Technical catalogue

REDI

PHONOLINE: Soundproof piping system

The Company

REDI has been producing plastic fittings for over 40 years, becoming a highly advanced and successful company.
The reason for this success is our constant effort in offering the most comprehensive service to our Clients aiming at establishing long-lasting and profitable business relationships.
REDI is certified in accordance with quality standards UNI EN ISO 9001:2008.

REDI manufactures and offers the following product ranges:

- PVC-U rubber ring-sealed fittings for underground drainage (EN 1401)
- PVC-U and PP inspection chambers (AFNOR-ANF)
- PVC-U anti-flooding valves (DN 100 ÷ 630)
- PVC-U solvent weld fittings for above ground drainage (EN 1329 - AFNOR-ENF)
- Phonoline: soundproof piping system 12 dB (EN 14366)
- PP pipes and fittings for non-pressure above ground drainage (EN 1451)
- Surface drainage systems
- Ventilation

REDI is part of Aliaxis group, world leader in the manufacture of building materials.
The Company operates a policy of progressive improvements and reserves the right to alter the specification of any product without prior notice. Information given by way of illustrations and dimensions is intended to assist the Buyer but where such information is of paramount importance it should be confirmed with the Company in writing before any order is placed.

REDI is a friend of the environment *ISO 14001*


IIP
IQNet
CERTIFICATO N. / CERTIFICATE N. 47
Si certifica che il Sistema di Gestione per la Qualità di / We hereby certify that the Quality Management System operated by
REDI SPA
UNITA' OPERATIVE / OPERATIVE UNITS
VIA MADONNA DEI PRATI, 5/A - 40069 ZOLA PREDOSA (BO)
è conforme alla norma / is in compliance with the standard
UNI EN ISO 9001:2008
per le seguenti attività / for the following activities
EA14
SINCERT
CISQ

UNI EN ISO 14001


SGA
IQNet
CERTIFICATO N. / CERTIFICATE N. 136
Si certifica che il Sistema di Gestione Ambientale di / We hereby certify that the Environmental Management System operated by
REDI SPA
UNITA' OPERATIVE / OPERATIVE UNITS
VIA MADONNA DEI PRATI, 5/A - 40069 ZOLA PREDOSA (BO)
è conforme alla norma / is in compliance with the standard
UNI EN ISO 14001:2004
per le seguenti attività / for the following activities
EA14
Progettazione e produzione di sistemi di tubazione in materiale termoplastico per scarico acque tramite processo di stampaggio ad iniezione
Design and production of thermoplastic piping system for waste water by injection moulding.
SINCERT
CISQ

UNI EN ISO 9001

Index

The new soundproof piping system

phono line

REDI Phonoline has been certified by the French CSTB and the German Fraunhofer Institute according to EN 14366, only European standard for soundproof systems.

Widest European Soundproof system: 8 diameters available.
More flexibility for designers, contractors and installors.

Standard metric-sized range: unlike most existing systems, REDI Phonoline is 100% standard metric size and does not require adaptors for the connection to the horizontal waste network or sewer network.

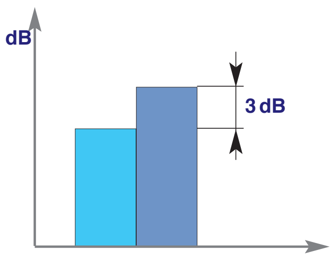
Fire reaction class B s2 d0: the best performance for plastic systems (most existing soundproof systems are classified B2, B1 or B at the best)

Thermal linear expansion: only 0,04 mm/m x °C
(most existing systems have a double expansion or even more)

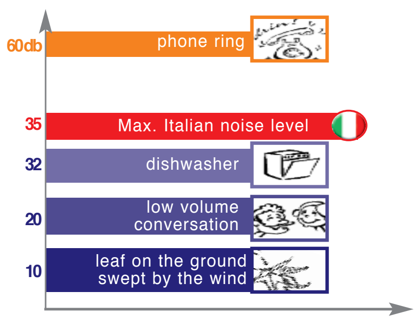
WHAT IS DECIBEL?

A decibel is a unit calculated from a logarithm of the ratio between the measured sound multiplied by 10. The human ear, via the eardrum, is sensitive to pressure, but not in a linear way; doubling a pressure value does not mean that the sensation increases two-fold. For example 40 dB is not half of 80 dB.
Instead the 3 dB rule is applied i.e. "doubling an acoustic power value corresponds to an increase in sound intensity of 3 dB; vice versa, an acoustic power value that is halved corresponds to a decrease in sound intensity of 3 dB.
So 40 dB + 40 dB = 43 dB
And 80 dB - 40 dB = 77 dB

$$dB = 10 \log \frac{P}{Pa}$$



Noise which is halved



ABSTRACTS FROM ITALIAN LAW REFERENCES

D.P.C.M. 5th December 1997 (standard n. 447/1995)

Sect. 1- Application area

1. 1. The current decree-following section 3, paragraph 1, letter e) of the law of 26th October 1995, n. 447 defines the acoustic requirements of the sound sources originated inside the buildings, the passive acoustic requirements of the buildings and of the components used for building them, in order to reduce human exposition to the noise.

Sect. 2-Definitions

1. Following the application of this decree, the houses reported on article 2, paragraph 1, letter b), of the law of 26th October 199, n.447, are split up according to the classes reported in the A schedule, enclosed to the present decree.
2. The horizontal and the vertical elements are components of the buildings.
3. The following are considered as discontinuous functioning: services lifts, waste and soil systems, the bathrooms, the wc elements and the the sinks and various fittings.
4. The following are considered as continuous functioning services: heating system, ventilation and air-conditioning system.

NOISE PRODUCED BY TECHNOLOGICAL EQUIPMENTS

The noise produced by the technological equipments must not go over the following limits:

a) 35 dB(A) LAmax with a slow time constant for discontinuous functioning services:

b) 25 dB(A) LAeq for continuous functioning services

The measurements of sound level must be carried out in the environment where the noise level is higher.
Such environment has to be different from that one where the noise is originated.

Chart A - House classification (art. 2)

- Class A: building used as residences or similar use;
- Class B: building used as offices;
- Class C: building used as hotels, boarding houses and similar activities;
- Class D: building used as hospitals, clinics, nursing homes and similar use;
- Class E: building used as school activities at any levels and similar use;
- Class F: building used for recreational, religious or similar activities;
- Class G: building used for commercial activities or similar.

ABOUT NOISE...

The choice of a soundproof piping system follows first the analysis of common noise levels we experience daily in our houses.

The following table enables a right comparison of noises affecting our daily life.

Note that some National Building Regulations require a noise limit below 35 dB.

PRODUCT DESCRIPTION

- Soundproof pipes and fittings for public and private drainage
- Thermoplastic mineral-reinforced material
- Ring jointed sockets fitted with certified elastomeric liprings
- Fittings packed in carton boxes
- 2/3-meters long pipes packed in wood frames and protected by film
- 1/0,5/0,25/0,15-meters pipes packed in carton boxes
- Pipe support: phonoline sound perfomances require noise-insulating supports

TECHNICAL DATA

- Density: 1,75 g/cm3
- Fire resistance: not flammable item complying to Class B s2 d0 NF P 92501
- Coefficient of thermal linear expansion; 0,04 mm/m x °C
- Colour: RAL 9002 pearl white
- Lip rings certified EN681

AVAILABLE DIAMETERS

- 40 - 50 - 75 - 90 - 100 - 110 - 125 - 160

INSTALLATION

- Pipes and fittings cutting, chamfering, cleaning, pipes and jointing must be executed in full compliance with national building regulations.

GENERAL FEATURES OF THE SYSTEM

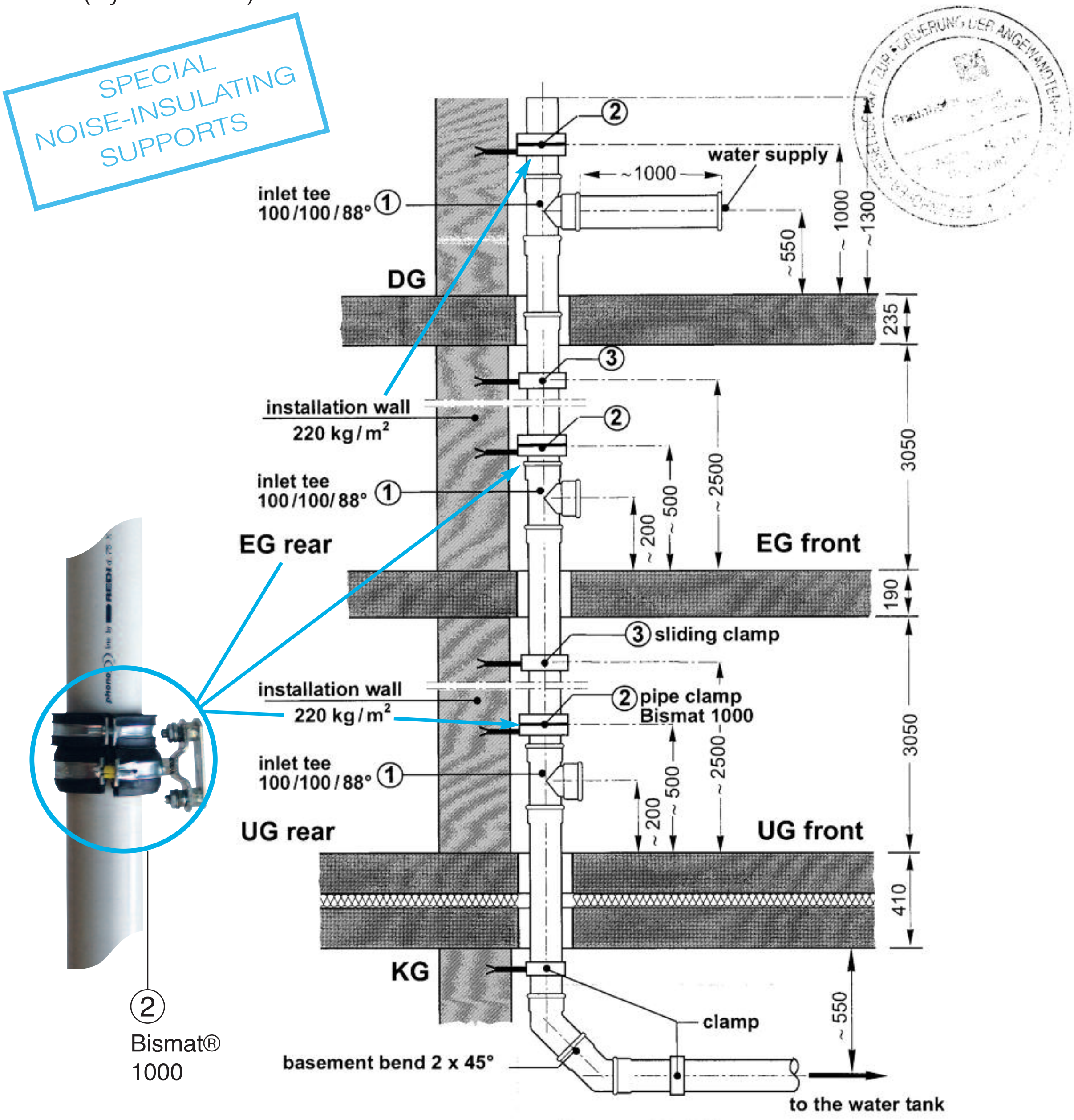
- ALGAE AND BACTERIA-PROOF
- ABRASION PROOF
- ELECTRICALLY INSULATED
- GRANTS EXTREMELY HIGH INTERNAL SMOOTHNESS
- SHOCK RESISTANT
- CORROSION RESISTANT (SEE CHART ON PAGE 5)
- UNFLAMMABLE B s2 d0

