PRESSURE

GIRAIR®

Pipes fittings and valves for COMPRESSED AIR

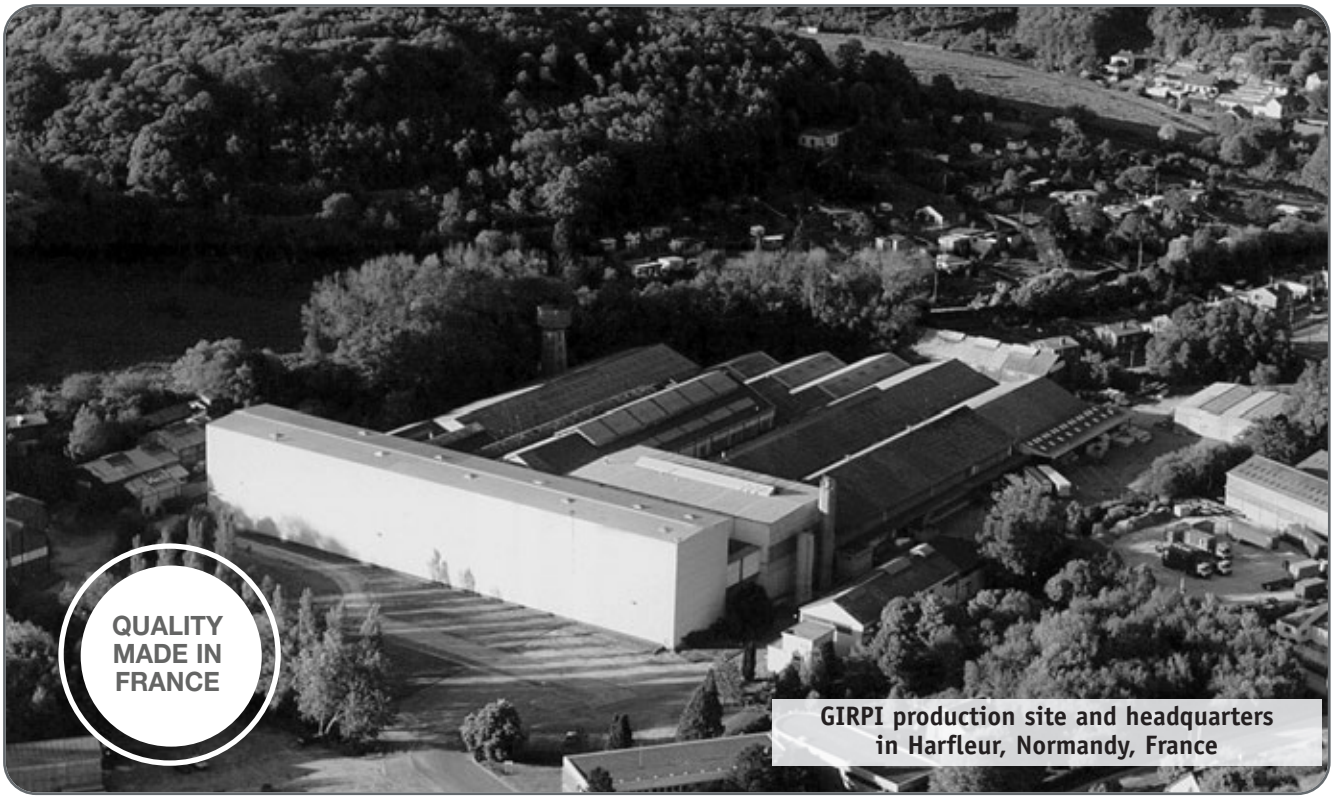
TECHNICAL DOCUMENTATION

November 2017

GIRPI

safety for your pipeworks

an Aliaxis company



GIRPI production site and headquarters in Harfleur, Normandy, France

GIRPI is certified to

afaq ISO 9001 Qualité AFNOR CERTIFICATION

afaq ISO 14001 Environnement AFNOR CERTIFICATION

afaq OHSAS 18001 Santé Sécurité au Travail AFNOR CERTIFICATION

The **GIRAIR®** system is made from a totally recyclable material.

GIRAIR® SYSTEM

Technical Sheet

CONTENTS

IMPORTANT REMARK:

The date on each page of this documentation is not a printing date but an updating date.

GIRPI

GENERAL RECOMMENDATIONS

■ GENERAL RECOMMENDATIONS

GIRPI technical documentations are available for free download and viewing through our web site www.girpi.com

We advise you to check the updates available. In case of doubt or for any questions on the content of this technical documentation, more particulary concerning :

- **chemical compatibility between GIRAIR® and specific additives or fluids,**
- **calculations and measures related to compensation for expansion and contraction phenomena affecting GIRAIR® systems,**
- **special parts and/or assemblies,**
- **GIRAIR® installation training,**

please contact GIRPI's technical support at +33(0)2 32 79 58 00 or by e-mail at be.girpi@aliaxis.com

This technical documentation refers to texts and regulations applicable on the day of publishing.

It is reminded that the network must be installed by professionals with good knowledge of applicable standards, and of this documentation.

■ TECHNICAL RECOMMENDATIONS

⚠ **Before any injection or use of additives or specific fluids in the GIRAIR® network, check their chemical compatibility. Refer to data sheet 9.1 of this documentation or call GIRPI's technical support services at +33 (0) 2 32 79 58 00 or by e-mail at be.girpi@aliaxis.com**

■ TRANSLATION

This English translation of our GIRAIR® technical documentation has been made in good faith, but the original French version shall prevail under all circumstances.

GIRPI

GIRAIR® SYSTEM

HOW TO SELECT THE SYSTEM BEST ADAPTED TO YOUR NEEDS?

Technical Sheet

1.1

GIRPI, specialist of pipeworks made from synthetic materials, has developped complete systems to meet today's requirements in the building industry.

In addition to **GIRAIR®**, described in this documentation, **GIRPI** offers systems adapted to each application.

HOW TO SELECT THE SYSTEM BEST ADAPTED TO YOUR NEEDS?

APPLICATIONS	GIRPI SYSTEMS
Compressed air distribution	**GIRAIR®**
Domestic hot and cold water services	**SYSTEM'O® (HTA® + HTA®-F)**
Low temperature heating	**HTA®**
Gravity drainage up to 100°C	**HTA®-E**
Cold water, swimming pool, irrigation, water treatment	**PVC-U K62**
Comfort cooling/air conditioning Industrial cooling Air conditioning in the food industry	**KRYOCLIM®**
Acoustic drainage	**FRIAPHON®**

	GIRAIR® system	**KRYOCLIM® system**	**SYSTEM'O®**	**PVC-U K62 pressure fittings**
				
PN: Nominal Pressure rating (at 20°C)	PN 12,5 (ø16 to 110)	PN 10 (ø20 to 160) PN 6 (ø200)	**HTA®** PN 25 (ø16 to 63) PN 16 (ø25 to 160) **HTA®-F** PN 16 (ø16 to 160)	PN 25 (ø12 to 20) PN 16 (ø25 to 160)
Fire classification	Bs1d0	Bs1d0	Bs1d0	NPD**
Priming with:	CLEANER	CLEANER	CLEANER	CLEANER
Welding polymer	GAFIX	HPFIX	RERFIX/RERFAST	RERFIX/RERFAST/CSTB
Main French certifications*	LNE fire certificate	CSTB technical advice LNE fire certificate	CSTB technical advice LNE fire certificate	Approval NFP
Drinking water certified*	not applicable	not applicable	ACS	ACS
Non permeable to oxygen	yes	yes	yes	yes
Working temperatures (°C)	[- 0°C ; + 40°C]	[- 30°C ; + 40°C]	**HTA®** [+5°C ; +90°C] 100°C without pressure **HTA®-F** +20°C up to 70°C	+ 20°C

It is important to verify the chemical compatibility before using specific additives or fluids (see our technical documentation or ask GIRPI for tests)

* Please consult us for certifications outside France.

** No Performance Determined

GENERAL PROPERTIES
BENEFITS

■ A COMPLETE PIPING SYSTEM FOR:

- Compressed air distribution networks.
- Neutral gas distribution networks.
- Centralised vacuum networks (*).

■ CORROSION RESISTANT

GIRAIR® is neither attacked by atmospheric agents (humidity, aggressive environment) nor by condensates, which enables networks to remain sound and airtight throughout their long working lives. Furthermore, the cleanliness of the air or gas conveyed is maintained.

■ AIRTIGHTNESS

thanks to its joining method based on solvent cementing, GIRAIR® networks remain perfectly airtight during their whole working life.

■ ENERGY SAVINGS

for a given piping internal cross section, the air flow is improved. The smoothness of the pipe's inner surface and the design of the fittings, allowing for a full bore passage, result in reduced load losses and spare the tools at points of use, for a globally more economical operation.

■ AIR QUALITY

thanks to its resistance to corrosion and to its chemical resistance to most of the usual compressor oils (see data sheet 9.1), GIRAIR® helps maintain the air quality throughout the distribution network, until it reaches points of use.

■ IMPACT RESISTANCE

the GIRAIR® system presents an excellent ductile behaviour in case of a mechanical impacts, even at very low temperatures. Should the pipe break under very high impacts (>2.5 J/cm²), its ductile structure will prevent it from bursting into pieces and from projecting any dangerous splinters.

■ FIRE REACTION RATING

thanks to its Bs1d0 rating according to Euroclasses, which is the best possible fire classification for synthetic materials, GIRAIR® contributes to improving fire safety. Indeed, even when directly submitted to flames, it remains non-flammable, does not produce any flaming drops that could start new fires, and thanks to its high thermal insulation properties, it does not propagate heat along the network.

■ EASY NETWORK IDENTIFICATION

thanks to its blue colour (RAL 5012 incorporated in the mass of its resin), GIRAIR® compressed air networks can be identified easily and quickly. The GAFIX welding polymer has a darker shade of blue (RAL 5024) and helps make visual checks of the welds on site.

■ INSTALLATION TIMES UNDER CONTROL

lightweight system, professional, quick and reliable installation methods, simple tools, no fire permit required for installation, installation times are kept under control with the GIRAIR® system.

■ RECYCLING FRIENDLY

GIRAIR® is over 98% recyclable.
For more information about recycling possibilities please consult:
http://fr.recovinyl.com/certified_recyclers

■ LIMITS OF USE

The GIRAIR® system is not compatible with medical air networks, flammable gases or silicon-free applications.

* please contact GIRPI's technical support at +33 (0)2 32 79 58 00 or by e-mail at be.girpi@aliaxis.com for more information on that subject.

GENERAL PROPERTIES
CHARACTERISTICS

2017

The physical and mechanical properties below are measured on standard test samples before aging. As for all synthetic materials, these characteristics are likely to drop as the materials age, depending also on the conditions of use of the system.

1. PHYSICAL CHARACTERISTICS OF GIRAIR®

Characteristics	Standards	Units	Values
Density (volumic mass)	NF EN ISO 1183-1	kg/m³	≈ 1300
Linear expansion coefficient α	ISO 11359	mm/m°C	0.095
VICAT softening temperature (5 daN load)	NF EN 727	°C	≥ 73
Fire classification	EN 13501-1	—	Bs1d0
Thermal conductivity λ	ISO 22007	W/m°K	0.17

2. MECHANICAL CHARACTERISTICS OF GIRAIR®

Characteristics	Standards	Units	Values
Resistance to static pressure			
Pipes-Fittings-Assemblies time ≥ 1 h	NF EN 921	bar	≥ 52
Pipes-Fittings-Assemblies time ≥ 1 000 h	NF EN ISO13846	bar	≥ 40
Resistance to alternating pressure			
(On fittings) Pressure: mini 20 bar/maxi 50 bar Diameters 16 to 90 = 1 Hz frequency Diameters 110 = 0.42 Hz frequency	 NF T 54-094 NF T 54-094	 cycles cycles	 ≥ 5000 ≥ 2500

1 MPa = 10 bar

3. PHYSICAL CARACTERISTICS OF BRASS

The grades used are brass CW614N (CuZn39Pb3) for machined parts and CW617N (CuZn40Pb2) for forged/stamped parts.

Items containing brass	Grades
Items with inserts (GAEAL, GAEBL, GAMML, G4GL)	CW614N
Nut (GA3G/L, GA3F/L, GAUR)	CW617N or CW614N

The user must check whether the nature of the brass composing our fittings complies with applicable regulations in the country of use, and is compatible with the operating temperature, the specifications of the fluid carried, and any additives.

4. DIMENSIONAL CHARACTERISTICS

GIRAIR® pipes and fittings are manufactured and tested according to the dimensional requirements indicated in the following French Standards:

	Standards
Pipes	NF EN 1452
Fittings	NF T54-038

GENERAL PROPERTIES
OPERATING CONDITIONS

■ NOMINAL PRESSURE

The notion of nominal pressure (PN) corresponds to the maximum operating pressure at 20°C for which the product was designed for continuous service. GIRAIR® is **PN 12.5** rated.

■ TESTING PRESSURES

In order to ensure that it can durably meet the performances indicated in the next paragraph, GIRPI designed and dimensioned the products of the GIRAIR® range so that they could resist the following testing pressures:

- PN x 4.2 = 52.5 bar for 1 hour at 20°C.
- PN x 3.2 = 40 bar for 1.000 hours at 20°C.

⚠ Tests at the above pressure conditions, very demanding and destructive, are exclusively carried out in factories and laboratories. They are part of a continuous product quality monitoring scheme.

Those tests **must not** be carried out on:

- products that will be installed on networks afterwards,
- existing installations.

