d	ventilation•	
FPH701158VSTW (with ventilatio)*	110	58	1
FPH7011STW (without ventilation)**	110		1





# PhoNoFire®



**INDUSTRIE COMPOSIZIONE STAMPATI S.r.l.**

**Registered Office**

Strada Prov.le per Gioia  
Centro Aziendale Quercete  
81016 **SAN POTITO SANNITICO** (CE)  
Part. IVA: IT 03629690615

**Headquarter and Building Division Plant**

Via Caduti del Lavoro, 9/A  
20096 - **Pioltello** (MI) Italy  
tel. +39 02 921361 - fax +39 02 92136227

**Infrastructure Division Plant**

Via degli Artigiani, 27 località Palude  
06024 - **Gubbio** (PG) Italy  
tel. +39 075 6210501

**info@coes.it**

**www.coescompany.com**



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