CORROSION RESISTANCE CHART

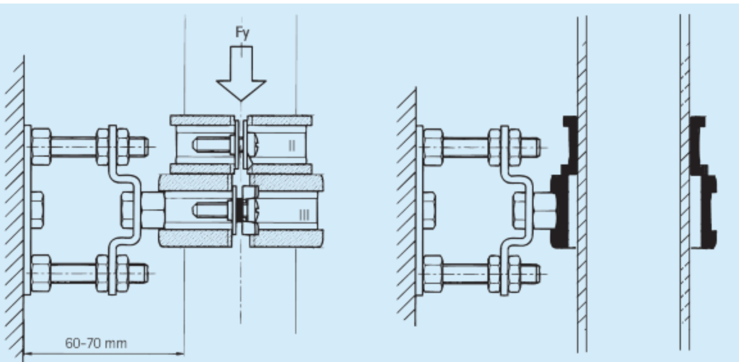
Prodotto	Conc. %	Temp.° 20	C 60
ACETICA, ALDEIDE	100	NS	-
ACETICA, ANIDRIDE	100	NS	NS
ACETICO ACIDO	60	S	L
ACETICO ACIDO MONOCL.	SOL.	S	L
ACETONE	100	NS	NS
ADIPICO, ACIDO	SOL.SAT.	S	L
ALLILICO, ALCOLE	90	L	NS
ALLUMINIO CLORURO	SOL.SAT.	S	S
ALLUMINIO SOLFATO	SOL.SAT.	S	S
AMILE ACETATO	100	NS	NS
AMILICO, ALCOLE	100	S	L
AMMONIACA (LIQ.)	100	L	NS
AMMONIACA (SOLUZ.)	SOL.DIL.	S	L
AMMONIO, CLORURO	SOL.SAT.	S	S
AMMONIO, FLUORURO	20	S	L
AMMONIO NITRATO	SOL.SAT.	S	S
ANILINA	100	NS	NS
ANILINA	SOL.SAT.	NS	NS
ANILINA CLORIDRATO	SOL.SAT.	NS	NS
ANTIMONIO CLORURO	90	S	S
ARGENTO NITRATO	SOL.SAT.	S	L
ARSENICO, ACIDO	SOL.DIL.	S	-
BENZALDEIDE	0,1	NS	NS
BENZENE	100	NS	NS
BENZINA(BENZENE)	80/20	NS	NS
BENZOICO, ACIDO	SOL.SAT.	L	NS
BORACE	SOL.SAT.	S	L
BORICO ACIDO	SOL.DIL.	S	L
BROMICO ACIDO	10	S	-
BROMIDRICO ACIDO	50	S	L
BROMO (LIQUIDO)	100	NS	NS
BUTADIENE	100	S	S
BUTANO	100	S	-
BUTILE ACETATO	100	NS	NS
BUTILFENOLO	100	NS	NS
BUTILICO	100	S	L
BUTIRRICO, ACIDO	20	S	L
BUTIRRICO, ACIDO	98	NS	NS
CALCIO, NITRATO	50	S	S
CARBONIO SOLFURO	100	NS	NS
CARBONIO TETRACLORURO	100	NS	NS
CICLOESANOLO	100	NS	NS
CICLOESANONE	100	NS	NS
CITRICO, ACIDO	SOL.SAT.	S	S
CLORIDRICO, ACIDO	>30	S	S
CLORO (ACQUA DI)	SOL.SAT.	L	NS
CLORO (GAS) SECCO	100	L	NS
CLOROSOLFONICO ACIDO	100	L	NS
CRESILICI, ACIDI	SOL.SAT.	NS	NS
CRESOLO	SOL.SAT.	-	NS
CROMICO, ACIDO	1÷50	S	L
CROTONICA, ALDEIDE	100	NS	NS
DESTRINA	SOL.SAT.	S	L
DICLOROETANO	100	NS	NS
DIGLICOLICO, ACIDO	18	S	L
DIGLICOLICO, ACIDO	18	S	L
DIMETILAMMINA	30	S	-
ESADECANOLO	100	S	S
ETILE ACETATO	100	NS	NS
ETILE ACRILATO	100	NS	NS
ETILE ALCOLE	95	S	L
ETILE, ETERE	100	NS	L
FENILIDRAZINA	100	NS	NS
FENILIDRAZINA CLORIDR.	97	NS	NS
FENOLO	90	NS	NS

Prodotto	Conc. %	Temp.° 20	C 60
FLUOSILICICO ACIDO	32	S	S
FORMALDEIDE	40	S	S
FORMICO, ACIDO	1÷50	S	L
FOSFINA	100	S	S
FOSFORICO ORTO ACIDO	30	S	L
FOSFORO TRICLORURO	100	NS	-
FURFURILICO ALCOLE	100	NS	NS
GLICOLICO, ACIDO	30	S	S
GLUCOSIO	SOL.SAT.	S	L
IDROGENO SOLFORATO	100	S	S
LATTICO, ACIDO	10÷90	L	NS
LIEVITO	SOL.	S	L
MAGNESIO CLORURO	SOL.SAT.	S	S
MAGNESIO SOLFATO	SOL.SAT.	S	S
MALEICO ACIDO	SOL.SAT.	S	L
METILE METACRILATO	100	NS	NS
METILENE CLORURO	100	NS	NS
METILICO, ALCOLE	100	S	L
NICHEL SOLFATO	SOL.SAT.	S	S
NICOTINICO, ACIDO	CONC.LAV.	S	S
NITRICO, ACIDO	<46	S	L
NITRICO, ACIDO	<46	S	-
NITRICO, ACIDO	<46	S	-
OLEICO, ACIDO	100	S	S
OLEUM	10% DI SO_3	NS	NS
OLEUM	10% DI SO_3	NS	NS
OSSALICO, ACIDO	SOL.SAT.	S	S
OZONO	100	NS	NS
PERCLORICO, ACIDO	10	S	L
PERCLORICO ACIDO	70	L	NS
PICRICO, ACIDO	SOL.SAT.	S	S
PIOMBO ACETATO	SOL.SAT.	S	S
PIOMBO TETRAETILE	100	S	-
PIRIDINA	100	NS	-
POTASSIO BICROMATO	40	S	S
POTASSIO CIANURO	SOL.	S	S
POTASSIO CLORURO	SOL.SAT.	S	S
POTASSIO CROMATO	40	S	S
POTASSIO FERRICIANURO	SOL.SAT.	S	S
POTASSIO FERROCIANURO	SOL.SAT.	S	S
POTASSIO IDROSSIDO	SOL.	S	S
POTASSIO NITRATO	SOL.SAT.	S	S
" " PERMANGANATO	20	S	S
" " PERSOLFATO	SOL.SAT.	S	L
RAME CLORURO	SOL.SAT.	S	S
RAME FLORURO	2	S	S
SODIO BENZOATO	35	S	L
SODIO BISOLFITO	SOL.SAT.	S	S
SODIO CLORATO	SOL.SAT.	S	S
SODIO FERRICIANURO	SOL.SAT.	S	S
SODIO IDROSSIDO	SOL..	S	S
SODIO SOLFITO	SOL.SAT.	S	L
SOLFORICO, ACIDO	40÷90	S	L
SOLFORICO, ACIDO	96	L	NS
SOLFOROSA ANIDRIDE	100 LIQUIDA.	L	NS
SOLFOROSA ANIDRIDE	100 SECCA	S	S
SOLFOROSO, ACIDO	SOL.	S	S
SVILUPP. FOTOGRAFICO	CONC.LAV.	S	S
TARTARICO, ACIDO	SOL.	S	S
TOLUENE	100	NS	NS
TRICLOROETILENE	100	NS	NS
TRIMETILOLPROPANO	<10	S	L
VINILE ACETATO	100	NS	NS
ZINCO CLORURO	SOL.SAT.	S	S

Performances of Phonoline system by using superior noise-insulating support Bismat® 1000 (by Walraven)



Fraunhofer - Institute für Bauphysik



Collare Bismat® 1000 by Walraven

SPECIAL NOISE-INSULATING SUPPORTS

Test Results - Fraunhofer - Insitute für Bauphysik

Determination of the Installation sound level L_{In} in the laboratory	P-BA 219/2006e **Table 1**

Client: REDI S.p.a, Via Madonna dei Prati 5/A, 40069 ZOLA BREDOSA – BOLOGNA, ITALY

Test specimen: Wastewater installation system (test specimen S 9760-01) consisting of "REDI Phonoline 110x5.0" plastic pipes and fittings (manufacturer: REDI) mounted with pipe clamps "Bismat 1000" (manufacturer: Walraven).