■ WORKING CONDITIONS

The **Maximum Working Pressure (MWP)** is the maximum pressure in continuous service for which the GIRAIR® system was designed.
It depends on the temperature of the fluid transported and/or on the ambient temperature that can be found in the direct surroundings of a GIRAIR® installation.
Temperature elevations reduce the modulus of the materials used to manufacture GIRAIR®, which in turn reduces its resistance to hydrostatic pressure.
The table below indicates the applicable Maximum Working Pressure according to temperatures

Ambient or fluid temperature	Maximum working pressure
0°C - 25°C	12.5 bar
25°C - 40°C	10 bar

■ GUARANTEES

• GIRPI guarantees its products for a duration of 10 years from the delivery to the first purchaser, except for normal wear parts. This guarantee applies only when the products are chosen, stored, installed and used in strict compliance with the technical documentation, the applicable certificates and codes of practice, and covers only the replacement of defective parts, excluding any other damage.

No application other than those exactly expressed in the technical documentation can be guaranteed, particularly concerning:

- the nature and the type of installation for which the products are being used,
- supporting methods, and materials,
- insulation methods, and materials,
- installation and working conditions (flushing, etc.),
- the nature of the fluids to be transported, and the working temperature-pressure values to be respected.

It is reminded that GIRPI does not take responsibility for the hydraulic design of piping networks, namely as far as pipe dimensioning is concerned.

GIRPI

GIRAIR® SYSTEM

GIRAIR® RANGE

Technical Sheet

2.1

2017

DESIGNATION	REFERENCE	DIAMETERS IN MM										TECHNICAL SHEET
		16	20	25	32	40	50	63	75	90	110	
PIPE	TUBGA	■	■	■	■	■	■	■	■	■	■	7.1
ELBOWS 90°	GA4M	■	■	■	■	■	■	■	■	■	■	7.1
ELBOWS 45°	GA8M	■	■	■	■	■	■	■	■	■	■	7.2
SERRATED STUB FLANGES	GACS						■	■	■	■	■	7.2
BENDS 90°	GA4C						■	■	■	■	■	7.2
COUPLINGS	GAMA	■	■	■	■	■	■	■	■	■	■	7.2
CAPS	GABO	■	■	■	■	■	■	■	■	■	■	7.3
REDUCING BUSHES LONG PATTERN	GARD			16	20	25	32	32 40	32	50 63	50 63	7.3
EQUAL TEES 90°	GATE	■	■	■	■	■	■	■	■	■	■	7.3
REDUCING TEES 90°	GATR		16	16 20	16 20 25	20 25 32	25 32 40	20 25 32 40	25 32	25	32	7.4
REDUCING BUSHES SHORT PATTERN	GARS		16	20	25	32	40	50	63	75	90	7.4
THREADED ADAPTORS	GAMML	■	■	■	■	■	■	■				7.5
ADAPTOR NIPPLES	GAEAL	■	■	■	■	■	■	■				7.5
THREADED ELBOWS 90°	GA4GL		■									7.5
ADAPTOR NIPPLES	GAEBL	■		■								7.5
THREADED ADAPTORS	GAMM	■	■	■	■	■	■	■				7.5
EQUAL THREADED TEES 90°	GATG	■	■	■								7.6
THREADED ELBOWS 90°	GA4G	■	■	■								7.6
ADAPTOR NIPPLES	GAEA	■	■	■	■	■	■	■	■			7.6
REDUCING ADAPTOR NIPPLES	GAEB	■	■	■	■	■	■					7.6
3 PIECE UNIONS	GA3P	■	■	■	■	■	■	■				7.7
3 PIECE UNIONS GIRAIR® / BRASS	GA3GL	■	■	■	■	■	■	■				7.7
3 PIECE UNIONS	GA3FP	■	■	■	■	■	■	■				7.7
3 PIECE UNIONS GIRAIR® / BRASS	GA3FL	■	■	■	■	■	■	■				7.8
CONNECTORS	GAUR	■	■	■	■	■						7.8
WALL PLATE ELBOW	GAAP	■	■	■								7.8
ACCESSORIES	GHRR	■	■									7.8
QUICK ADAPTOR	GHES	■										7.8
DOUBLE UNION BALL VALVES	GA2MBE	■	■	■	■	■	■	■				8.1
FLANGED SOCKET BALL VALVES	GA2MFE								■	■	■	8.3
DROP BENDS 180°	Q2C		■	■	■							7.9
DROP BENDS 180°	GA2C	■	■	■	■							7.9
DROP BENDS	Q2S		■	■	■							7.9
WALL PLATES with 2 or 3 outlets	GAAP		■	■								7.9
WALL PLATES with 4 outlets	GAAPG4		■	■								7.10
WALL PLATES with 4 outlets and drain	GAAPG4P		■	■								7.10
WALL PLATES ELBOW WITH 1 FEMALE THREADED OUTLET AND 1 SOCKET INLET	Q4GP		■	■								7.10
WEDGE	CALQAP		■	■	■	■	■	■				7.10
THREADED SADDLES 1/2"	QSB					■	■	■				7.11
THREADED SADDLES 3/4"	QSB			■	■	■	■	■				7.11
MONOKLIP® BRACKETS	HCKCP/HCK HCKC	■	■	■	■	■	■	■	■	■	■	7.13
WELDING POLYMER	GAFIX	■	■	■	■	■	■	■	■	■	■	3.2
CLEANER⊕	CLEANER⊕	■	■	■	■	■	■	■	■	■	■	3.2

GENERAL RULES OF INSTALLATION
TOOLS

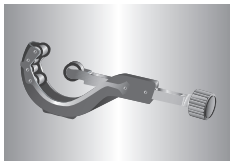
■ HANDLING AND STORAGE

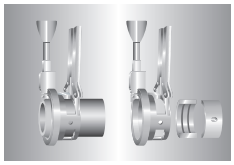
The pipes and fittings will be stored separately on an even area, away from dust and sun. In all cases, take special care to avoid rough handling, impacts and especially with indenting, cutting or heavy objects, particularly in cold weather. Transport and store the pipes with their protection cover. Remove the cover and protection caps or plugs immediately before installation.

For any operation, use the individual protection equipment adapted and recommended for the installation on the building site.

■ CUTTING

• **The roller plastic pipe-cutter**
Allows for neat, clean cuts to be carried out.





• **The chamfering pipe-cutter**
This type of tool cuts and chamfers pipes in one single operation. According to the model and size used, it can cut and chamfer pipes of all diameters, with the help of reducing half-shells.

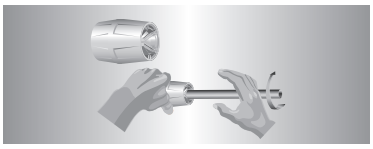
• **It is strongly advised to avoid using disk saws or shears to cut the pipe.**

■ TRIMMING - CHAMFERING

⚠ **Omitting to chamfer the pipe externally may cause leaks, both short term and longer term.**

After cutting, the pipe must be trimmed inside and a chamfer must be made on the outside. **The chamfer shall deflect from the pipe following a 15° angle. That chamfer's dimensions must comply with the following table:**

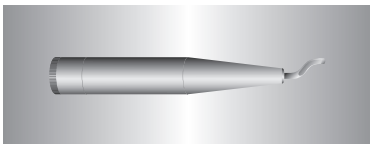
Pipe ø	Chamfer length A
ø 16	1 - 2 mm
ø 20 - ø 50	2 - 3 mm
ø 63 - ø 110	3 - 6 mm



These operations can be performed by means of the following tools:

• **Trimming and chamfering coner**
This tool can be used to trim the inside of the pipe, and on the other side, it chamfers the outside.
Ref. GIRPI **CONE50U** for pipes ø50 mm

• **Chamfering tool**
This tool chamfers the pipe.
Ref. GIRPI **CHANF160R** ø32 to 110 mm



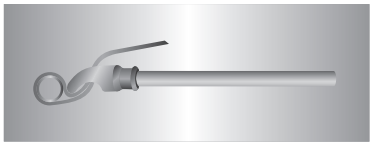
• **Chamfering pipe-cutter** *(see "cutting" section).*

• **Trimmer**
This reams the inside of pipes of all diameters.
Ref. GIRPI **EBAV1R** ø16 to 110 mm

• **The use of tools including cutting or abrading disks to chamfer pipes is strictly prohibited.**

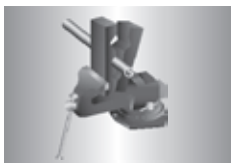
■ HOLDING TOOLS

• **Chain vice**
Polyurethane pipe-rests hold the pipe without any scratching.



• **Strap wrench**
Maximum gripping power, with no risk of deforming the pipes or fittings (braided nylon strap).

• **Bench vice**
When using such traditional vices, it is mandatory to clamp the pipes by means of wooden notched pipe-rests.



GIRPI

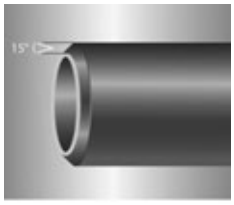
GIRAIR® SYSTEM

GENERAL RULES OF INSTALLATION
WELDING PROCEDURE

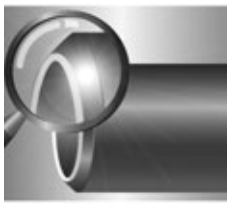
Technical Sheet

3.2

CUTTING



CHAMFERING



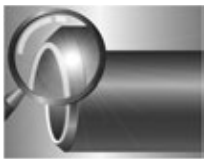
CHECKS

PRIMING

WELDING POLYMER APPLICATION

PUSH STRAIGHT

■ CHECKS PRIOR TO WELDING

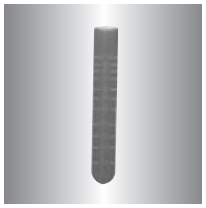


Abrading and priming operations are not compulsory.
However, depending on the environment met on each building site, pipes and fittings can be cleaned with a clean, lint-free piece of cloth, and primed with CLEANER ⊕, in order to ensure optimal performances for each assembly.
In all cases, pipes and fittings MUST be clean and free from any trace of humidity. If that is not the case, the cleaning procedure described above must be carried out.

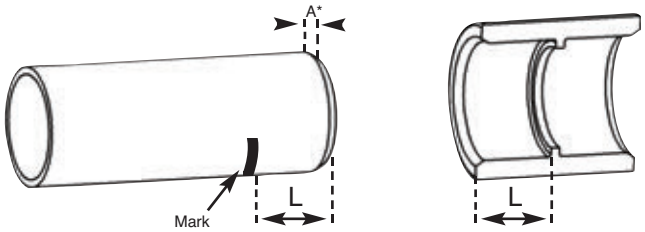
Before welding it is important to make certain checks:
- on the pipes: check that they are chamferred.
Extract chips produced during cutting or trimming operations, so as to avoid the obstruction of balancing valves and other similar equipment on the network.
- on the fittings: see that they contain no sign of impact, deep scratches, etc...
- on the welding polymer: it must be fluid, homogeneous, check the maximum date of use on each pot.

■ MARKING OF THE SOCKET LENGTH

- Before applying the welding polymer, mark the socket length with the gauge supplied by GIRPI or by a “test” assembly.



ref.: JAUGE



* See table on technical sheet 3.1

This mark enables the application of the welding polymer over the necessary length, and helps the installer to check whether the penetration length of the male end in the socket is correct. The use of GIRPI’s socket gauge is recommended (ref. JAUGE).

■ SURFACE PREPARATION

Dulling / abrading the surface to be joined is not necessary.
Preparing the surfaces of the male and female parts to be joined is mandatory.
That priming operation shall be carried out using CLEANER ⊕ cleaner and a clean, soft, lint-free piece of cloth.
Leave the cleaned surfaces to dry, or dry them up using another clean, soft, lint-free piece of cloth

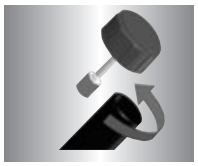
■ WELDING POLYMER APPLICATION

- Once the checks and marking have been done, apply **GAFIX** welding polymer, available in 250 ml or 1 liter pots.
- Check the maximum date of use on each pot.
- To apply the welding polymer, use the brush provided with the pot.
  Brushes provided with:
  - 250 ml pots are fit for use with sizes 16 to 50 mm.
  - 1 liter pots are fit for use with sizes 40 to 110 mm.

As a range addition, the applicators reference PAB1L are recommended for the application of welding polymers for diameters > 90 mm.

GENERAL RULES OF INSTALLATION
WELDING PROCEDURE

■ WELDING POLYMER APPLICATION



The use of any other means or method is prohibited, namely: fingers, wood sticks, or any other ustensil. Dipping the pipes or fittings directly into the welding polymer pots is prohibited as well (such practices lead to the creation of thick welding polymer deposits, which can cause obstruction of small bore pipeworks).

- Apply the welding polymer moderately (in a thin coat) over the whole socket length (female) and over the whole length of the male end (marked on pipe). The welding polymer should be applied in rotation movements so as to obtain a uniform, homogeneous coat, well spread over the whole interlock surface.

Pipe diameter	Rotations
ø 16 to 40	4
ø 50 to 90	6
ø 110	8

Due to standardised size tolerances on male and female elements, gaps may need to be filled in order to obtain a reliable weld. Under such circumstances, a double welding procedure is required. That double procedure consists in applying a first layer of welding polymer on the male end, then apply the usual layer of welding polymer on the female end. Finally, apply a second layer on the male end before pushing the two elements together immediately after.

⚠ **Modifying the welding polymer's composition by dilution or by any other means is prohibited.**

■ JOINTING

⚠ **Immediately after applying the welding polymer, joint the two elements right home (as far as the marks previously traced) by pushing longitudinally and without twisting.**
- Keep held together for 5 to 10 seconds without any movement. In order to secure optimal welding performances, do not submit fresh joints to any mechanical effort during the first minutes that follow joining.