Test set-up:
- The pipe system was mounted according to Figure 4 (see also Annex A).
- The system consisted of wastewater pipes (nominal size OD 101.6), three inlet tees, two 45°-basement bends and a horizontal drain section. The inlet tees in the basement and in the ground floor were closed by lids supplied by the manufacturer. The pipe system was mounted by a plumber enterprise.
- Pipe system "REDI Phonoline": size OD 110, one-layer pipe, material: PVC with mineral filler, wall thickness 5.0 mm, weight 2.9 kg/m, density 1.6 g/cm³. One-layer fittings, size OD 110, material: PVC with mineral filler, wall thickness 3.2 mm, density 1.4 g/cm³. Connection of the pipes by plug-on socket connection.
- Pipe clamps "Bismat 1000": structure born sound insulating support attachment consisting of supporting and fixing clips. Fixed to the installation wall with dowels and thread rods.

Test facility: Installation test facility P12, mass per unit area of the installation wall: 220 kg/m², installation rooms: sub-basement (KG), basement (UG) front, ground floor (EG) front and top floor (DG), measuring rooms: UG front, UG rear (details in Annex P and EN 14366: 2005-02)

Test method: The measurements were performed following EN 14366 and German standard DIN 52 219: 1993-07; noise excitation by constant water flow with 0.5 l/s, 1.0 l/s, 2.0 l/s and 4.0 l/s (details in Annexes A and F).

Results:

Waste water system "REDI Phonoline" with pipe clamps "Bismat 1000"				
Flow rate [l/s]	0,5	1,0	2,0	4,0
Installation sound level L_{In} [dB(A)] measured in the basement test-room UG front	45	48	51	54
Installation sound level L_{In} [dB(A)] measured in the basement test-room UG rear	8	11	15	19
Airborne sound pressure level $L_{a,A}$ [dB(A)] ¹)	45	48	51	54
Structure-borne sound characteristic level $L_{sc,A}$ [dB(A)] ¹)	3	7	12	16

¹) Evaluation according to DIN EN 14366.

Date of tests: September 12, 2006

Comments:
- The requirements of DIN 4109 only apply for the installation sound level L_{In} measured in the test room UG rear.
- By using supporting and fixing clips the details of attachment strongly affects the acoustical properties of the system. Only if the assembly instructions of the manufacturer are obeyed exactly and the weight of the system is distributed evenly on all fastening elements, a reproducible acoustical behaviour is reached. Otherwise possibly strong deviations from the measured values may occur.

Fraunhofer Institut Bauphysik

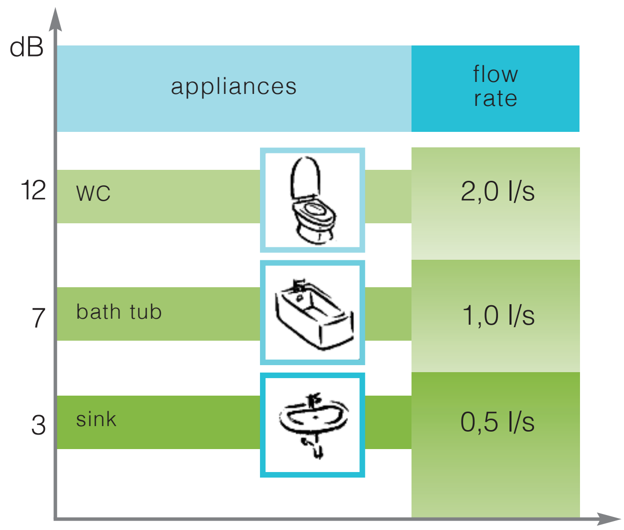
The tests were performed in a laboratory accredited by the German Accreditation System for Testing (DAP, file no. PL-3743.26) according to standard EN ISO/IEC 17025.
Stuttgart, October 19, 2006
Head of Laboratory:

PHONOLINE PERFOMANCES' CHART WITH NOISE-INSULATING SUPPORTS BISMAT® 1000 (by Walraven)

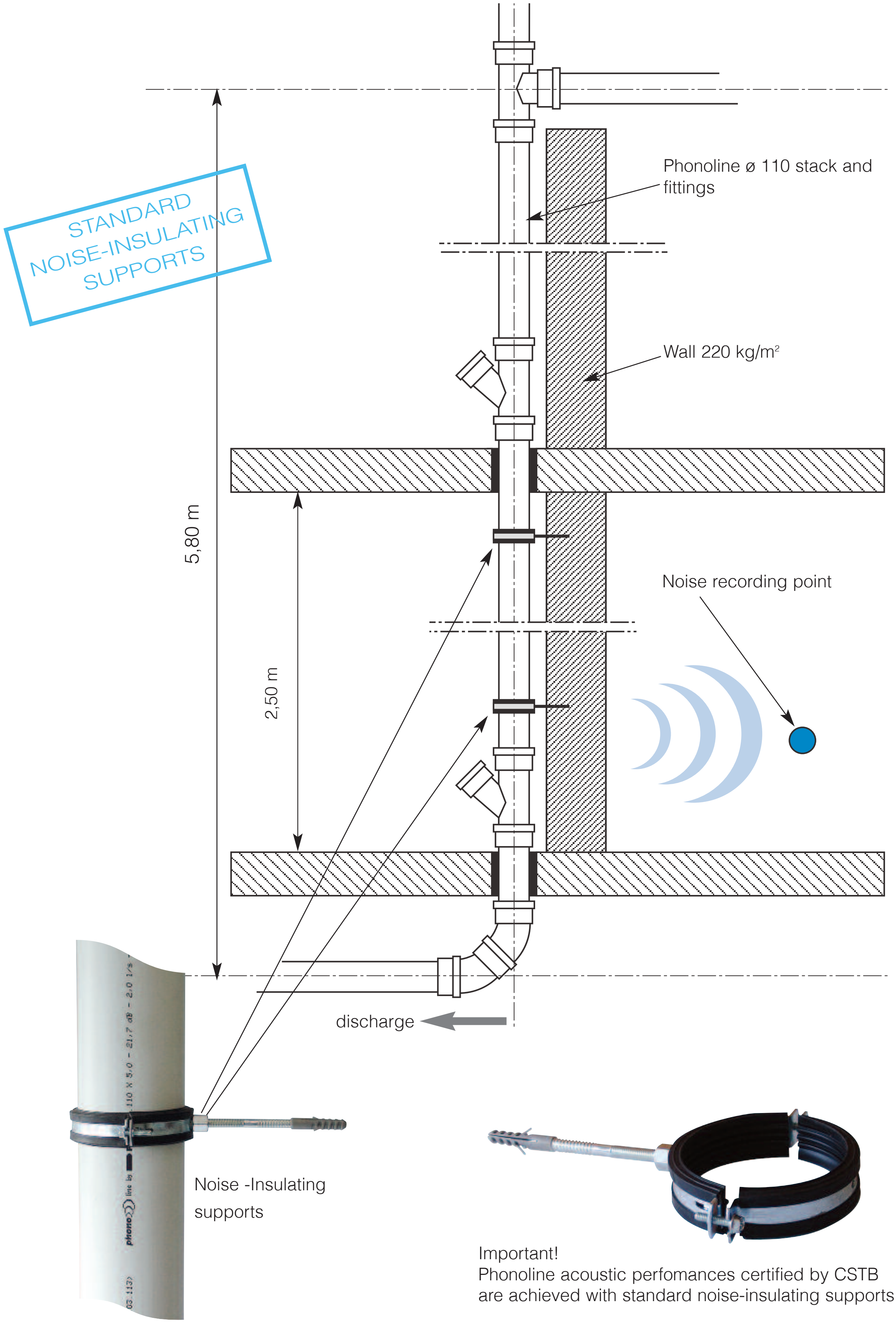
The method used to measure the noise level of a soil and waste system is regulated by a standard requiring the execution of cycle tests carried out with different flow rates, in order to simulate all the sanitary appliances you can find inside a building. Fraunhofer Institut für Bauphysik certified all the perfomances reported in the chart on the right side. In the tests are used superior noise-insulating support Bismat® 1000 (by Walraven).

Sound level of the waste and soil system, according to all existing appliances

Phonoline perfomance with noise-insulating Bismat® 1000 (by Walraven)



Test conditions executed by CSTB - Grenoble (pr EN 14366)



Important!
Phonoline acoustic perfomances certified by CSTB are achieved with standard noise-insulating supports

Test result - CSTB Institut

CSTB
le futur en construction

REDI – S.p.a.
via Madonna dei Prati 5/a
40069 Zola Predosa
BOLOGNA
ITALIE

Grenoble, le 30 octobre 2003
N/Réf. GA/2003-477/PD/BEA
Objet : ***Résultats acoustiques***

Monsieur,

Voici les résultats acoustiques des tests effectués sur un système de tubes et raccords « phonoline », à emboîtement DN 110 selon le projet de norme européen pr EN 14366.

Deux grandeurs ont été mesurées :

- ✓ Le bruit aérien seul : Lan
- ✓ Le bruit structural seul : Lsn

Les indices présentés sont calculés en dB(A) de 100 Hz à 5000 Hz.

Bruit structural : Lsn

	0,5 l/s	1,0 l/s	2,0 l/s	4.0 l/s
Tube à emboîtement DN 110	16.0	18.9	21.7	26.6

PARIS
MARNE-LA-VALLÉE
GRENOBLE
NANTES
SOPHIA ANTIPOLIS

CENTRE SCIENTIFIQUE ET TECHNIQUE DU BATIMENT

Établissement public à caractère industriel et commercial

24, rue Joseph Fourier
F-38400 Saint-Martin-d'Hères
Grenoble
Tél. : (33) 04 76 76 25 25
Fax : (33) 04 76 44 20 46
Serveur Internet : http://www.cstb.fr

RC Paris B 775 688 229
Siret 775 688 229 000 19
N° TVA : FR 70 775 688 229

Les détails de ces résultats sont donnés dans le rapport d'étude n° ER 712.03.113.

Je vous prie d'agréer, Monsieur, l'expression de mes salutations distinguées.