- A bead of welding polymer is formed after pushing the elements together. That bead helps check that the weld is done. Excess welding polymer can be wiped off with a clean, soft and lint-free piece of cloth.

Nota : In certain cases it is necessary to mark the position of one element in relation to the other. On large sizes, greater than diameter 90, **2 fitters must operate simultaneously**, i.e one fitter will coat the male end, while the other fitter will be coating the female end with welding polymer. This method enables a quick jointing, needed for a strong weld.

■ PARTICULAR CLIMATIC CONDITIONS

⚠ - Temperature range required for cold welding: +5°C to +35°C. If the welding polymer is stored at 20°C, welding is possible at 0°C.

- The atmospheric conditions (temperature, humidity) considerably affect the curing drying time, (evaporation of solvents of the welding polymer). Therefore:

- At low temperature, the parts when assembled should be held together for 20 to 30 seconds.

- In hot weather, the adhesive should be applied rapidly and the parts immediatly jointed. So as to avoid evaporation of the welding polymer, the pot must be closed after each welding operation, and it must be used as quickly as possible once opened, especially under warm climatic conditions.

■ **DRYING TIMES** The drying times of the GAFIX welding polymer are as follows:

DRYING TIMES BEFORE PRESSURE TESTS:		6 bar		12.5 bar	
		ø16 - ø63	ø75 - ø110	ø16 - ø63	ø75 - ø110
Ambient temperature	5 - 10°C 11 - 35°C	5 h 2 h	6 h 2 h	6 h 3 h	12 h 4 h

GENERAL RULES OF INSTALLATION
RECOMMENDATIONS

Technical Sheet
3.4

2017

■ CONNECTIONS BETWEEN GIRAIR® AND THREADED METAL COMPONENTS

Connections between threaded metal components and GIRAIR® fittings with metal threaded inserts:
Excluding connection to wall plates (namely our reference GAAP), obtained by means of tap connectors (GAUR reference), connections between GIRAIR® and metal pipes, fittings and equipment featuring male or female threads (cylindrical/parallel) must be made by means of the GIRAIR®/metal couplings provided for this purpose.
It is advised not to connect tapered (conical) male threads onto GIRPI's GIRAIR® fittings with female metal threaded inserts.
Fittings that are equipped with threaded metal components: GAEAL, GAEBL, GAMML, GA4GL, can be used when high torque is required for connections to metal threaded components. The table below indicates maximum torque values.

Diameter mm	16	20	25	32	40	50	63
Maximum torque (N.m)	45	50	60	75	90	110	135

Connections between threaded metal components and GIRAIR® fittings with plastic threads:
For male or female plastic threaded fittings (GAEA, GAEB, GAMM, GATG, GA4G, GA3F/P), connections with cylindrical/parallel threaded metal components is possible.

When straight couplings, elbows, tees or other GIRAIR® fittings with plastic threads are used, they must be screwed by hand, the last ¼ turn only being tightened with a tool when required, preferably with a strap wrench.

■ SEALING

General recommendations related to sealing compounds:
The use of anaerobic resins is forbidden. Applying excess anaerobic resin quantities on brass components may result in a contact between the anaerobic paste and the plastic components, and cause the plastic components to crack.
Please contact the sealing paste manufacturers to get their confirmation as to the drying times, chemical/compatibility resistance and sealing capacity under pressure of their products.

Connections between threaded metal components and GIRAIR® fittings with metal threaded inserts:
In our current state of our knowledge at the date of publication of this data sheet, the following compounds have proven to be satisfactory for connecting **GIRAIR®**/**GIRAIR®** parts and mixed **GIRAIR®**/metal parts:

- Tangit (Loctite) racoretanch plastique.
- Geb fileplast plastique.

Do not use anaerobic resins (e.g. Filetfix III by Virax). In no case should GIRPI's GIRAIR® pipes and fittings be machine threaded inside or outside.

Connections between threaded metal components and GIRAIR® fittings with plastic threads:
The use of tallow, hemp or similar materials is forbidden, as excessive tightening can cause the fittings to break up.

The following sealants will be preferred:

- PTFE (e.g. "Teflon") tape, preferrably high density.
- Soft silicon paste.

■ APPROXIMATE QUANTITIES OF WELDING POLYMER FOR 100 WELDS ACCORDING TO THE PIPE DIAMETER:

PIPE DIAMETER mm	16	20-25-32	40-50-63	75	90-110
WELDING POLYMER QUANTITY	125 ml	200 ml	1 liter	2 liters	3.5 liters

The above figures were estimated based upon laboratory tests. They cannot truthfully reflect the possible variations encountered from one installation site to another, and must be considered as indicative.

■ THERMOFORMING

Thermoforming of GIRAIR® pipes is **strictly prohibited on the work site** and involves cancellation of GIRPI's guarantee. For all direction changes, make use of standard GIRPI fittings only.

Contact GIRPI's Technical Assistance for particular problems to be solved.

GIRPI

GIRAIR® SYSTEM

GENERAL RULES OF INSTALLATION
COMMISSIONING, TESTS AND PUTTING INTO SERVICE

Technical Sheet

3.5

2017

■ GENERAL

The GIRAIR® system pipes and fittings are inspected throughout their manufacture and are guaranteed for a use complying with their design within the limits indicated.
During the installation and before putting the GIRAIR® network into service, it is advisable to make a certain number of checks as with all other materials

.

■ INSPECTION

a) Visual inspection
During installation, the pipes and fittings should be inspected so as to eliminate doubtful elements containing abnormalities such as impacts and deep scores caused by unsuitable handling. Before the tests, the whole network will be visually inspected to eliminate any pipework section containing deep cuts or notches, large deformations due to sudden impacts, traces of blow torch burns, etc...
Any damaged part should be replaced before putting into service. The aim of the visual inspection is also to ensure that the installation complies with the drawings and hence the correct installation of all the components (connection, supports, monitoring and safety mechanisms, etc...).

b) Leak tests
After installation of the network, a pressure test will be made in order to detect possible leaks, at 1 bar (all parts of the network should be visible and accessible during the test). Valves must all be opened and closed several times.

■ TEST BEFORE PUTTING INTO SERVICE

When the leak tests have been made, it is advised, in order to remove all foreign matter, to clean the inside of the network. The test pressure of the circuit will be equal to at least 1.5 times the working pressure with a maximum of 12.5 bar.
This pressure will be kept for 12 hours and the manometers should not show any pressure drop. The rise of pressure will be done progressively.
The waterproofness of the valves will be checked by closing them, one after the other, and by draining out the pressure downstream each of them. At the end of the tests the normal working pressure shall be restored.
As a general rule, before starting the installation, all tests and controls must be carried out according to applicable codes of practice and regulations.

■ OPERATING CONDITIONS

⚠ Whatever the use, the safety mechanisms necessary for the traditional protection of networks (regulation, pressure reduction and limitation, temperature regulation and limitation, shut off mechanisms, etc...), should be planned, installed and kept in perfect working order throughout operation.

a) Vibrations
Vibrations can be a source of disorders on both pipework and supports ; it is highly advisable to install a suitable system preventing vibrations from spreading.

b) Sources of heat and UV
Being made from thermoplastic material, GIRAIR® should in no case be installed close to a source of heat causing a rise in temperature greater than its limits of use, and must be protected from exposure to ultraviolet rays.

c) Prevention of impacts
As with all networks conveying pressurised fluids, GIRAIR® pipework systems must be protected from impacts which might occur in passage ways used by handling machinery or suspended loads in movement (use of safety barriers, railings, etc...).

d) Malfunction
Compliance with the operating Pressure/Temperature conditions must be checked and ensured using regulation and safety devices, such as pressure reducers, safety valves, expansion tanks, anti-hammering or similar devices, in compliance with applicable codes of practice.

Any malfunction must be noted in the maintenance log book of the networks.

e) Insulation materials
Electric cable insulation materials contain substances that can potentially damage GIRAIR® pipes. Therefore, it is advised not to store or install GIRAIR® pipes near electric cables.

EXPANSION - CONTRACTION
PHENOMENON - CALCULATIONS

2017

■ TECHNICAL ASSISTANCE:

GIRPI's installation guide and expansion slide rules will enable you to figure out expansion loop dimensions and bracket positioning in changes of direction. You can obtain then upon simple request from **contact@girpi.fr**

For help in calculating expansion, producing the application drawings or training staff on site, contact GIRPI's technical support: **+33 (0)2 32 79 58 00 - be.girpi@aliaxis.com**

■ THE PHENOMENON

All materials subjected to thermal variations:

- contract when temperatures fall,
- expand when temperatures rise.

■ CALCULATION PARAMETERS FOR GIRAIR®

The implementation of the system must take account of the elongation or contraction of the pipe which is calculated using the following formula:

$$\Delta L = \alpha \times L \times \Delta T$$

The linear expansion coefficient of GIRAIR® is:

α = 0,095 millimeter per meter per °C (mm/m.°C)

in which : α = expansion - contraction coefficient (linear)

L = length of the piping when installed, in meters

ΔT = temperature deviation in degrees Celsius °C
(difference between the maximum or minimum temperature in service and installation temperature)

ΔL = length deviation, in mm
(difference in length between L on installation and L in operation, i.e elongation or shrinkage length)

■ COMPRESSED AIR TEMPERATURE DURING OPERATION

Most of the time the air's temperature depends on the temperature of the air fed into by the compressor, and on the presence of dryers.

Without dryer, the air produced by the compressor, can vary from 20° in winter to 40° in summer.

If a refrigerating dryer is used, the usual temperature obtained at the start of the network is 10°C.

Ex 1 : Working network (without dryer)

Ø 63 mm

- Temperature of installation = 20°C
- Temperature of the air at compressor outlet = 40°C
- Length (during the installation) = 15 m

ΔT = 40 - 20 = 20°C

$\Delta L1$ = 0.095 x 15 x 20 = 29 mm **expansion**.

Ex 2 : Working network with a dryer

Ø 63 mm

- Temperature of installation = 25°C
- Temperature of the air at the start = 10°C
- Length (during the installation) = 25 m.

ΔT = 25 - 10 = 15°C

$\Delta L2$ = 0.095 x 25 x 15 = 36 mm **contraction**.

EXPANSION - CONTRACTION
SOLUTIONS

■ THE REMEDIES

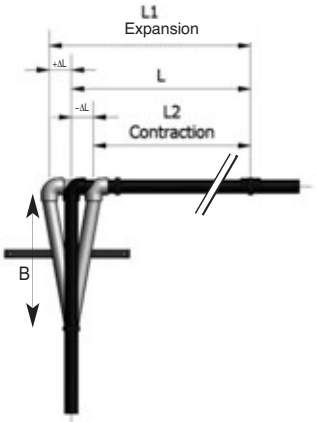
In order to avoid the disorders subsequent to the movements of the pipes, it is necessary to let them expand and contract freely.

It is therefore necessary to:

- Use pipe brackets allowing the longitudinal movements of the pipe to be guided.
- See to it that there never is a straight length of pipe between 2 anchors without any expansion compensation, either by using a change in direction, or by making a loop (see illustrations below).

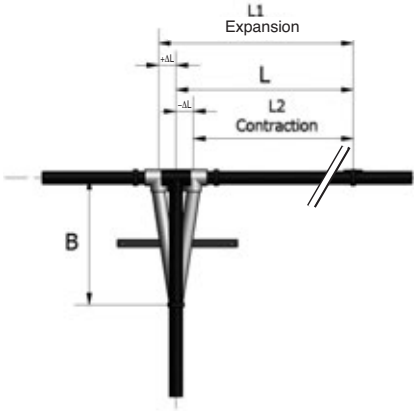
1 - LOOP ARMS

CHANGE IN DIRECTION



Change in direction
(which is generally efficient in most cases).

BRANCH

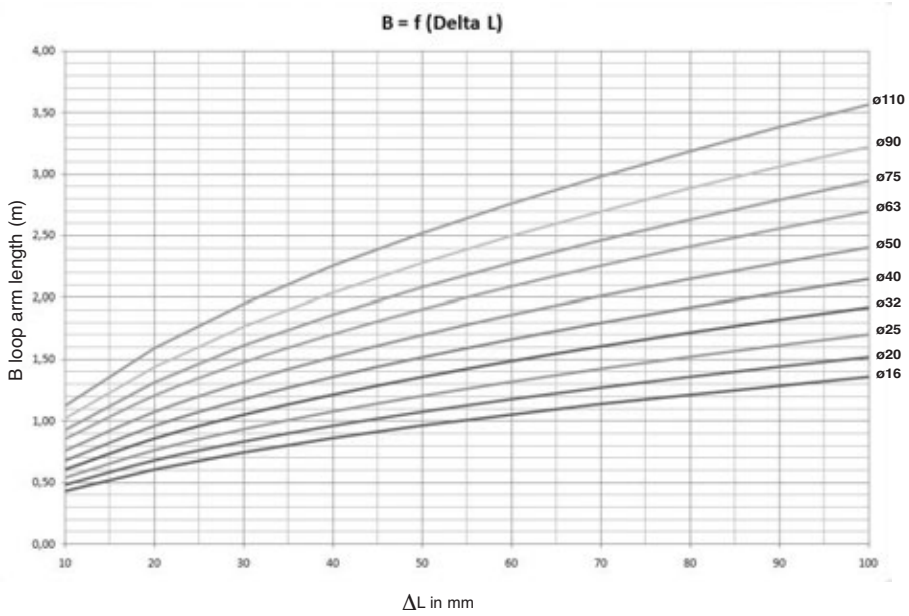


L	: Length of pipe section during installation
L1	: Length at maximum temperature
L2	: Length at minimum temperature (fluid or room)
ΔL	: Length difference between L1 (or L2) and L
B	: Length of loop's arm
C.C.	: Guide (bracket)
P.F.	: Anchor point

Using the following chart, it is possible to determine the loop arm length "B" required to absorb the calculated expansion.

$$B = 34\sqrt{Ø \times \Delta L}$$

34 : constant
Ø : External diameter (mm)
Δ : Length deviation (in mm)
B : loop arm length (mm)



Ex 1 :
B = 34 $\sqrt{63 \times 29}$ = 1450 mm =1.45 m

Details of Ex.1 can be found on technical sheet 4.1

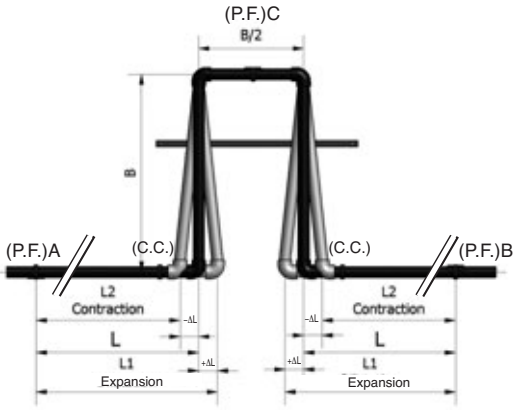
EXPANSION - CONTRACTION
SOLUTIONS

2017

2 - EXPANSION LOOPS

Loops
Made from GIRAIR® pipes and fittings, they are generally used on long, straight sections of pipework.