Pascal DUCRUET
Département Acoustique et Éclairage

CSTB Certificate of Phonoline sound perfomances achieved with the use of standard noise-insulating support

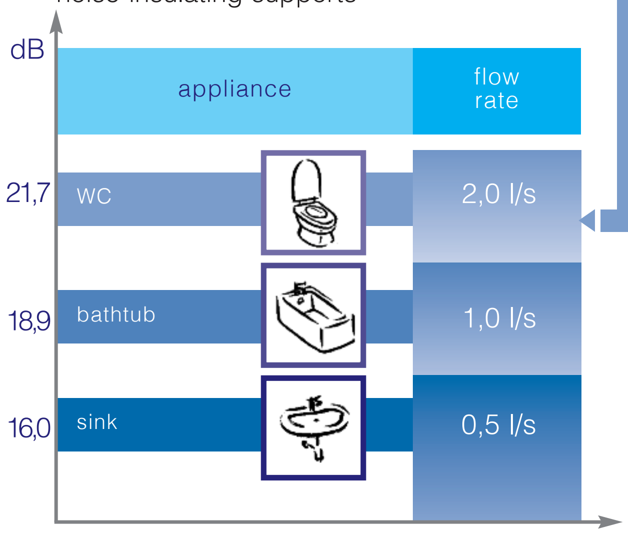
STANDARD NOISE-INSULATING SUPPORTS

PHONOLINE PERFOMANCES' CHART WITH STANDARD NOISE-INSULATING SUPPORTS

The method used to measure the noise level of a soil and waste system is regulated by a standard requiring the execution of cycle tests carried out with different flow rates, in order to simulate all the sanitary appliances you can find inside a building. Phonoline system was tested by CSTB (Centre Scientifique et Technique du Batiment - Grenoble), that certified all the acoustic perfomances reported in the chart on the right side. In the test are used standard noise-insulating supports.

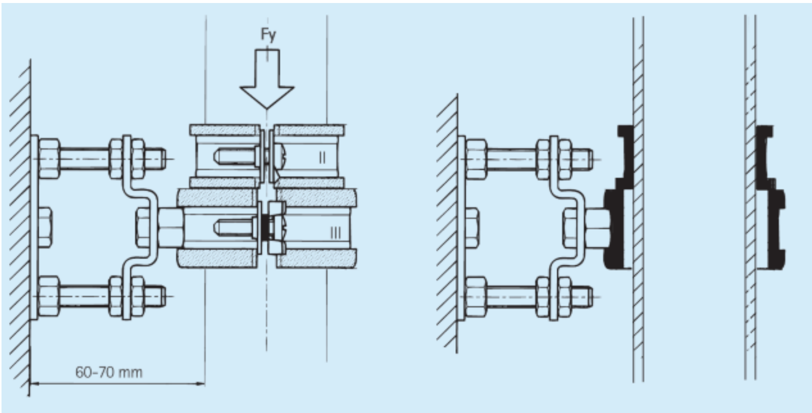
Sound level of the waste and soil system, according to all existing appliances

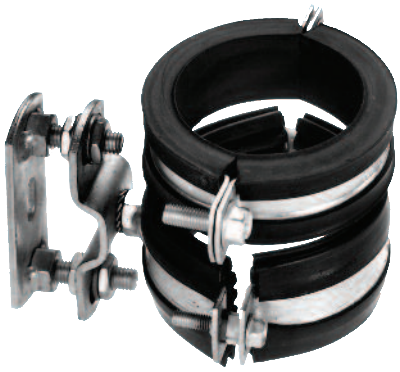
Phonoline perfomances' chart with standard noise-insulating supports



USE OF SUPERIOR NOISE-INSULATING PIPE SUPPORTS

Application of Bismat® 1000:
The noise-insulating support Bismat® 1000 for stand pipes has to be mounted every second floor (from Ø 125 mm, one per floor)
Bismat® 1000 is a complete support and fixing set for drain pipes consisting of socket clamp, clamp for guidance and 2 point-wall plate assembly.





Example of soundproof Phonoline system installation and of standard use noise-insulating supports.

LABORATORIO PROVE ED ESPERIENZE REDI

Rapporto di prova N° 13 / 2007

Oggetto : Classificazione del comportamento al fuoco del sistema Phonoline

Dalle prove eseguite sul materiale costituente i tubi e i raccordi Phonoline, secondo la norma francese NF P 92 501, risulta che lo stesso materiale rientra nella classe di reazione al fuoco " B s2 d0".

I tubi e i raccordi Phonoline sono pertanto da considerarsi non infiammabili.

Zola Predosa, 3 marzo 2007.

LABORATORIO
PROVE ED ESPERIENZE
Dott. F. Giuliani
REDI S.p.A.

REDI 40069 Zola Predosa - Via Madonna dei Prati, 5/A - (Bologna - Italy)

GASKETS

Phonoline is equipped with lip gaskets.

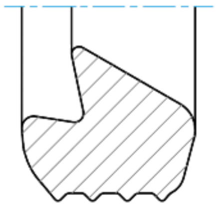
The gaskets quality ensures a long lasting life system.

REDI EXCLUSIVELY uses gaskets manufactured by specialised Companies complying with law requirements and certified by the main international certification bodies.

All gaskets can be removed from the groove and consequently re-placed without affecting the hydraulic seal.

Technical features of the gaskets:

- Reference Standards: EN 681-1
  DIN 4060
- lip profile like BL type
- material: SBR (SS-P-60-00)
- hardness: 60 ± 5 IRHD
- tensile strencht at break: 14,4 N/mm2
- elongamon at break: 380%
- permanent distortion: 9,7%
- tensile strencht at break (after accelerated ageing) -0,8%
- elongamon at break (after accelerated ageing) -5,8%



Gasket section

GASKETS STANDARD

MPA NRW

Standard

nr. 220000032 04-02-1b

DIN 4060

kiwa Partner for progress

Standard nr. K4195/06

Type rubbe SBR ss-p-60-00

DET NORSKE VERITAS
CERTIFICATION LICENCE

DNV

Certificate

n. 112.929.01-01E

SS-EN 681-1

Type test report:

SP report No. 98K12514 A-C,

98K 12558, 99K12583, 99K12604,

F020847C, F101033

BSI Product Services

Certificate nr. KM 51718

BS EN 681-1

TENDER SPECIFICATIONS

- Soundproof and unflammable (Class B s2 d0) pipes and fittings system for W & S sanitary systems inside buildings; it can be located in a specific technical space (shaft) fixed with noise-insulating supports or directly embedded in the wall.

- System made from thermoplastic mineral-reinforced material. Sound performance certified by German Fraunhofer Institute according to EN14366 (12 dB at 2/ls flow rate, using special noise-insulating support Bismat® 1000) and by CSTB Institute of Grénoble, according to EN 14366 requirements (max noise of 21,7 dB at 2l/s flow rate, using standard noise-insulating supports).

- Push-fit system with elastomeric lip-rings certified EN681 and Din 4060.

- Pipes and fittings – branded "Phonoline by REDI"

PRODUCT MARKING

FITTING
Phonoline REDI
Diameter
Angle

PIPE
Phonoline REDI
External diameter x thickness
REDI test number (Fraunhofer)
Certified soundproofness
Fire resistance: Class B s2 d0

phono line by REDI *d.110 x 5,0 - M1 - 12 dB- 2,0 l/s - EN 14366 (Fraunhofer P-BA 219/2006)*

Installation advices

W & s branches in the “bathroom”

The dimensioning of the collecting branches of the many sanitary equipments is based on the discharged liquid quantity in a specific time unit.
In order to calculate the nominal diameter of the DN branch you must proceed with interpolation (PICT. 1) by filling in the following variables that related to any single case taken in consideration.

Q= discharge intensity expressed in liter/second, typical of the sanitary equipment

u= pipe usage ratio or filling factor

J= pipe slope expressed in %

Description of the variables:

Q: by considering the kind of user, it’s possible to fix some average typical Q rates for each sanitary equipment

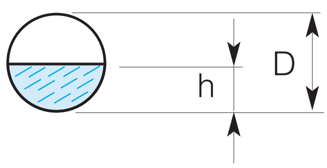
Fig.1

Kind of Sanitary Equipment	Discharge intensity (l/sec.)	Average discharge (sec.)
Shower plate	0,45	13
Washbasin	0,45	13
Bidet	0,45	13
Bathtub	0,90	200
Double kitchen sink	0,90	13
Domestic washing machine	0,90	80
Dishwasher	0,90	80
Double washtub	1,50	20
Restaurant dishwasher	1,60	130
Service washing machine	1,80	140
W.C. W. & S.	2,50	10

u: usage ratio calculated as

h/D = 0,5

This filling hypothesis avoids the creation of internal counter-pressures that slow the W & S down and increase its noise.
In order to maintain this ratio constant, the W & S branch diameter will have to be bigger at least of a measure than the fixing point diameter.



J: when increasing the branch slope you register an increase of the discharge flow speed and consequently of the W & S intensity in the pipe itself.
As you can see from picture 2, -by changing the slope- the same water quantity coming from the same equipment might be drained away by pipes of different diameters.

As it is not always convenient to carry on with the dimensioning in the best conditions, through the practical experience it has been created a simplification of the dimensioning theory of the drainage networks proposed in picture 3.

Pict.2

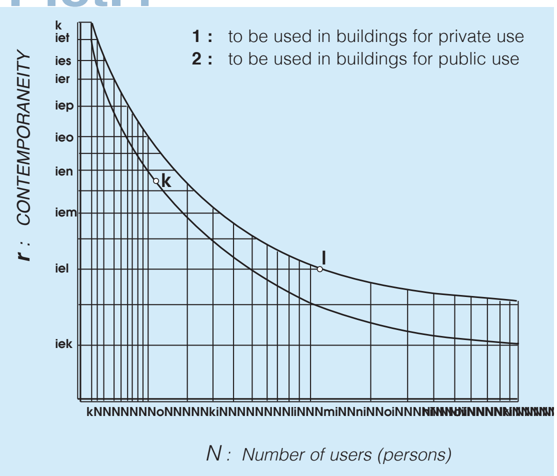
DN Considering u = 0,5 (mm)	Slope J					
	0,5 %	1,0 %	1,5 %	2,0 %	2,5%	3,0 %
32	0,19	0,27	0,34	0,39	0,43	0,48
40	0,30	0,43	0,54	0,61	0,67	0,74
50	0,47	0,66	0,84	0,95	1,04	1,16
63	0,54	0,76	0,95	1,08	1,19	1,32
75	0,92	1,29	1,63	1,85	2,03	2,26
80	1,21	1,70	2,14	2,43	2,67	2,96
100	1,90	2,67	3,35	3,81	4,19	4,65
110	2,47	3,46	4,04	4,59	5,44	5,60
125	2,97	4,16	5,24	5,95	6,54	7,26

Pict.3

Sanitary Equipment kind	DN connection (mm)	DN branch (mm)
Washbasin	25/32	32/40
Bidet	25/32	32/40
Showerplate	32	40
Bathtub	32	40
Double kitchen sink	32	40
Domestic washing machine	32	40
Dishwasher	32	40
Double washtub	40	50
Restaurant dishwasher	50	63
Home washing machine	65	80
W.C. W & S	90	100

Definition of the discharge flow rate of a stack

Pict.4



The calculation of the total flow rate (**Qt**) of a stack or of a sewer pipe is equal to the sum of the W & S intensity of the single users, multiplied by the "**r**", namely usage contemporaneity ratio.