L	: Length of pipe section during installation
L1	: Length at maximum temperature
L2	: Length at minimum temperature (fluid or room)
ΔL	: Length difference between L1 (or L2) and L
B	: Length of loop's arm
C.C.	: Guide (bracket)
P.F.	: Anchor point

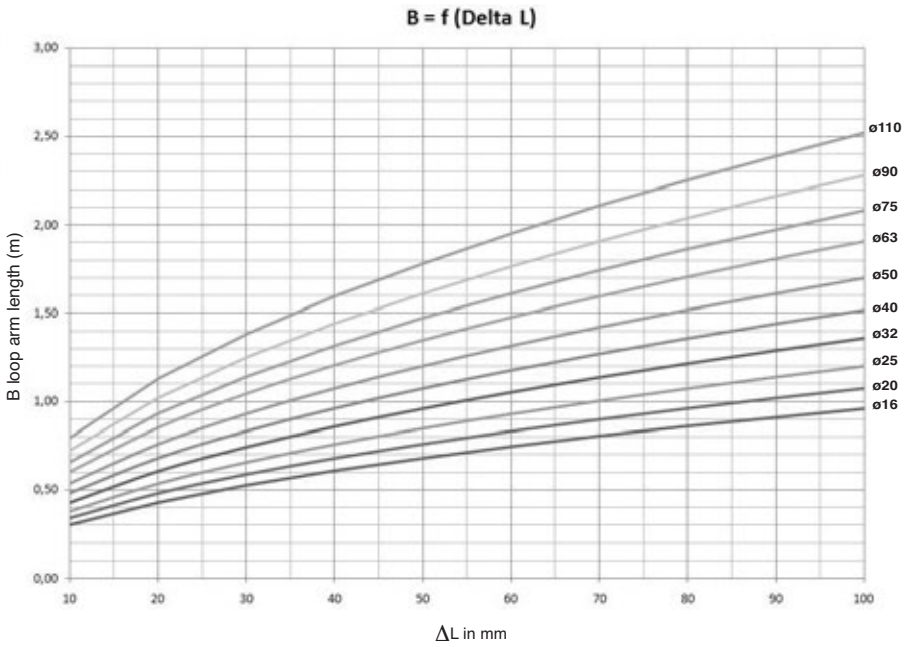


Using the following chart, it is possible to determine the loop arm length "B" required to absorb the calculated expansion.

$$B = 34\sqrt{Ø \times (\Delta L/2)}$$

34 : constant
Ø : External diameter (mm)
Δ : Length deviation (in mm)
B : loop arm length (mm)

Ex 2 :
$B = 34\sqrt{63 \times 36/2} = 1140$ mm = 1.14 m



Details of Ex.2 can be found on technical sheet 4.1

GIRPI

GIRAIR® SYSTEM

INSTALLATION: ACCESSORIES AND ANCILLARIES
MONOKLIP® BRACKETS

Technical Sheet

5.1

2017

■ GENERAL DESCRIPTION

MONOKLIP® brackets have been especially designed to support GIRAIR® pipeworks. The pipe is allowed to move freely inside the bracket as it expands and contracts. Depending on their size, they are offered with M6, M8 and 7x150 female threaded brass inserts, or with a plain 5.5 mm diameter drilled base.

GIRAIR® is a complete system, specially developped to bring global reliability. Therefore, all of the system's elements must imperatively be used. The use of components of external origin will make GIRPI's guarantee null and void, especially the use of other brackets than MONOKLIP®.

Other brackets than MONOKLIP® shall be used under the installer's entire responsibility.

In all cases, the supports:

- shall continue to support their load even under temperature variation effects,
- shall allow the pipeworks to expand freely,
- shall keep the pipeworks which they support at enough clearance from any wall or obstacle so as to allow for the expansion movements and also for the assembly and disassembly of the mechanical couplings and accessories (unions, flanges, valves, pressure limiters, etc...),
- shall in no event either injure or damage the pipeworks.
- shall be free from any chemical substance which could potentially damage the pipeworks (e.g.plasticisers).

■ SUPPORTS

In order to allow the pipes to expand and contract freely, MONOKLIP® brackets must be used (with M6, M8, or 7x150 female threaded inserts).

Thanks to its range of wedges, the total height of MONOKLIP® brackets can be controlled so as to ensure a constant axis of the piping sections, even when reducers are used.

Also, wedges will be added to MONOKLIP® brackets on piping sections where accessories or components of larger dimensions than the fittings (e.g. valves) are installed

Ref. : "CALE1220" for diameter 20 mm.
"CALE2563" for diameters 25 - 32 - 40 - 50 - 63 mm
"CALE2563/4" for diameters 25 - 32 - 40 - 50 - 63 mm
"CALE75110" for diameters 75 - 90 - 110 mm

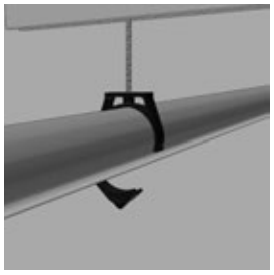
■ MONOKLIP® BRACKET CENTRES

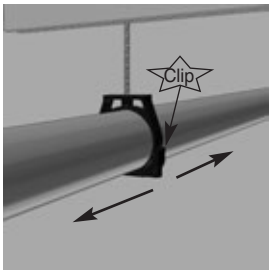
SPACING BETWEEN MONOKLIPS®										
Pipe diameter		20	25	32	40	50	63	75	90	110
Distance between brackets (in meters)	Horizontal sections (m)	1.1	1.3	1.4	1.6	1.8	2.1	2.1	2.1	2.1
	Vertical sections (m)	2	2.2	2.2	2.9	3	3.1	3.1	3.1	3.1

When the fluid's temperature is likely to reach temperatures above 20°C during the projected lifetime of an installation, the following corrective factors shall be applied: 0.9 up to 30°C, and 0.8 up to 40°C.

INSTALLATION: ACCESSORIES AND ANCILLARIES
MONOKLIP® BRACKETS

■ EXAMPLES OF SUPPORTS: MONOKLIP® BRACKETS

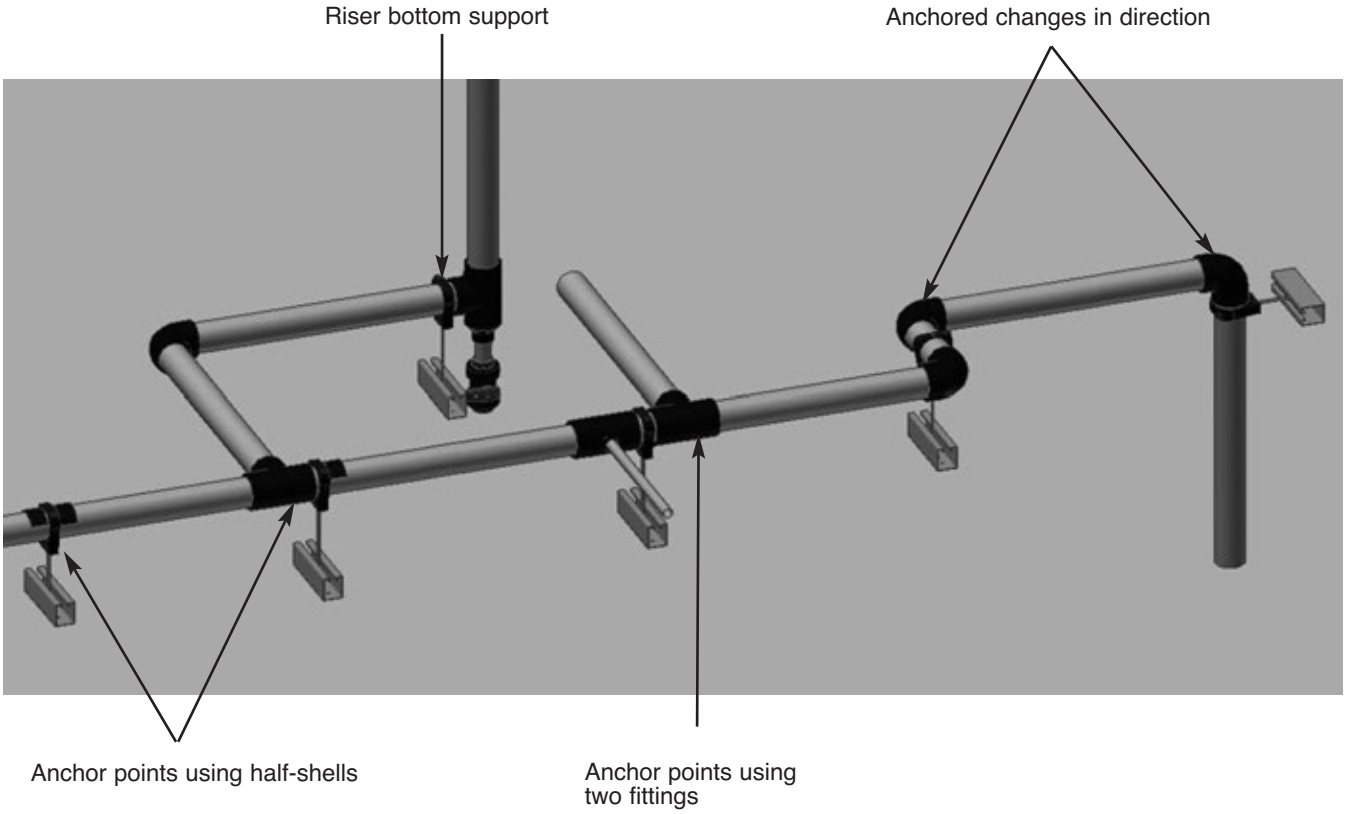




Bracket which works as a guide to ensure free movement of the pipes

■ EXAMPLES OF ANCHORS

Half-shell anchors are composed of sections cut from “GAMA” GIRAIR® straight couplings. Cut the couplings in two transversally and longitudinally, with their internal stops removed. The resulting half-shells are then cleaned with CLEANER⊕, coated with GAFIX welding polymer, and welded onto pipes of the same size, also coated with GAFIX welding polymer before contact.



GIRPI

GIRAIR® SYSTEM

INSTALLATION: ACCESSORIES AND ANCILLARIES
SPECIAL CASES

Technical Sheet

5.3

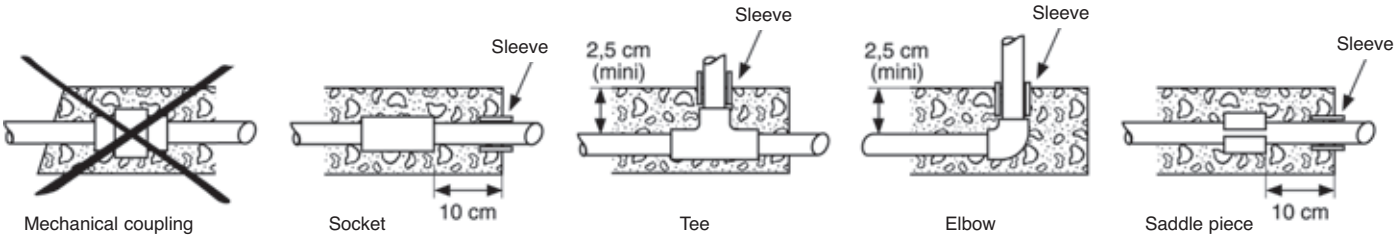
2017

■ PASSING THROUGH PARTITIONS AND FLOORS

When a GIRAIR® pipe goes through a wall or a floor, it must be protected by a rigid sleeve made of synthetic material, and preferrably GIRAIR®.
The sleeve internal diameter is chosen with enough tolerance to allow the pipes to expand and contract freel
The sleeve must be long enough to protrude on both sides of the finished masonry element.

■ BUILT-IN OR EMBEDDED INSTALLATIONS

GIRAIR® can be built or embedded in the masonry as long as there is no disconnectable coupling in that pipework section.
The following precautions must be respected.



- The pipe must be made integral with the masonry either by means of the couplings making up the system or using half-shells onto the wall of the pipe.
- Each time the pipe enters the masonry it must be protected against shearing by a sleeve which protrudes from the finished surface of the masonry.
- The chase will be filled with a homogeneous material without sharp gravel which could damage the pipe.
- The commissioning tests must be carried out before filling the chase or pouring the concrete.
- Condensate drainage must be part of the design.

■ BURIED INSTALLATIONS

GIRAIR® pipeworks can be buried if the following precautions are respected:

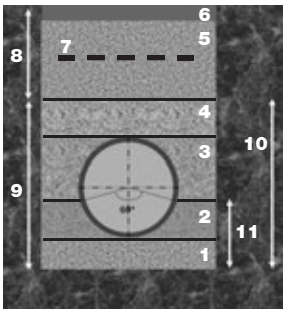
- The bottom of the excavation must be levelled and free of large grained materials and have no surface hard spots. A carefully compacted bed of 10 cm minimum will be made of clean sand 0/10 containing less than 10 % of fines.
- The backfill directly in contact with the pipe (comprised of sand containing less than 12 % of fines and free of gravel with diameter greater than 30 mm) will cover the pipe to a depth of 15 cm minimum and will be compacted.
- The covering backfill will be compacted in successive layers comprised of materials removed from the trench and which contain less than 30 % of elements greater than 20 mm.
- The minimum total height of the backfill above the pipe will be:
  - general case: 60 cm
  - under road/rail traffic: 80 cm
  - under concrete slab: 40 cm

1 - Belding
- 10 cm on normal ground
- 15 cm on hard or rocky ground
- Clean, lightly fillerised sand (< 5%)

2 - Base
- Clean sand with low fine element content (< 5%)
- Installation by mechanical clamping of the grains

3 - Lateral embankment

4 - Initial embankment
- ≥ 10 cm above the collar
- ≥ 15 cm above the top



5 - Roadway embankment or base
- Untreated gravel
- Granularity 0/20 and 0/40
- Minimum code : "Cb" (granulate standard XP P 18-545 march 2008)
- Warning mesh: (NF EN 12 613): 30 cm above pipes

6 - Finishing layer
- Topsoil, asphalt overlay, etc...

7 - Warning mesh

8 - Embankment

9 - Protective embankment

10 - Wrapping area

11 - Seating

GIRPI

GIRAIR® SYSTEM

NETWORK CALCULATION
NETWORK DESIGN ASPECTS

Technical Sheet

6.0

■ GENERAL

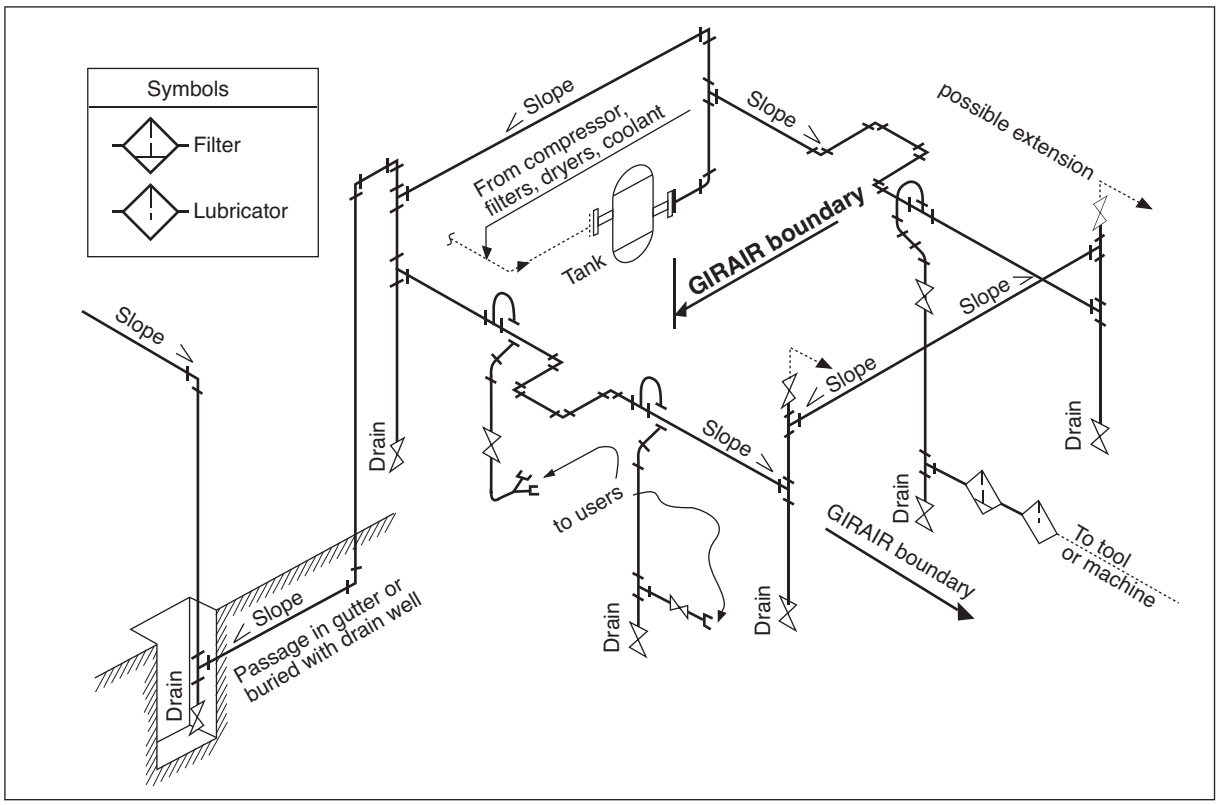
The evolution in compressed air production techniques and tools requires the design of innovative networks.
In order to allow for extensions or new branches, the mains of such networks must be amply dimensioned.

Sectioning the network into closed loop circuits according to each workshop type and depending on various working pressures guarantees higher efficiency and optimal working pressures at all points in the network.

A shallow slope on the manifolds combined with the installation of a condensate trap made with fittings and pipes at each low point, together with the installation of all branches starting upward, will ensure the good quality of compressed air at each point of final distribution.

■ BASIC PATTERN

The isometric drawing below is an example and summarizes the basic principles to respect during the installation of compressed air network using the GIRAIR® system.
In case of any specific problem, please consult us.



The GIRAIR® system can only be used after the tank, the coolers, etc..., and must not be directly connected to elements subject to strong vibrations.

GIRPI

GIRAIR® SYSTEM

NETWORK CALCULATION
FLOW RATE-PRESSURE LOSSES

Technical Sheet

6.1

2017

■ NETWORK DESIGN ADVICE

• Have as many straight sections as possible.

• Compressed air speed should be around 7 m/s: indeed, by exceeding this speed, pressure losses increase quickly, and so do energy costs.

Nonetheless, a speed inferior to 5 m/s means that the diameter of the pipe is not fully used, which also enables to regulate air consumption peaks thanks to the amounts of air stored in the network.

• The network needs to be drained easily from its condensates at low points.

• Make branches start from the upper side of the pipe .

• Choose accessories and fittings that will cause less pressure losses.

• Design a network as simple as possible to have a better balance flow.

• Try to have an internal diameter of pipe as constant as possible. Avoid pipe section reductions to limit pressure losses.

• Use enough valves to allow for network isolation by sections.

■ DRAINING

Condensation has no effect on the GIRAIR® system, but it can damage production tools. It is important to be able to evacuate condensation and even more if the system does not have a dryer upstream.

• Drains can be automatic or manual.

• The network requires a slope about 0.7 % to 1 %, directed toward the drain.

• Drains will be located at the lowest points of the circuit or at the end of straight lines.

■ BRANCHES

In order to avoid the presence of water in downpipes, branches are done with drop bends starting from the upper side of the network.

This technique enables condensation and impurities to be evacuated toward the drains without affecting the equipment or the manufacturing process (e.g. low pressure paint pistols...).

■ THE FLOW: PRESSURE OF NETWORK

To determine the compressed air network dimensions some data needs to be known precisely:

• The equipments using compressed air:
  - quantity,
  - the pressure recommended by the manufacturers,
  - the volume of air consumed when machines are on,
  - number of machines working simultaneously.

• Kind of joints used to link the equipment to the compressed air network.

• Identify the accessories added to the compressed air network (filters...).

• Incorporate network extension plans in the initial design.

• User's energetic policy, consequences on the pressure losses....

The pressure of the network at the starting point shall be equal to the pressure of the machine needing the highest pressure added to the GIRAIR® system load losses, and to particular accessories pressure losses: filters, quick fittings (some of them may have a pressure loss of 1 bar or more, contact the manufacturer for exact information).

Examples :

- Pneumatic screwdriver	=	flow 25 Nm3/h	pressure 5 bar
- Paint pistol	=	" 14 Nm3/h	" 4 bar
- Sandblaster	=	" 35 Nm3/h	" 6 bar

In order to determine pipework sizes, start with the mains (starting from compressor outlet) and proceed by sections.

NETWORK CALCULATION
FLOW RATE - PRESSURE LOSSES

2017

■ PRESSURE LOSSES AND PIPEWORK SIZE

The calculation of pipework dimensions is a direct function of the pressure loss (Δp) admitted between start point and end points. Oversized networks will lead to high pressure losses and may cause compressors to conserve too much energy.
This pressure loss takes into account the total length of pipe, and each fitting's specific influence figured out in equivalent runs of pipe, according to each fitting's shape.
The following table shows the equivalent pipe lengths corresponding to each type of fitting, per size.

EQUIVALENT LENGTH OF PIPE OF THE SAME DIAMETER (in meters)

Pipe external Ø	Coupling Unions	Elbow 90°	Elbow 45°	Tee	Tee to branch	Reducing bush short pattern	Reducing double long pattern	Bends 90°	180° drop bends
16	0.10	0.30	0.15	0.10	0.70	0.45	0.20	0.10	0.25
20	0.15	0.40	0.20	0.15	0.85	0.55	0.25	0.15	0.35
25	0.20	0.50	0.25	0.15	1.05	0.70	0.30	0.15	0.45
32	0.25	0.60	0.30	0.20	1.35	0.90	0.40	0.20	0.55
40	0.30	0.80	0.40	0.25	1.70	1.10	0.45	0.25	-
50	0.40	0.95	0.50	0.35	2.15	1.35	0.60	0.35	-
63	0.50	1.25	0.60	0.45	2.70	1.70	0.75	0.45	-
75	-	1.50	0.75	0.55	3.70	2.40	1.10	0.55	-
90	-	1.85	0.95	0.70	4.55	3.10	1.35	0.75	-
110	-	2.50	1.35	0.95	6.05	3.50	1.55	1.00	-

It is common usage to consider that fittings account for an additional 15% of the total length of pipe.

Use the above formula to determine the diameter with an optimised fluid speed of **7m/s**:

$$\text{Ø int.} = 1.84 \sqrt[5.16]{\frac{Q^2\ L1}{\Delta p1\ P}}$$

Aubery equation

Ø int. = inside diameter (mm)
Q = flow (m3/h)
L1 = length (m)
Δp1 = pressure loss of the pipework section (bar)
P = pressure of the network (bar)

L1 = Length of pipe + sum of length of the equivalent fittings

Note : for a 300 m length circuit if we impose a 0.3 bar Δp

for a 70 m length section: $\Delta p = \frac{0.3 \times 70}{300} = 0.07$ bar

Reminder: GIRAIR® (mm) pipe dimensions

Ø ext.	16	20	25	32	40	50	63	75	90	110
Ø int.maxi	12.4	15.4	19.4	26.2	32.6	40.8	51.4	61.4	73.6	90

NETWORK CALCULATION
FLOW RATE - PRESSURE LOSSES

■ **THOSE TABLES GIVE AN EVALUATION OF THE PIPE OUTSIDE DIAMETER REQUIRED ACCORDING TO THE PRESSURE LOSSES AND THE FLOW RATE, WITH A FLUID SPEED ABOUT 7M/S**

Pressure = 7 bar

$\Delta p \leq 0.1$

Q Flow m3/h	L1 = Length (m) pipes length + equal length due to the fittings							
	10	25	50	75	100	125	150	200
25	16	20	20	25	25	25	25	25
50	20	25	25	32	32	32	32	32
75	25	32	32	32	32	40	40	40
100	25	32	32	40	40	40	40	40
200	32	40	40	50	50	50	50	50
300	40	50	50	50	63	63	63	63
400	40	50	63	63	63	63	75	75
500	50	50	63	63	75	75	75	75
600	50	63	63	75	75	75	90	90
700	50	63	75	75	75	90	90	90
800	50	63	75	75	90	90	90	90
900	63	63	75	90	90	90	90	110
1000	63	75	75	90	90	90	110	110
1500	75	90	90	110	110	110	110	110
2000	75	90	110	110	-	-	-	-

$\Delta p \leq 0.3$

Q Flow m3/h	L1 = Length (m)) pipes length + equal length due to the fittings					
	300	400	500	600	800	1000
25	25	25	25	25	32	32
50	32	32	32	32	32	40
75	40	40	40	40	40	40
100	40	40	40	40	50	50
200	50	50	50	63	63	63
300	63	63	63	63	75	75
400	75	75	75	75	75	90
500	75	75	75	75	90	90
600	75	75	90	90	90	90
700	90	90	90	90	90	110
800	90	90	90	90	110	110
900	90	90	90	110	110	110
1000	90	90	110	110	110	110
1500	110	110	110	-	-	-
2000	-	-	-	-	-	-

Pressure = 12.5 bar

$\Delta p \leq 0.1$

Q Flow m3/h	L1 = Length (m) pipes length + equal length due to the fittings							
	10	25	50	75	100	125	150	200
25	16	16	20	20	20	25	25	25
50	20	20	25	25	32	32	32	32
75	25	25	32	32	32	32	32	32
100	25	32	32	32	32	32	40	40
200	32	32	40	40	50	50	50	50
300	32	40	50	50	50	50	63	63
400	40	50	50	50	63	63	63	63
500	40	50	63	63	63	63	75	75
600	40	50	63	63	63	75	75	75
700	50	63	63	63	75	75	75	75
800	50	63	63	75	75	75	90	90
900	50	63	75	75	75	90	90	90
1000	50	63	75	75	90	90	90	90
1500	63	75	90	90	90	110	110	110
2000	75	90	90	110	110	110	110	-

$\Delta p \leq 0.3$

Q Flow m3/h	L1 = Length (m) pipes length + equal length due to the fittings					
	300	400	500	600	800	1000
25	25	25	25	25	25	25
50	32	32	32	32	32	32
75	32	32	32	32	40	40
100	40	40	40	40	40	40
200	50	50	50	50	50	63
300	50	50	63	63	63	63
400	63	63	63	63	75	75
500	63	63	75	75	75	75
600	75	75	75	75	90	90
700	75	75	75	90	90	90
800	75	75	90	90	90	90
900	75	90	90	90	90	110
1000	90	90	90	90	110	110
1500	110	110	110	110	110	-
2000	110	110	110	-	-	-

DIMENSION SHEET
PIPES AND FITTINGS

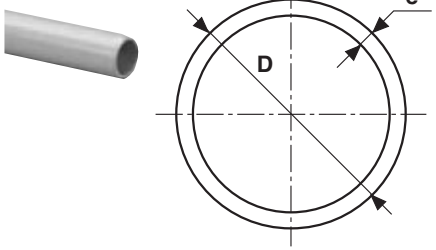
2017

CAUTION:
- All the sizes indicated in the dimension sheets are in millimeters, when not specified.
- All the threaded fittings are BSP :
  - On GIRAIR®, male threads are conical (taper) and female threads are cylindrical (parallel).
  - On brass, all threads are cylindrical (parallel).