While calculating the sum of the flow rates you have to take in consideration a single sanitary equipment for each bathroom (you have to choose the equipment with the largest W & S intensity, usually the W.C.) and the other independent W & S units, i.e.: kitchen sinks, washing machines W & S, dishwasher, etc…

The variables that affect the calculation of the total **Qt** flow rate are connected by the following formula:

$$QT = \frac{r}{4} \times \Sigma Q \times \frac{N}{A} = l/sec$$

whereas:

QT = max discharge intensity
Q = discharge intensity for kind of equipment, namely one for each room (pict. 1)
r = contemporaneity ratio of the various bathrooms that involve the same stack (pict. 4)
N = number of users (persons)
A = number of the involved bathrooms
ΣQ = the sum of the discharge intensities for each floor
(Q1 x n. of apartment kind 1+ Q2 x apartment kind 2 + Q3 x apartment kind 3)

Calculation example for a stack having 1 bathroom to be connected at each floor:
QT = ?
Q = considering a single sanitary equipment every bathroom, we will use for each single apartment the WC and the kitchen sink (pict. 1)
r = the data can be obtained by interpolation in the chart of picture 4
N = 20 people (4 located in each apartment)
A = 5 bathrooms + 5 kitchens
ΣQ (Q w.c. x n. of w.c. + sink Q x n. of sinks)

$$QT = \frac{0,3}{4} \times (5 \times 2,50 + 5 \times 0,90) \times \frac{20}{10} = 2,55\ l/sec$$

DIMENSIONING OF THE VERTICAL AND VENTILATION STACKS DN1

A stack receives the discharges of various branches located on different floors: it is advisable that this stack maintains a constant section –along its own length- from the bottom to the roof-vent cowl with a constant DN diameter.
The problems related to the secondary ventilation of the stack will be discussed in the following chapter; right now we will just calculate its DN1 diameter.
In order to proceed with the dimensioning it is necessary to have already defined the max flow rate (Qt).

Pict.5

QT (l/sec) Max discharge intensity	**DN** (mm) Ø stack	**DN1** (mm) Ø secondary ventilation stack	**WC** Maximum installable n.	
			Total	For floor
1,74	**50**	40	-	-
2,03	**63**	50	-	-
4,51	**80**	63	-	-
7,24	**100**	80	30	6
10,57	**125**	80	56	8
17,25	**160**	100	150	16
28,26	**200**	110	300	38

Ventilation of the w & s systems

GENERAL REMARKS

The ventilation of a systemis the set of pipes made up for the air passage, which is necessary for compensating the hydrostatic depressions, that originate inside gravity discharge stacks.

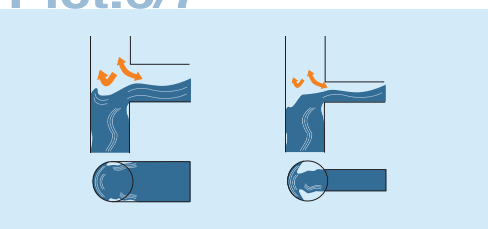
When the water falls inside the stack (about 10 mt/sec speed) it originates an effect of compression of the below existing air, and an hydrostatic depression (vacuum) just over the referring sewage unit.
The ventilation must temporarily fill in this vacuum, thus avoiding the emptying of the trap interceptors of each single connected system; it must also limit -as much as possible – the water fluttering inside the stack, which causes the W & S noise.
The main cause that originates pressures and corresponding hydrostatic depressions has to be searched in the structure of the pipes that make up the evacuation system of the building.
By following the W & S water run -from the entrance into the stack until the sewage network itself- we should take in consideration the variables that might occur:

• **Connection to the stack:**

1) with a **87°30' Branch at constant section** during the discharge there is a total closure of the pipe and a consequent pressure fall in the top stack.
On the other side the air circulation inside the link pipe is good and it can be avoided the danger of the WC trap interceptor emptying.

2) with a **Reduced 87°30' Branch** during the discharge there is a partial closure of the stack with a lower pressure fall than the previous case.
The air circulation inside the pipe is good by the way, and if the pipe has been measured in the appropriate way, there will be no suction phenomenon in the trap interceptors.

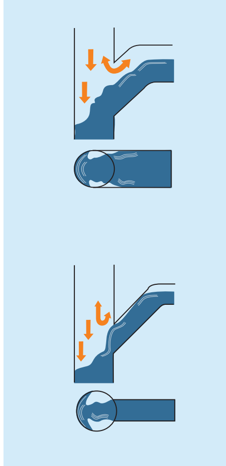
Pict.6/7



3) with a **45° Branch at constant section** the hydraulic closure of the stack -during the discharge- will be just partial.
The discharge flow rate (Qt) strongly increases and the chances of emptying the trap interceptors are practically impossible.

4) with a **Reduced 45 ° branch** it will similarly happen – as the previous case - a partial hydraulic closure of the stack. However, it is necessary to carefully measure the diameter of the link branch of the stack -because in case of hydraulic closure there might be an emptying risk of the trap interceptors of the sanitary equipments.

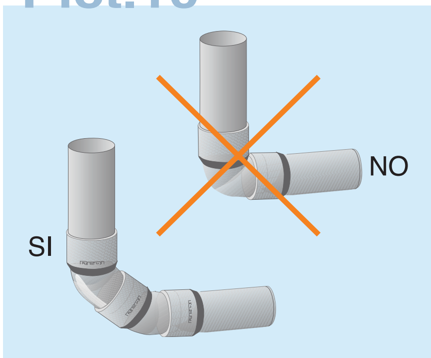
Pict.8/9



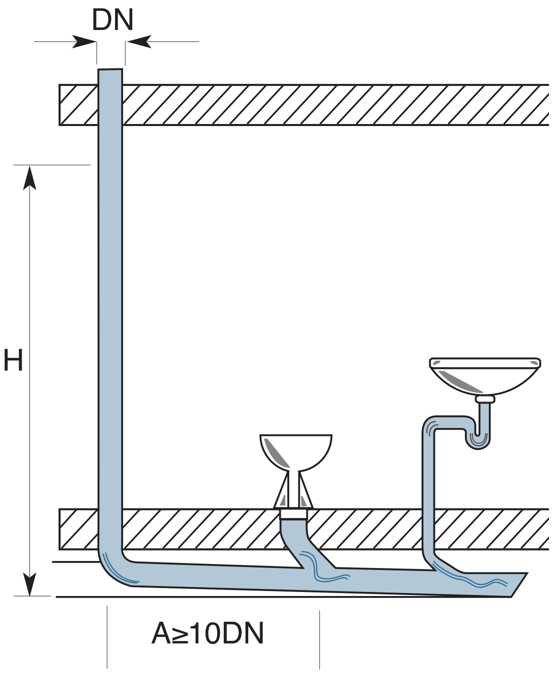
• **Stack bottom:**

1) At the bottom of the stack-where the discharge pipe gets from vertical to horizontal- the water flow violently changes direction; this causes a strong increase of the internal pressure, which is proportional to the height of the stack itself. In order to weaken the impact intensity it should be advisable to get two 45° bends rather than one of 87° 30' (this general rule should be always applied when there is enough space).

Pict.10



2) 2) For stacks' heights superior than 4 building storeys, the **H** counterpressure level –caused by the stack bottom- might change from 3 to 5 mt (Pict.11).
It is absolutely not advisable to connect the equipments to the stack in these stretches, except for those cases in which there's a secondary ventilation (pict. 17) or a stack doubling beneath the mentioned stretch (pict. 16).
On the other hand, the link is possible along the horizontal stretch of the sewer pipe in a neutral **A** area, which is usually placed at a distance at least 10 times superior than the stack diameter (DN).

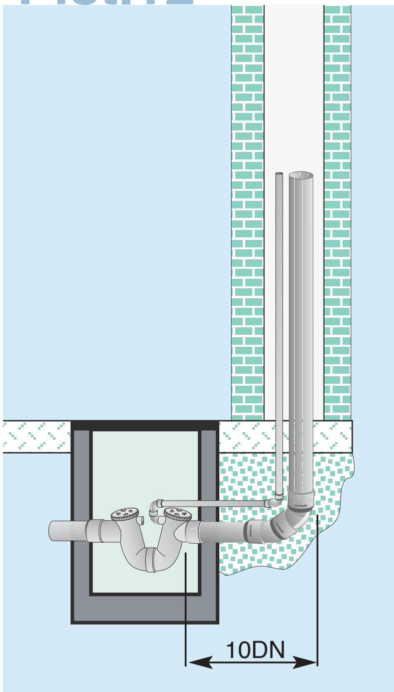


Pict.11

• **Stack trap interceptor**

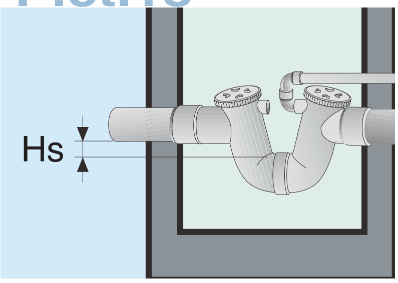
1) 1) In order to avoid that the roof-vent cowl acts like a chimney tower with the sewage system- i.e. causing a drying up of the internal deposits by its constant draw, as well as the diffusion into the atmosphere of polluting substances- it is necessary to place a black waters trap interceptor (B-W) at the stack basement.
For a correct positioning of the trap interceptor you must take in consideration the elevated pressure created during the discharge in the stack basement. In order to avoid the trap interceptor damaging –and its bad functioning, by the way- you must keep a distance from the stack basement 10 times larger than its own diameter.
In order to get a good water flow inside the trap interceptor it is not advisable to use trap interceptors (realized by assembling bends) for the short reachable height (Hs) of water seal.
REDI proposes its one-piece B-W trap interceptor – planned for ensuring the maximum height (Hs) – equipped for the connection with the ventilation system and provided with double inspection having a diameter equal to the pipe one.
REDI trap interceptor –being an inspectable product - must be installed inside a drain well for its periodic cleaning or for easily reaching the above-placed stack in case of obstruction.
In case of secondary ventilation, the basement link must be connected to the dedicated socket which is placed on the B-W trap interceptor, close to the inspection cap.

Pict.12



Ventilation connected with B-W trap interceptor

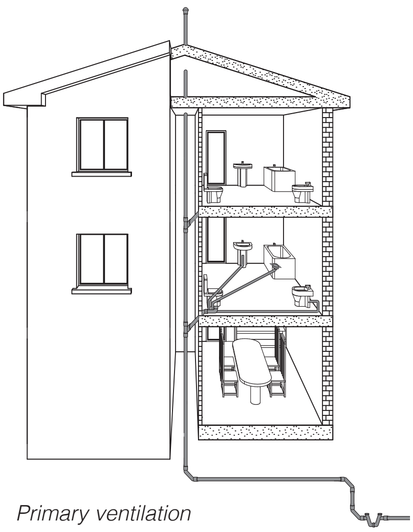
Pict.13



Primary ventilation

It is the easiest and most economic ventilation system. It's advisable to use it in buildings with few floors where the W & S contemporaneousness risks are limited.
It is realized just with the extension of the stack getting outside, on the roof: the only important thing is to maintain the stack diameter equal until the roof-vent cowl.
In case it occurs a W & S contemporaneousness in two sanitary systems placed on different floors, there might be the risk of an emptying of the intermediate-placed trap interceptors. This is due to the fact that there are no air exits that compensate the suction effect.
In this case the kind of stack joint is extremely important; as a matter of fact, it must not completely obstruct the stack flow during the W & S.
You can see from picture 10 that the most convenient connection may realized with a 45° branch at constant section.

Pict.14

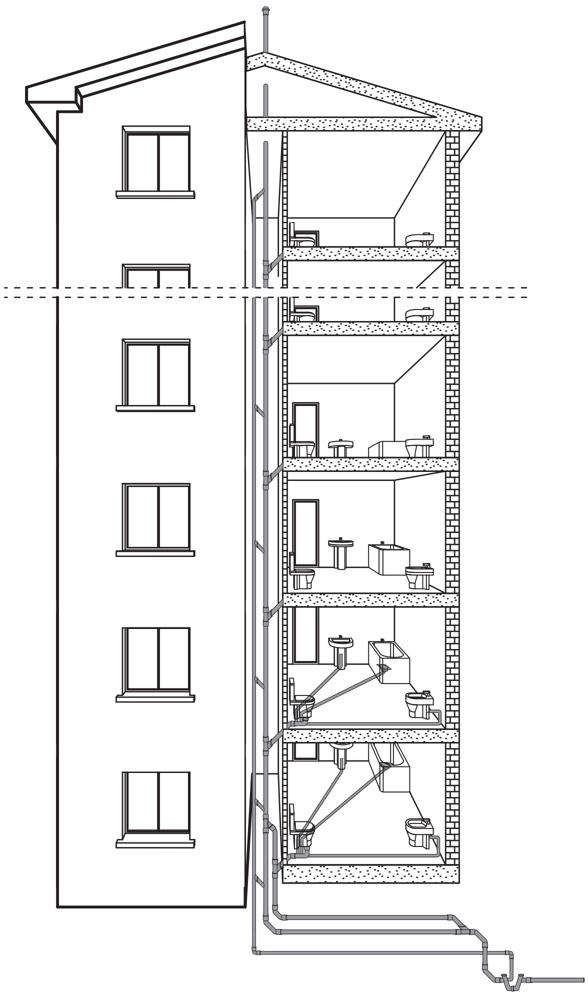


Primary ventilation

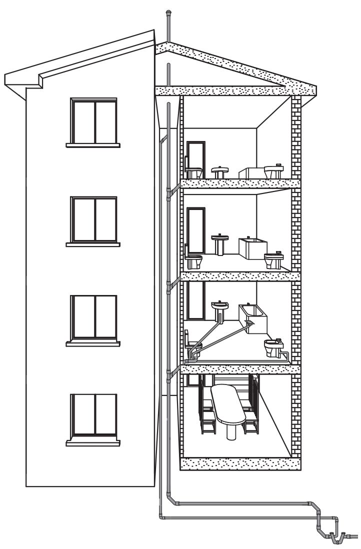
STACK SECONDARY VENTILATION (ROUNDVENTILATION)

It consists in the stack doubling by a ventilation bypass connection located on each floor (picture 17). In this case the stack must be extended up to the roof-vent cowl by always keeping its constant diameter.
The joint of the secondary stack in the final section of the roof-vent cowl allows internal recycles that strongly reduce the gas flow towards the external side. This flow becomes ten times larger when a secondary stack gets outside through its own roof-vent cowl (this procedure must absolutely be avoided).
In case of medium height buildings (3/4 floors) you can just connect the upper side of the ventilation stack (at least 20 cm above the 5th floor), with the connection placed above the B-W trap interceptor of the stack basis (picture 15).
When the building is high (8/10 floors) the excessive stack length might create more intense suction phenomena on the lower floors; in order to avoid this problem you should connect the equipments to an independent stack. (pict.16) at the level of the lower floors.
By this way you will avoid flowings, foams and noise, that occur hight otherwise on the lower floors.
The diameter of the secondary DN1 column must be minimum 2/3 of the diameter of the main Stack DN (pict.5); the building material is the same used for the stack: fire resistant PVC ME.

Pict.16



Pict.15



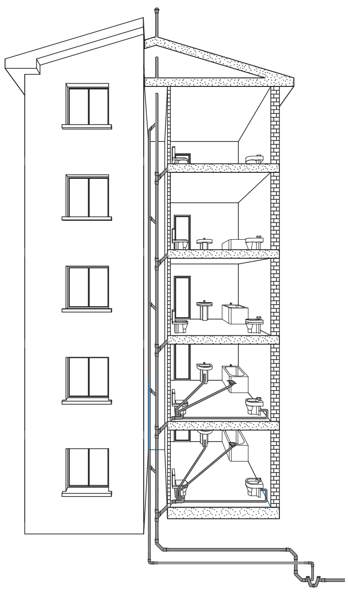
Secondary ventilation with max 3 floors

Secondary ventilation with auxiliary stack

System secondary ventilation

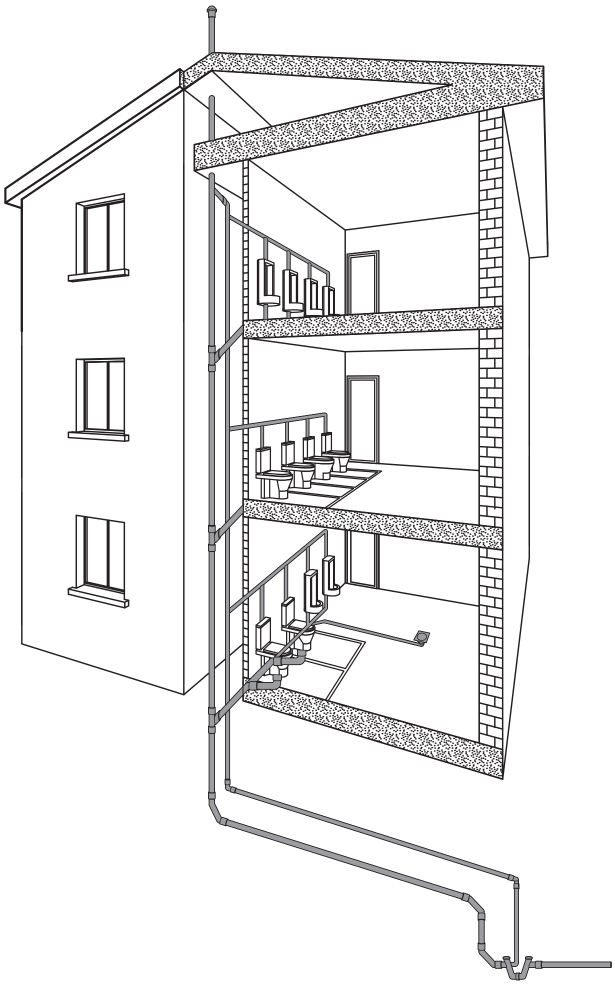
Each separate equipment will be connected to the secondary ventilation stack by means of branches jointed to the technical bend or to the trap interceptor itself. (pict. 18).
In this case the secondary ventilation stack connects the B-W trap interceptor to the roofvent cowl top side without any intermediate by-passes- which are typical of the secondary ventilation stack.
This installation solves the contemporaneity problems in the same bathroom, when it occurs an emptying of the trap interceptors and flow slowing downs with gurgling and foams.
The demand of many ventilation pipes compels to install all sanitary equipments on a unique wall, in order to reduce costs (that are usually so elevated).
The dimensioning of the pipe diameter may be realized by considering a (u) usage ratio -equals to 1 (filled pipe)- since the air passage does not go through the W & S branch, but through the corresponding ventilation system.
It's an expensive technical solution that cannot be justified in the building business - where it is very difficult to have contemporaneous S & W situations in the same bathroom.
It is by the way the safest system to be used in case of many equipments- of contemporaneousness use- placed on the same branch (common sanitary systems).