IMPORTANT NOTE: With the constant concern to improve the range and quality of its products within the context of the standards used at present, GIRPI reserves the right to modify the dimensional characteristics of its pipes and fittings together with the scope of its ranges, without prior notice.

GIRAIR® PIPES

Chamferred at both ends, in 4 meter lengths. Wrapped in plastic sleeves

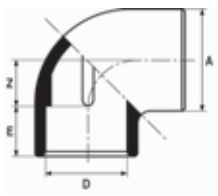


D	Dn	Reference	Pack (*)	PMS at 25°C	e mini	Weight kg/m	Internal Ø	Capacity. l/m
16	10	TUBGA16	10	12.5	1.8	0.106	12.4	0.120
20	15	TUBGA20	10	12.5	2.3	0.168	15.4	0.186
25	20	TUBGA25	10	12.5	2.8	0.257	19.4	0.295
32	25	TUBGA32	10	12.5	2.9	0.340	26.2	0.538
40	32	TUBGA40	10	12.5	3.7	0.542	32.6	0.834
50	40	TUBGA50	5	12.5	4.6	0.842	40.8	1.307
63	50	TUBGA63	1	12.5	5.8	1.334	51.4	2.074
75	65	TUBGA75	1	12.5	6.8	2.090	61.4	2.960
90	80	TUBGA90	1	12.5	8.2	3.030	73.6	4.250
110	100	TUBGA110	1	12.5	10	4.480	90.0	6.360

(*) Number of pipes per bundle

ELBOWS 90°

Soc. x Soc.



D	Dn	Reference	Z	E	A
16	10	GA4M16	10	9	21
20	15	GA4M20	11	17	26
25	20	GA4M25	14.5	19.5	30.5
32	25	GA4M32	18	23	38
40	32	GA4M40	23	27	49
50	40	GA4M50	27	31.5	58
63	50	GA4M63	33	38	73
75	65	GA4M75	39	44	92.5
90	80	GA4M90	49	52.5	112
110	100	GA4M110	58	62	131.5

GIRPI

GIRAIR® SYSTEM

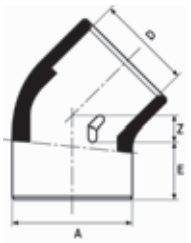
DIMENSION SHEET
FITTINGS

Technical Sheet

7.2

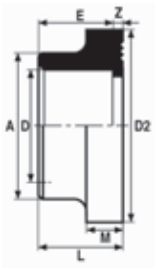
2017

ELBOWS 45°
Soc. x Soc.



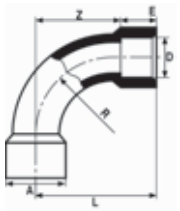
D	Dn	Reference	Z	E	A
16	10	GA8M16	4.5	14.5	21
20	15	GA8M20	4.5	17	25.5
25	20	GA8M25	5.5	19.5	31.5
32	25	GA8M32	8	23	39.5
40	32	GA8M40	9.5	27	49
50	40	GA8M50	11.5	32	58
63	50	GA8M63	14	38	72.5
75	65	GA8M75	18	44	92
90	80	GA8M90	22	52	109
110	100	GA8M110	24	62	131.5

SERRATED STUB FLANGES
Soc.



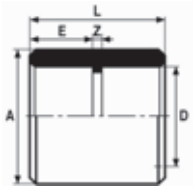
D	Dn	Reference	Z	E	A	D2	M	L
50	40	GACS50	3	32	61	73	8	35
63	50	GACS63	3	38.5	76	90	9	41.5
75	63	GACS75	3	44	90	106	10	47
90	80	GACS90	5	52	108	125	11	57
110	100	GACS110	5	62	131	150	12	67

BENDS 90°
Soc. x Soc.



D	Dn	Reference	Z	E	A	L
50	40	GA4C50	99	31	64	131
63	50	GA4C63	126	38	75.5	164
75	65	GA4C75	151	42	94	198
90	80	GA4C90	180	51	112	231
110	100	GA4C110	225	60	136	285

COUPLINGS
Soc. x Soc.

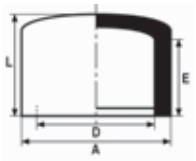


D	Dn	Reference	Z	E	A	L
16	10	GAMA16	3	15	33	22
20	15	GAMA20	3	17	26	37
25	20	GAMA25	2.5	20	31.5	42.5
32	25	GAMA32	3.5	23	38	49.5
40	32	GAMA40	4	26.5	48	57
50	40	GAMA50	3	32	59.5	67
63	50	GAMA63	4	38	75.5	80.0
75	65	GAMA75	4	45	91	94
90	80	GAMA90	5	52	106.5	109
110	100	GAMA110	6	62	126.5	130

DIMENSION SHEET
FITTINGS

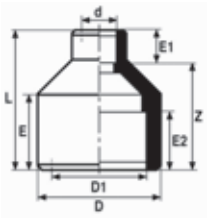
2017

CAPS
Soc.



D	Dn	Reference	E	A	L
16	10	GABO16	14	24	20
20	15	GABO20	17.5	26	22
25	20	GABO25	19.5	31.5	25.5
32	25	GABO32	24	39.5	30
40	32	GABO40	28	48	36.5
50	40	GABO50	33	59.5	43
63	50	GABO63	40.5	75	52.5
75	65	GABO75	52	91	77
90	80	GABO90	59	107.5	91.5
110	100	GABO110	66	129	109.5

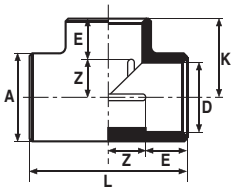
REDUCING BUSHES LONG PATTERN
Spig. (Ø) x Soc. (øR)



D-d	Dn	Reference	D1	Z	E	E1	E2	L
25-16	20-10	GARD2516	16.5[1]	25.5	19	14.5	14	40
32-20	25-15	GARD3220	25	31	22.5	17	19.5	48
40-25	32-20	GARD4025	32	36.5	27	19.5	21.5	56
50-32	40-25	GARD5032	40	45	32	23	27.5	68
63-32	50-25	GARD6332	50	55.5	38.5	23	32	78.5
63-40	50-32	GARD6340	50	55.5	38.5	27	32	82.5
75-32	65-25	GARD7532	61[1]	62	45	22.5	38	85
90-50	80-40	GARD9050	75	74.5	53	32	44	106.5
90-63	80-50	GARD9063	75	75	53	38.5	44.5	113.5
110-50	100-40	GARD1150	90	90.5	62	32	52.5	122.5
110-63	100-50	GARD1163	90	92	63.5	38	54	130

(1) - **NB :** reducer's large ends for references GARD 32 to 110 (except GARD 7532, 7540 and 7550) can be used as sockets and spigots, with one size interval. Small ends are socket only.
e.g.: GARD 90/63 = 90 SPIG. + 75 SOC. / 63 SOC.

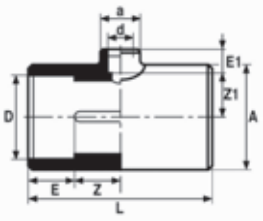
EQUAL TEES 90°
Soc. x Soc.



D	Dn	Reference	Z	E	A	L	K
16	10	GATE16	9	14	21	48	24
20	15	GATE20	11	17	26	56	28
25	20	GATE25	14	19	31.5	66.5	34
32	25	GATE32	18.5	22.5	39.5	82	41
40	32	GATE40	22	27	49.5	97.5	50
50	40	GATE50	26.5	31	61	115	58
63	50	GATE63	32.5	38.5	78	142	72
75	65	GATE75	39	44.5	91.5	166.5	83
90	80	GATE90	45	53	112	196.5	98
110	100	GATE110	55.5	62.5	132	236	119

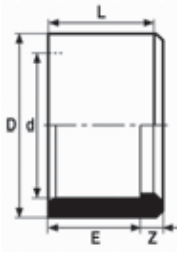
DIMENSION SHEET
FITTINGS

REDUCING TEES 90°
Soc. x Soc.



D-d	Dn	Reference	Z	Z1	E	E1	A	a	L
20-16	15-10	GATR2016	11	11	17	15	26	21	56
25-16	20-10	GATR2516	14	14	18.5	14	31	21	66
25-20	20-15	GATR2520	13.5	13	19.5	16	31	26	66
32-16	25-15	GATR3216	17	18	23	14	44.5	24	82.5
32-20	25-15	GATR3220	17.5	18.5	23.5	16.5	39	26.5	82
32-25	25-20	GATR3225	18	20	23	19	39	31.5	82
40-20	32-15	GATR4020	22	23	27	17	49.5	26.5	97.5
40-25	32-20	GATR4025	22	23	27	19.5	49.5	31.5	97.5
40-32	32-25	GATR4032	22	22	27	23	49.5	39.5	97.5
50-25	40-20	GATR5025	26.5	28	31	20	60.5	33	114.5
50-32	40-25	GATR5032	26.5	28	31	23	61	41	115
50-40	40-32	GATR5040	26.5	27	31	26	61	50	115
63-20	50-15	GATR6320	34	32.5	38	17.5	80	38	143
63-25	50-20	GATR6325	33.5	35	38.5	20	80	37	144
63-32	50-25	GATR6332	33.5	35	38.5	23.5	80	45	144
63-40	50-32	GATR6340	33.5	36	38.5	27.5	80	54.5	144
75-25	65-20	GATR7525	39	40	44.5	19.5	92.5	37	167
75-32	65-25	GATR7532	38.5	38.5	44.5	23	92.5	45	166.5
90-25	80-20	GATR9025	46	46.5	52.5	19.5	114.5	37.5	197
110-32	100-25	GATR1132	57	67.5	62	23.5	135	65	238

REDUCING BUSHES SHORT PATTERN
Spig. (Ø) x Soc. (øR)

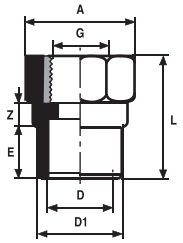


D-d	Dn	Reference	Z	E	L
20-16	15	GARS20	2.5	15.0	17.5
25-20	20	GARS25	3.5	17.0	20.5
32-25	25	GARS32	5	19.5	24.5
40-32	32	GARS40	6	23	29
50-40	40	GARS50	5	27	32
63-50	50	GARS63	7	31.5	38.5
75-63	65	GARS75	7.5	37	44.5
90-75	80	GARS90	8	44	52
110-90	100	GARS110	10.5	52	62.5

DIMENSION SHEET
FITTINGS

2017

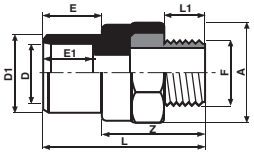
THREADED ADAPTORS
Soc. / Spig. x female brass thread



D-G	Dn	Reference	D1	Z	E	L	A
16-3/8"	10	GAMML16	20	9	17	38.5	32.2
20-1/2"	15	GAMML20	25	9	16.5	44	36
25-3/4"	20	GAMML25	32	9.5	19.5	49	41.4
32-1"	25	GAMML32	40	9.8	23	56.4	49.6
40-1"1/4	32	GAMML40	50	7	31	64	60
50-1"1/2	40	GAMML50	63	7	37.5	69.5	66
63-2"	50	GAMML63	75	8	43.5	80.5	82

Assembling: see Technical Sheet 3.4

ADAPTOR NIPPLES
Soc. / Spig. x male brass thread

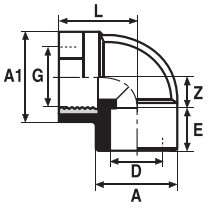


D-F	Reference	D1	Z	E	E1	A	L	L1
16-3/8"	GAEAL16	20	32.5	17	15	32.2	49.5	11
20-1/2"	GAEAL20	25	41	19	17	36	60	15
25-3/4"	GAEAL25	32	43	22.5	19.5	41	65	16
32-1"	GAEAL32	40	49	27	23	49.5	76	19.5
40-1"1/4	GAEAL40	50	55	31	26	60	87	22
50-1"1/4	GAEAL50	63	55	37.5	31	66	92	22
63-2"	GAEAL63	75	63	43.5	37.5	82	106	26

D-F	Reference	D1	Z	E	E1	A	L	L1
16-1/2"	GAEABL16	20	36.5	16.5	14.5	32.2	53.5	13.5
25-1"	GAEABL25	32	45.5	23	19	49.5	68.5	19.5