Pict.17



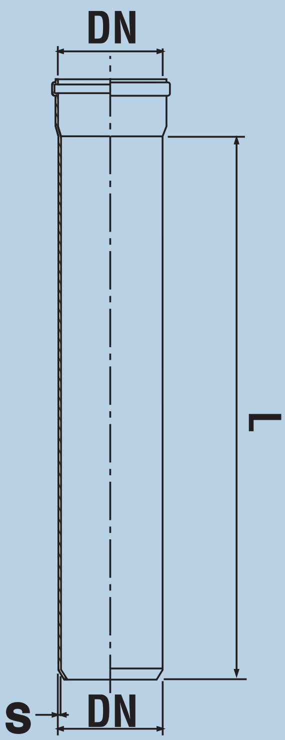
Secondary column ventilation (roundventilation)

Pict.18



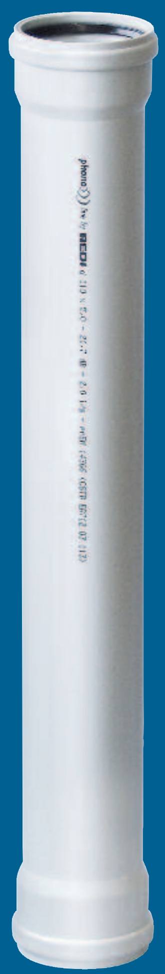
System secondary ventilation

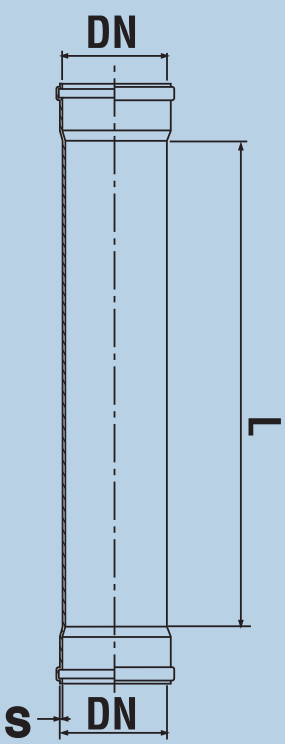
Single socket pipe



	Ø (mm)	x	L (ml.)	Thick. (mm)	Ref.
40	40	x	0,15	3,0	V080455
	40	x	0,25	3,0	V040455
	40	x	0,50	3,0	V050455
	40	x	1,00	3,0	V010455
	40	x	2,00	3,0	V020455
	40	x	3,00	3,0	V030455
50	50	x	0,15	3,0	V080555
	50	x	0,25	3,0	V040555
	50	x	0,50	3,0	V050555
	50	x	1,00	3,0	V010555
	50	x	2,00	3,0	V020555
	50	x	3,00	3,0	V030555
75	75	x	0,15	4,0	V087555
	75	x	0,25	4,0	V047555
	75	x	0,50	4,0	V057555
	75	x	1,00	4,0	V017555
	75	x	2,00	4,0	V027555
	75	x	3,00	4,0	V037555
90	90	x	0,15	4,5	V080955
	90	x	0,25	4,5	V040955
	90	x	0,50	4,5	V050955
	90	x	1,00	4,5	V010955
	90	x	2,00	4,5	V020955
	90	x	3,00	4,5	V030955
100	100	x	0,15	5,0	V081055
	100	x	0,25	5,0	V041055
	100	x	0,50	5,0	V051055
	100	x	1,00	5,0	V011055
	100	x	2,00	5,0	V021055
	100	x	3,00	5,0	V031055
110	110	x	0,15	5,0	V081155
	110	x	0,25	5,0	V041155
	110	x	0,50	5,0	V051155
	110	x	1,00	5,0	V011155
	110	x	2,00	5,0	V021155
	110	x	3,00	5,0	V031155
125	125	x	0,15	5,0	V081255
	125	x	0,25	5,0	V041255
	125	x	0,50	5,0	V051255
	125	x	1,00	5,0	V011255
	125	x	2,00	5,0	V021255
	125	x	3,00	5,0	V031255
160	160	x	0,15	5,5	V081655
	160	x	0,25	5,5	V041655
	160	x	0,50	5,5	V051655
	160	x	1,00	5,5	V011655
	160	x	2,00	5,5	V021655
	160	x	3,00	5,5	V031655

Double socket pipe



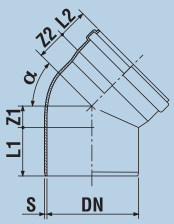


DN	Ø (mm)	x	L (ml.)	Thick. (mm)	Ref.
40	40	x	0,50	3,0	VF50455
	40	x	1,00	3,0	VF10455
	40	x	2,00	3,0	VF20455
	40	x	3,00	3,0	VF30455
50	50	x	0,50	3,0	VF50555
	50	x	1,00	3,0	VF10555
	50	x	2,00	3,0	VF20555
	50	x	3,00	3,0	VF30555
75	75	x	0,50	4,0	VF57555
	75	x	1,00	4,0	VF17555
	75	x	2,00	4,0	VF27555
	75	x	3,00	4,0	VF37555
90	90	x	0,50	4,5	V050955
	90	x	1,00	4,5	V010955
	90	x	2,00	4,5	V020955
	90	x	3,00	4,5	V030955
100	100	x	0,50	5,0	VF51055
	100	x	1,00	5,0	VF11055
	100	x	2,00	5,0	VF21055
	100	x	3,00	5,0	VF31055
110	110	x	0,50	5,0	VF51155
	110	x	1,00	5,0	VF11155
	110	x	2,00	5,0	VF21155
	110	x	3,00	5,0	VF31155

Sound insulation for piping NEW

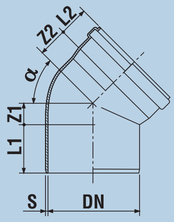
DN (mm)	DN pipe	S	L	Ref.
80	75 - 80 - 90	5	15 m.	CD08500
110	100 - 110	5	15 m.	CD11500
110	100 - 110	10	15 m.	CD11100

Bend 15° S/S

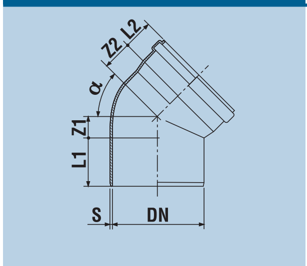


DN (mm)	S	Z1	Z2	L1	L2	Ref.
40	3	3	27	48	41	0100455
50	3	4	17	53	45	0100555
75	3	5	18	50	45	0100755
90	5.1	11	14	59	55.7	0100955 NEW
110	3.2	9	22	62	57	0101155
125	3.2	10	22	68	63	0101255
160	4.0	14	28	82	72	0101655

Bend 30° S/S

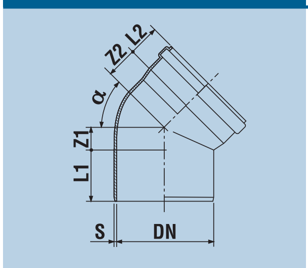


DN (mm)	S	Z1	Z2	L1	L2	Ref.
40	3	5	19.5	49	41	0110455
50	3	8	20	53	45	0110555
75	3	11	24	50	45	0110755
90	5.1	17	18	59	55.7	0110955 NEW
100	3.2	12	20	68	56	0781055
110	3.2	17	29	61	57	0111155
125	3.2	19	29	68	62	0111255
160	4.0	25	40	82	72	0111655



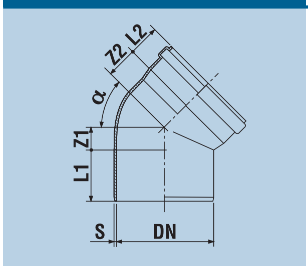
Bend 45° S/S

DN *(mm)*	S	Z1	Z2	L1	L2	Ref.
40	3	8	22	48	36	0700455
50	3	10	24	52	40	0700555
75	3.2	16	25	52	45	0730755
90	3	23	33	56	54	0120955
100	3	20	35	62	53	0701055
110	3.2	27	39	58	50	0121155
110	5.3	25	29	62.5	56.6	0701155 NEW
125	3.2	29	42	68	62	0701255
160	4.0	37	50	80	66	0701655



Bend 67°30' S/S

DN *(mm)*	S	Z1	Z2	L1	L2	Ref.
75	3	25	40	60	51	0130755
90	5.1	36	42	59	55.7	0130955 NEW
100	3.2	33	53	75	57	0721055
110	3.2	41	53	62	56	0131155
125	3.2	46	60	69	62	0131255
160	4.0	60	74	82	74	0131655

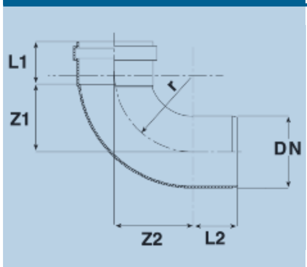


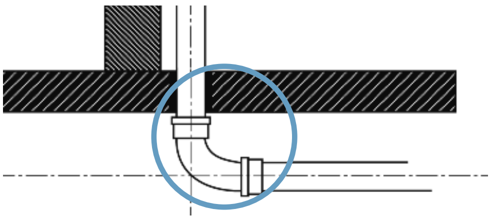
Bend 87° S/S

DN *(mm)*	S	Z1	Z2	L1	L2	Ref.
40	3	20	32	43	36	0710455
50	3	23	40	53	40	0710555
75	3.2	52	58	50	45	0740755
90	3	47	57	56	54	0710955
100	3	47	63	63	55	0711055
110	3.2	59	69	58	50	0711155
110	5.3	57	61	62.5	56.6	0711355 NEW
125	3.2	67	79	69	62	0711255
160	4.0	84	100	80	66	0711655

Long radius bend

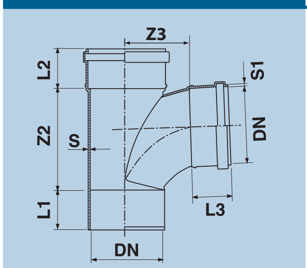
DN (mm)	r	Z1	Z2	L1	L2	Ref.
110	142	106	115	58	65	0741155



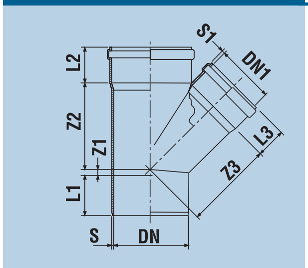


Long radius 45° M/F

DN (mm)	S	S1	Z2	L1	L2	L3	Z3	Ref.
110	3.2	2.9	146	62	57.5	57.5	95.5	0891355

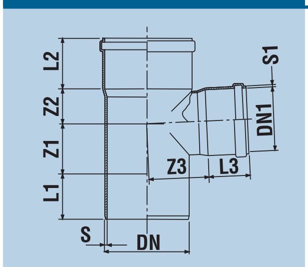


Branch 45° D/S



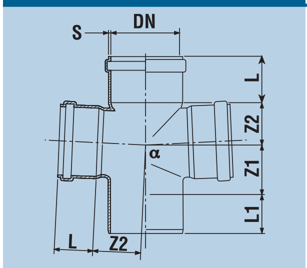
DN (mm)	DN1	S	S1	Z1	Z2	Z3	L1	L2	L3	Ref.
40	**40**	3	3	9	52	52	49	45	45	0800455
50	**50**	3.2	3.2	14	70	70	48	40	40	0800555
75	**50**	3.2	3.2	3	85	90	53	45	40	0312755
75	**40**	3.2	3.2	-	85	-	42	45	-	0312655 NEW
75	**75**	3.2	3.2	15	93	93	51	45	45	0880755
90	**50**	5,5	3	10	77	100	53	53	45	0312855
90	**90**	3	3	22	119	119	56	54	54	0880955
100	**40**	3	3	-20	84	95	84	60	44	0831055
100	**50**	3	3	-14	90	101	72	60	46	0833055
100	**100**	3.2	3.2	25	131	131	60	53	53	0881055
110	**40**	3.2	3.2	-	102	-	42	55	-	1310455 NEW
110	**50**	3.2	3.2	-14	102	114	63	55	40	0313155
110	**50**	5.3	2	-11	93	101	62.5	56.6	46.5	0813155
110	**75**	3.2	3.2	3	120	127	63	55	45	0315155 NEW
110	**110**	3.2	-	27	143	143	58	50	50	0301155
110	**110**	5.3	2.5	25	134	134	62.5	56.6	56.6	0801155
125	**110**	3.2	3.2	19	147	152	69	62	56	0319255
125	**125**	3.2	-	30	161	161	71	62	62	0801255
160	**110**	4.0	3.2	2	168	176	82	74	56	0311655
160	**160**	4.0	-	38	205	205	83	71	71	0301655

Branch 87° 30' D/S



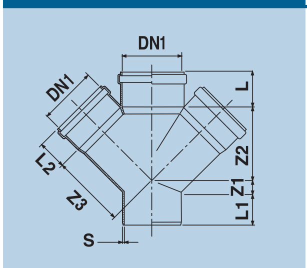
DN (mm)	DN1	S	S1	Z1	Z2	Z3	L1	L2	L3	Ref.
40	**40**	3.2	3.2	25	33	33	44	36	36	0810455
50	**50**	3.2	3.2	29	38	38	48	40	40	0810555
75	**40**	3.2	3.2	25	35	50	48	45	36	0350755
75	**50**	3.2	3.2	30	40	52	53	45	40	0350755
75	**75**	3.2	3.2	37	39	58	66	50	50	0890755
90	**50**	5.5	3	39	31	47	53	53	45	0352855 NEW
100	**50**	3.2	2.8	23	44	63	65	53	40	0843055
100	**100**	3.2	3.2	55	64	64	55	53	53	0811055
110	**50**	3.2	3.2	30	40	70	63	55	40	0353155
110	**50**	5.3	2.0	37	32	56	62.5	56.6	46.5	0853155 NEW
110	**75**	3.2	3.2	43	54	70	63	55	45	0357155
110	**110**	3.2	3.2	59	69	69	56	55/50	55/50	0341155
110	**110**	5.3	2.5	57	62	62	62.5	56.6	56.6	0811155 NEW
125	**110**	3.2	3.0	84	58	92	78	77	67	0357255
125	**125**	3.2	3.2	66	70	78	62	62	62	0811255

Double branch 87°



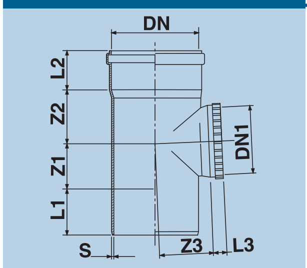
DN (mm)	α	S	Z1	Z2	L1	L2	Ref.
110	87°30'	3.2	62	70	70	80	0381155

Double branch 45°

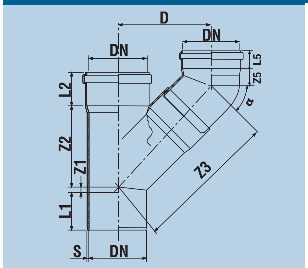


DN (mm)	DN1	S	Z1	Z2	Z3	L	L1	L2	Ref.
100	**40**	3	-20	93	105	60	75	44	0415055
100	**50**	3	-15	99	110	60	64	46	0414955
110	**110**	3.2	30	141	141	57	60	57	0361155
125	**125**	3.2	25	157	157	64	70	64	0361255

Access pipe



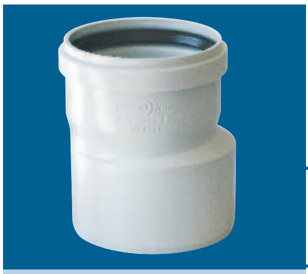
DN (mm)	DN1	S	Z1	Z2	Z3	L1	L2	L3	Ref.
75	**75**	3,2	37	39	58	66	50	28	1820755
100	**100**	3.2	55	64	64	55	53	35	1821055
110	**110**	3.0	59	69	69	60	55	36	1821155
125	**125**	3.2	66	70	78	62	62	22	1821255
160	**160**	4.0	83	99	99	85	72	24	1821655

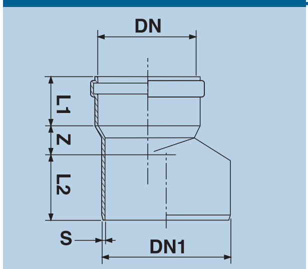


Parallel branch

DN (mm)	S	L1	Z1	Z2	L2	Z3	α	Z5	L5	D	Ref.
110	3.2	60	25	141	50	175	45°	36	50	127	1371155

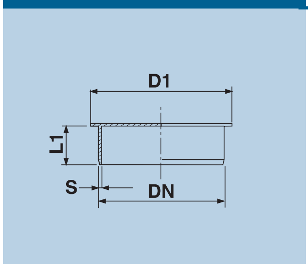
Note: *fabbricato*





Invert reducer

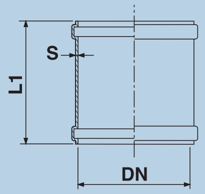
DN (mm)	DN1	S	Z	L1	L2	Ref.
40	**50**	3.2	22	42	48	0900555
40	**100**	3	48	42	58	0904855
50	**75**	3	30	45	48	0510755
50	**100**	3.2	45	45	61	0901055
50	**110**	3	51	45	70	0511155
75	**100**	3	31	50	61	0503355
75	**110**	3.2	35	45	63	0513155
90	**100**	3,2	5	58	57	0531055
90	**110**	3,2	5	58	61	0531155
100	**110**	3	5	60	61	0533155
100	**125**	3	16	57	61	0901255
110	**125**	3.2	22	56	63	0513255
110	**160**	4.0	43	56	82	0511655
125	**160**	4.0	36	62	82	0513655



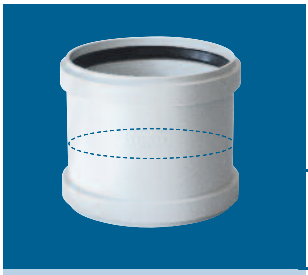
Socket plug

DN (mm)	D1	S	L1	Ref.	Note
40	45	2.5	18	0660405	
50	55	2.5	20	0660505	
75	80	2.5	39	0650705	*Screw cap*
90	125	3	52	0650905	*Screw cap*
100	125	3	56	0669905	
110	126	3.2	38	0661105	
125	142	3.2	42	0661205	
160	180	4.0	49	0661605	

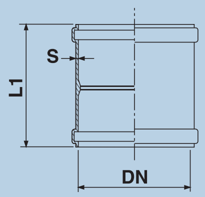
Repair/Slip coupler



DN *(mm)*	S	L1	Ref.
40	2.2	57	0614455
50	2.2	67	0614555
75	2.5	92	0610755
90	2,5	104	0610955
100	2.5	116	0611055
110	2.9	122	0611155
125	2.9	141	0611255
160	3.6	154	0611655



Coupler with central stop

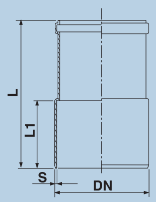


DN *(mm)*	S	L1	Ref.
75	2.5	92	0630755
90	2,5	104	0630955
100	2.5	116	0631055
110	2.9	122	0631155

A

B


Socketer/Adaptor



DN *(mm)*	Ref.	Note
40	0632255	A
40	6855700	B
50	0632355	A
50	6855800	B

WC bend DN. 100

DN (mm)	Ref.	Note
100	02510A5	*Adaptor included*

WC bend with 2 side-inlets DN. 100

DN (mm)	DN inlets	Ref.
100	40	12544A5

Kit: 1 bend WC
2 rubber gaskets
1 socket plug Ø40
1 adaptor

WC bend DN. 110

DN (mm)	Ref.	Note
110	12511A5	*Adaptor included*

WC bend with 2 side-inlets DN. 110

DN (mm)	DN inlets	Ref.
110	40	12504A5

Kit: 1 bend WC
2 rubber gaskets
1 socket plug Ø40
1 adaptor

Standard noise-insulating support

DN *(mm)*	Ref.
50	AV00500
75	AV00700
90	AV00900
100	AV01000
110	AV01100
125	AV01200
160	AV01600

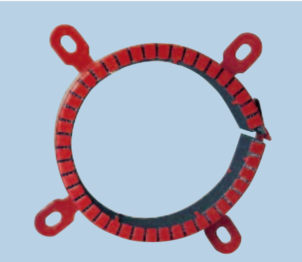
Superior noise-insulating support

DN *(mm)*	Ref.
75	AVI0700
100-110	AVI1100
125	AVI1200
160	AVI1600

Note: Bismat® 1000

Fire Stops REI 180

DN (mm)	S	Ref.	Pack
40/50	60	K0078PE	1
63	60	K0087PE	1
75	60	K0079PE	1
90	60	K0080PE	1
100/110	60	K0081PE	1
125	60	K0082PE	1
160	60	K0085PE	1



Fire Stops REI 120

DN (mm)	S	Ref.	Pack
40	30	K0096PE	1
50	30	K0088PE	1
75	30	K0089PE	1
90	30	K0090PE	1
100	30	K0098PE	1
110	30	K0091PE	1
125	30	K0092PE	1
160	30	K0095PE	1

Fully certified EN 1366

REDI

40069 ZOLA PREDOSA - Via Madonna dei Prati, 5/A - (Bologna - Italy)
Tel. + 39 051 6175111 - Fax + 39 051 757173

export@redi.it **www.redi.it**