Assembling: see Technical Sheet 3.4

THREADED ELBOWS 90°
Soc. x Female brass thread

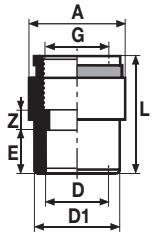


D-G	Dn	Reference	Z	E	A	A1	L
20-1/2"	15	GA4GL20	16	16.5	29	36	32

Especially adapted for connection with metal threaded fittings and high torque

Assembling: see Technical Sheet 3.4

THREADED ADAPTORS with metal reinforcing ring
Soc. x Female thread

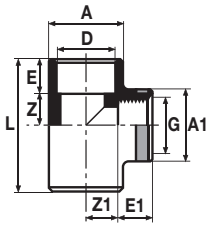


D-G	Dn	Reference	Pack	Z	E	L	D1	A1
16-3/8"	10	GAMM16	10	5.5	14	32	20	23
20-1/2"	15	GAMM20	10	5.5	16	38.5	25	27.5
25-3/4"	20	GAMM25	10	5.5	19	43	32	34
32-1"	25	GAMM32	10	5	22	48	40	41
40-1"1/4	32	GAMM40	10	7	27.5	58.5	50	55
50-1"1/2	40	GAMM50	10	8.5	31	63.5	63	65
63-2"	50	GAMM63	1	10.5	40	78.5	75	76

Assembling: see Technical Sheet 3.4

DIMENSION SHEET
FITTINGS

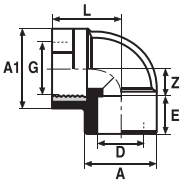
EQUAL THREADED TEES 90° with metal reinforcing ring
Soc. x Female thread branch



D-G	Dn	Reference	Pack	Z	E	L	A	Z1	E	A1
16-1/2"	10	GATG1612	10	9	15	48	25	12	17	35
20-1/2"	15	GATG2012	10	14	17	61.5	30.5	14.5	17	30
25-3/4"	20	GATG2534	10	13	20	66.5	35	15.5	20	40

Assembling: see Technical Sheet 3.4

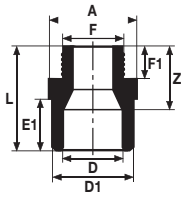
THREADED ELBOWS 90° with metal reinforcing ring
Soc. x Female thread



D	G	Reference	Dn	Z	E	A	A1	L
16	3/8"	GA4G16	10	9	15	24	23	25
20	1/2"	GA4G20	15	10	17	29	27	27
25	1/4"	GA4G25	20	14	19.5	36	34	33

Assembling: see Technical Sheet 3.4

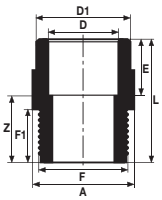
ADAPTOR NIPPLES
Soc. x Male thread



D	F	Reference	D1	Z	E	A	L	F1	E1
16	3/8"	GAEA16	20	24.5	15	25	39.5	12	17
20	1/2"	GAEA20	25	29	17	30	46	15	19
25	3/4"	GAEA25	32	33.5	19.5	36.5	53	17	23
32	1"	GAEA32	40	43.5	22.5	47	66	20	27
40	1"1/4	GAEA40	50	45	26.5	55	71.5	21.5	32
50	1"1/2	GAEA50	63	46	31.5	68	77.5	23	38.5
63	2"	GAEA63	75	49	38.5	78.5	87.5	27.5	44
75	2"1/2	GAEA75	90	49.5	45	94	94.5	30.5	51.8

Assembling: see Technical Sheet 3.4

REDUCING ADAPTOR NIPPLES
Soc. x Male thread



D	F	Reference	D1	Z	E	A	L	F1	E1
16	1/2"	GAEB16	20	27.5	15	24.5	42.5	15	16.5
20	3/4"	GAEB20	25	31.5	17	30	48.5	17	20
25	1"	GAEB25	32	35	21	36.5	56	19.5	23
32	1"1/4	GAEB32	40	40	23	47	63	21.5	27
40	1"1/2	GAEB40	50	42.5	27	48	69.5	22.5	32
50	2"	GAEB50	63	49.5	32.5	60	82	27	38

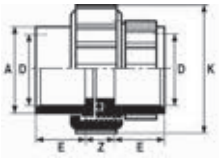
Assembling:
see Technical Sheet 3.4

The solvent welded ends of GAEA and GAEB adaptors are female (socket) only.
The male threaded ends of GAEA and GAEB adaptors can be assembled with GIRAIR® or metal threaded fittings (brass, iron, steel, stainless).

- Exclusively use PTFE tape or a sealing paste that is compatible with GIRAIR® (consult us).
- The male threaded ends of GAEA and GAEB adaptors are tapered (conical).

DIMENSION SHEET
FITTINGS

3 PIECE UNIONS with EPDM gasket
Soc. x Soc.



D	Dn	Reference	Z	E	A	K
16	10	GA3P16	14	15	22	34.5
20	15	GA3P20	14	17	27	42
25	20	GA3P25	14	19	35.5	55
32	25	GA3P32	13.5	23	41.5	62.5
40	32	GA3P40	17	26,5	52.5	73.5
50	40	GA3P50	17.5	32.5	58.5	81.5
63	50	GA3P63	22	38.5	74	100.5

Assembling: see Technical Sheet 3.4

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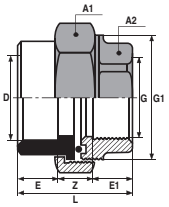
3 PIECE UNIONS GIRAIR® / BRASS with EPDM gasket
Soc. x Female brass thread



D	G	Dn	Reference	Z	E	E1	G1	A1	A2	L
16	3/8”	10	GA3G/L16	10	14	13	3/4”	30	27	37
20	1/2”	15	GA3G/L20	8	17	14	1”	36	27	39
25	3/4”	20	GA3G/L25	8	19.5	16	1”1/4	46	32.5	43.5
32	1”	25	GA3G/L32	10.5	23	16.5	1”1/2	51.5	38.5	50
40	1”1/4	32	GA3G/L40	10	27.5	21	2”	67	47	58.5
50	1”1/2	40	GA3G/L50	12	32.5	18.5	2”1/4	72	53.5	63
63	2”	50	GA3G/L63	11	38.5	22	2”3/4	89	65.5	71.5

Assembling: see Technical Sheet 3.4

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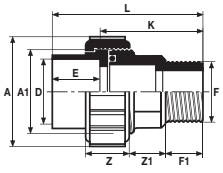
3 PIECE UNIONS with EPDM gasket
Soc. x Male thread



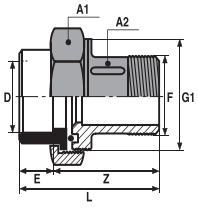
Dn	F	Reference	Z	Z1	F1	L	A	A1	K	E
16	3/8”	GA3F/P16	19	11.5	11.5	52	36	3/4”	36.5	15.5
20	1/2”	GA3F/P20	23	11	16.5	61	42	1”	40	17
25	3/4”	GA3F/P25	25	17	18	72	55	1”1/4	49	19
32	1”	GA3F/P32	26	17.5	20.5	80.5	62.5	1”1/2	53.5	23
40	1”1/4	GA3F/P40	30.5	17	23	88	73	2”	57.5	27
50	1”1/2	GA3F/P50	34	21	27	109	81.5	2”1/4	62	32
63	2”	GA3F/P63	38	22	31.5	125	99	2”3/4	68	38

Assembling: see Technical Sheet 3.4

GA3F/P unions can be assembled with GIRAIR or metal threaded fittings.
Use PTFE tape or a sealing paste that is compatible with GIRAIR (consult us).
Any other sealant is prohibited. The male thread is tapered (conical).

DIMENSION SHEET
FITTINGS

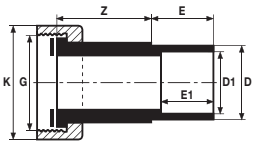
3 PIECE UNIONS GIRAIR® / BRASS with EPDM gasket
Soc. x Male brass thread



D	F	Dn	Reference	Z	E	A1	G1	A2	L
16	3/8”	10	GA3F/L16	35	14	30	3/4”	17	49
20	1/2”	15	GA3F/L20	34	17	36	1”	24.5	51
25	3/4”	20	GA3F/L25	50	19	46	1”1/4	31.5	69
32	1”	25	GA3F/L32	54	23	52	1”1/2	37.5	77
40	1”1/4	32	GA3F/L40	53	27	67	2”	47	83
50	1”1/2	40	GA3F/L50	63.5	32.5	72	2”1/4	53	96
63	2”	50	GA3F/L63	70	38.5	89.5	2”3/4	66	108.5

Assembling: see Technical Sheet 3.4

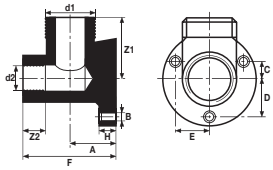
CONNECTORS with brass nuts for use with EPDM flat gasket
Spig. x Female brass thread



D-G	Dn	Reference	Pack	Z	E	D1	E1	K
16-1/2”	10	GAUR16	10	20	15	12	14	24
20-3/4”	15	GAUR20	10	22	17	16	15	29.5
25-1”	20	GAUR25	10	23	20	20	17	36
32-1”1/4	25	GAUR32	10	26	23	25	19.5	45
40-1”1/2	32	GAUR40	10	29	27	32	23	52

Assembling: see Technical Sheet 3.4

WALL PLATE ELBOW for jointing on pipe with GAUR brass connector
Inlet male thread f - outlet female thread G



Pipe	Dn	Reference	Pack	D1	D2	A	B	Z1	Z2	C	D	E	F	H
16	10	GAAP16	1	1/2”	3/8”	17	5	36	7.5	6	18	17	35.5	5.5
20	15	GAAP20	1	3/4”	1/2”	18.5	5	38	10	6	20	19	42.5	6
25	20	GAAP25	1	1”	3/4”	24.5	5	39.5	12	8	26	24	52.5	6

Voir fiche 3.4

ACCESSORIES male threaded instant fitting - profile: ISO C - inside Ø 6 mm

D-G	Ø int.	Reference	Cond.
3/8”	6	GHRR38	1
1/2”	6	GHRR12	1

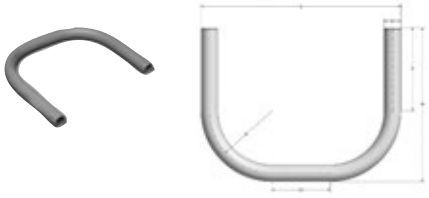
QUICK ADAPTOR ISO C quick nipples for Ø 8 mm flexible pipes - inside Ø 6 mm

D	Ø int.	Reference	Cond.
8	6	GHES8	1

DIMENSION SHEET
FITTINGS

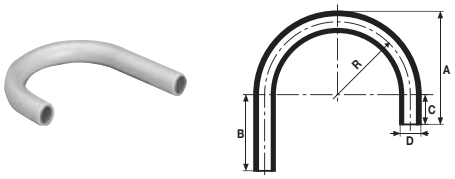
2017

DROP BENDS 180°
Spig. x Spig. (profile C)



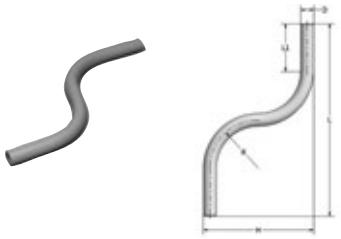
D	DN	Reference	h	H	R	L	l
20	15	Q2C20	100	185	75	200	50
25	20	Q2C25	100	187	75	200	50
32	25	Q2C32	150	166	100	200	/

DROP BENDS 180°
Spig. x Spig. (profile P)



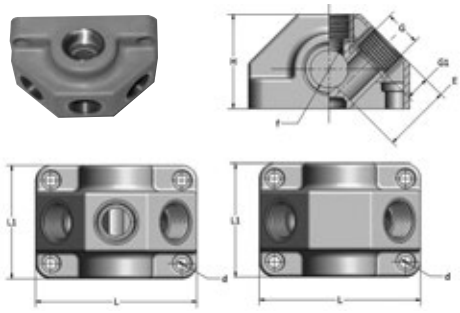
D	Dn	Reference	R	A	B	C
16	10	GA2C16	64	89	90	17
20	15	GA2C20	70	100	90	20
25	20	GA2C25	75	110.5	90	23
32	25	GA2C32	95	138	140	27

DROP BENDS 180°
Spig. x Spig. (profile S)



D	DN	Reference	R	H	L	L1
20	15	Q2S20	75	170	300	75
25	20	Q2S25	75	175	350	100
32	25	Q2S32	75	182	500	150

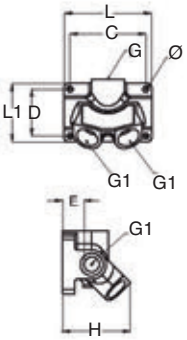
WALL PLATES
with 2 or 3 outlets



G-f	DN	Reference	d	E	G1	H	L	L1
2 x 1/2”-1/2”	15	GAAP12G2	6	36	14	50	85	60
3 x 1/2”-3/4”	20	GAAP34G3	6	36	14	50	85	60

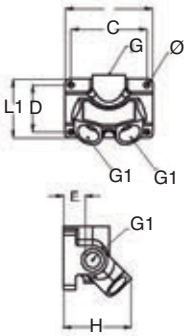
DIMENSION SHEET
FITTINGS

WALL PLATES
with 4 outlets and drain



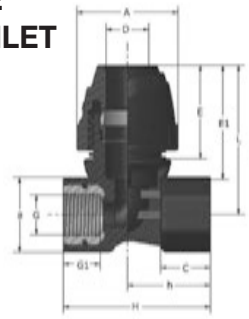
G	G1	Reference	d	E	L	L1	H	D	C	Ø
G 1/2”	4 x 1/2”	GAAP12G4P	7	35	105	70	81.5	56	91	7
G 3/4”	4 x 1/2”	GAAP34G4P	7	35	105	70	81.5	56	91	7

WALL PLATES
with 4 outlets



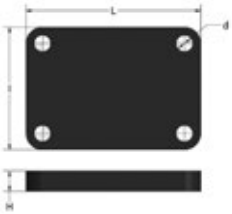
G	G1	Reference	d	E	L	L1	H	D	C	Ø
G 1/2”	4 x 1/2”	GAAP12G4	7	35	105	70	81.5	56	91	7
G 3/4”	4 x 1/2”	GAAP34G4	7	35	105	70	81.5	56	91	7

WALL PLATES ELBOW WITH 1 FEMALE THREADED OUTLET AND 1 SOCKET INLET



D-G	DN	Reference	A-a	C	C1	d	E	E1	G1	H-h	L
20 x 1/2”	15	Q4GP20	48 - 36.2	24	56	6.5	45	55	17	71-40	72
25 x 3/4”	20	Q4GP25	58 - 41.1	26	56	6.5	54	60	18	78-42	79

WEDGE

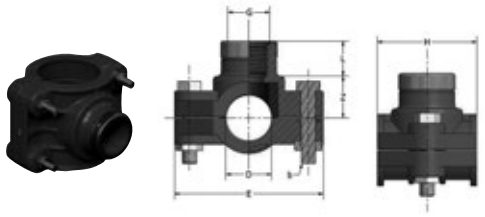


Reference	d	H	l	L
CALQAP	6	20	60	85

DIMENSION SHEET
FITTINGS

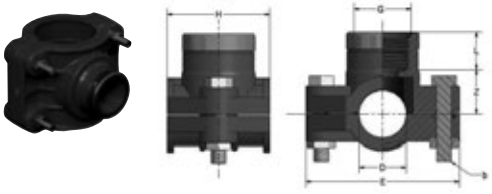
2017

THREADED SADDLES (1/2" thread)
Soc. x female thread branch



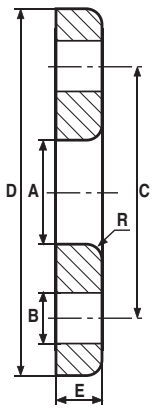
D x G	DN	Reference	E	H	L	Z	b
40 x 1/2"	32	QSB4012	84	51	22	27	2 M8 x 45
50 x 1/2"	40	QSB5012	115	80	18.8	38	4 M8 x 45
63 x 1/2"	50	QSB6312	127	88	18.8	45	4 M8 x 55

THREADED SADDLES (3/4" thread)
Soc. x female thread branch



D x G	DN	Reference	E	H	L	Z	b
25 x 3/4"	20	QSB2534	81.5	54.5	20.1	22.5	2 M8 x 45
32 x 3/4"	25	QSB3234	92	66	20.1	26.5	2 M8 x 45
40 x 3/4"	32	QSB4034	84	51	22	27	2 M8 x 45
50 x 3/4"	40	QSB5034	115	80	20.1	38	4 M8 x 45
63 x 3/4"	50	QSB6334	127	88	20.1	45	5 M8 x 55

BACKING RINGS PN16
drilled GN10/16 according to DIN 16-966



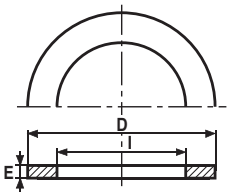
BVR: glass fibre reinforced polyester.
BPA: glass fibre reinforced polyamide.

Pipe Ø	Flange Dn	Reference	Pack	A	B	C	D	E	R	Number of holes	Torque
20	15	BVR15		28	14	65	95	14	1.5	4	0.5 to 1 mkg
25	20	BVR20		34	14	75	105	18	1.5	4	0.5 to 1 mkg
32	25	BVR25	1	42	14	85	115	20	1.5	4	0.5 to 1 mkg
40	32	BVR32B	1	52	18	100	140	20	2	4	2 to 4 mkg
40	40	BVR40A	1	54	18	110	150	20	2	4	2 to 4 mkg
50	40	BVR40B	1	63	18	110	150	20	2	4	2 to 4 mkg
50	50	BVR50A	1	65	18	125	165	22	2.5	4	2 to 4 mkg
63	50	BVR50B	1	78	18	125	165	22	2.5	4	2 to 4 mkg
63	60	BVR60A	1	78	18	135	175	22	2.5	4	2 to 4 mkg
63	65	BVR65A	1	81	18	145	185	22	2.5	4	2 to 4 mkg
75	60	BVR60B		92	18	135	175	18	2.4	4	2 to 4 mkg
75	65	BVR65B	1	92	18	145	185	22	2.5	4	2 to 4 mkg
75	80	BVR80A	1	94	18	160	200	24	3	8	2 to 4 mkg
90	80	BVR80B	1	110	18	160	200	24	3	8	3 to 4 mkg
110	100	BVR100	1	133	18	180	220	26	3	8	3 to 4 mkg
110	110	BVR110A	1	133	18	190	230	20	3	8	3 to 4 mkg

Pipe Ø	Flange Dn	Reference	Pack	A	B	C	D	E	R	Number of holes	Torque
50	40	BPA40	1	62.5	18	110	150	18	2.5	4	3 mkg
63	50	BPA50	1	78.5	18	125	165	19	2.5	4	3 mkg
63	60	BPA60	1	78.5	18	135	175	19	2.5	4	3 mkg
75	65/60	BPA65	1	92	18	145	185	22	2.5	4	4 mkg
90	80	BPA80	1	110	18	160	200	22	2.5	8	4 mkg
110	100	BPA100	1	133	18	180	218	24	3	8	5 mkg

DIMENSION SHEET
FITTINGS

EPDM FLAT GASKETS



For GAUR

Reference	Pack	D	I	E
JPNUR16	1	19	13	2
JPNUR20	1	24	17	2
JPNUR25	1	30	21	3
JPNUR32	1	38	27	3
JPNUR40	1	44	32	3
JPNUR50	1	55	42	3

For GACS

Reference	Pack	D	I	E
JPNCS50	1	71	50	3
JPNCS63	1	88	63	3
JPNCS75	1	104	75	3
JPNCS90	1	123	90	3
JPNCS110	1	148	110	4

WEDGES FOR MONOKLIP® BRACKETS
20 mm high - only compatible with MONOKLIP® brackets HCK 16 to 20

D	Reference	H	d1	H
16 to 20	CALE1220	26	16	20

WEDGES FOR MONOKLIP® BRACKETS
20 mm high - only compatible with MONOKLIP® brackets HCKC 25 to 63

D	Reference	H	I	L
25 to 63	CALE2563	20	25	52

WEDGES FOR MONOKLIP® BRACKETS
4 mm high - only compatible with MONOKLIP® brackets HCKC 25 to 63

D	Reference	H	I	L
25 to 63	CALE2563/4	4	25	52

WEDGES FOR MONOKLIP® BRACKETS
20 mm high - only compatible with MONOKLIP® brackets HCKC 75 to 110

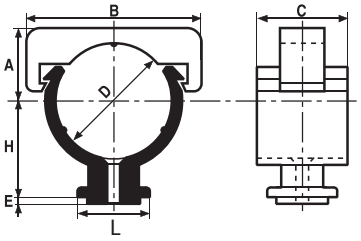
D	Reference	H	I	L
75 to 110	CALE75110	20	30	80

DIMENSION SHEET
MONOKLIP® BRACKETS

2017

MONOKLIP® BRACKETS
with M6, 7x150, M8 metal threaded insert, or ø5.5 drilled base

Ø 16 to 20
Black
Polypropylene

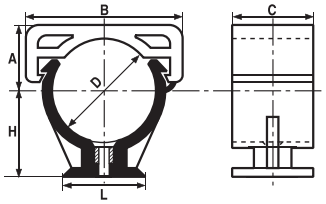


NB: compatible with CALE 1220 wedges, 20 mm thickness.

D	Dn	Reference	H	A	B	C	E
with M6 THREAD							
16	10	HCK16/6	18	12	27	20	1
20	15	HCK20/6	20	14	32	22	1
with M8 THREAD							
16	10	HCK16/8	18	12	27	20	1
20	15	HCK20/8	20	14	32	22	1
with 7 x 150 THREAD							
16	10	HCK16/7	18	12	27	20	1
20	15	HCK20/7	20	14	32	22	1
without INSERT drilled base ø5.5							
16	10	HCKP16/5	18	12	27	20	1
20	15	HCKP20/5	20	14	32	22	1

MONOKLIP® BRACKETS

Ø 25 to 63
Black Polyamide



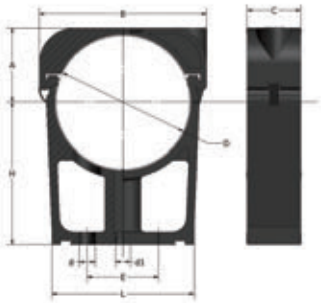
Diameter 25 to 63

NB: compatible with wedges CALE 2563, 20 mm thickness or CALE 2563/4, 4 mm thickness.

D	Dn	Reference	H	A	B	C	L
without INSERT drilled base ø5.5							
25	20	HCKCP25/5	22	16	38.5	25	16
with M6 THREAD							
25	20	HCKC25/6	22	16	38.5	25	16
32	25	HCKC32/6	28	20	44	24.5	34
40	32	HCKC40/6	32	24	55	24.5	34
50	40	HCKC50/6	35	30	65.6	24.5	52
63	50	HCKC63/6	35	41	79.5	24.5	52
with 7 x 150 THREAD							
25	20	HCKC25/7	22	16	38.5	25	16
32	25	HCKC32/7	28	20	44	24.5	34
40	32	HCKC40/7	32	24	55	24.5	34
50	40	HCKC50/7	35	30	65.6	24.5	52
63	50	HCKC63/7	35	41	79.5	24.5	52
with M8 THREAD							
25	20	HCKC25/8	22	16	38.5	25	16
32	25	HCKC32/8	28	20	44	24.5	34
40	32	HCKC40/8	32	24	55	24.5	34
50	40	HCKC50/8	35	30	65.6	24.5	52
63	50	HCKC63/8	35	41	79.5	24.5	52

MONOKLIP® BRACKETS

Ø 75 to 110



NB: compatible with CALE 75110 wedges, 20 mm thickness.

D-dn	Reference	d1	H	A	B	C	L	d	E	J
with M8 THREAD										
75-65	HCKC75/8	M8	80	42	96	30	80	9	40	7
90-80	HCKC90/8	M8	80	49	113	30	80	9	40	7
110-100	HCKC110/8	M8	80	60	130	30	80	9	40	7

GIRPI

GIRAIR® SYSTEM

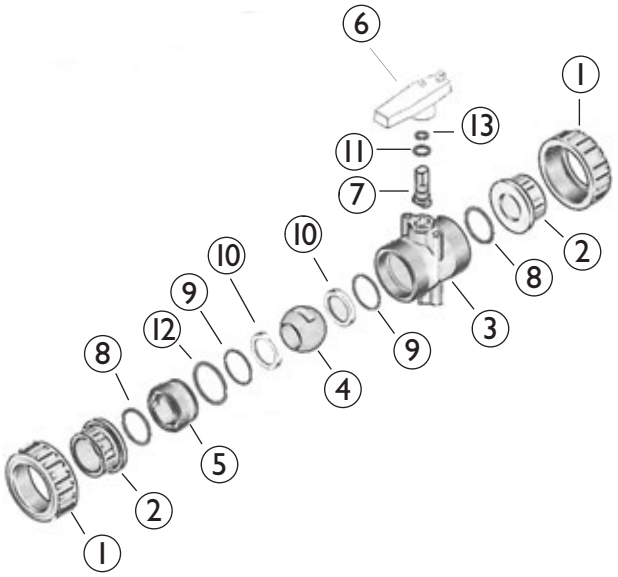
DOUBLE UNION BALL VALVES
CEMENTED SOCKET ENDS

Technical Sheet

8.1

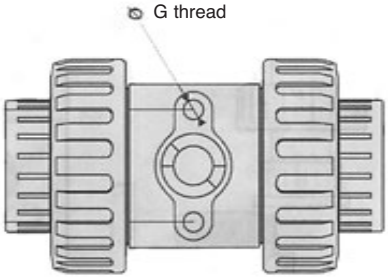
2017

ø 16 to 63



①	Backing nut
②	Cemented stub socket
③	Body
④	Ball
⑤	Ball seat support
⑥	Handle
⑦	Spindle
⑧	Socket o'ring
⑨	Seat gasket
⑩	Ball seat
⑪	Spindle o'ring
⑫	Ball seat support o'ring
⑬	Spindle o'ring

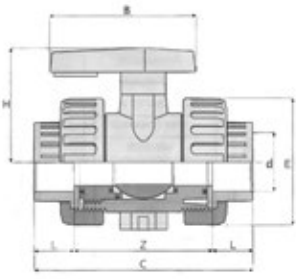
ANCHORING SYSTEM



Ball valve Ø	G Thread
16	M4
20	M4
25	M4
32	M5
40	M6
50	M6
63	M6

- These ball valves have a built-in anchoring system.
- There are two holes underneath fitted with threaded brass inserts (use screw in accordance with data below).
- These valves are solvent cemented to pipes, and can be dismantled thanks to their double union concept.
- Observe the flow direction.

d	Reference	DN	L	Z	C	E	H	B	g	X	Ø
16	GA2MBE16	10	14	67	97	47	45	66	160	31	5.5
20	GA2MBE20	15	16	68	102	47	45	66	160	31	5.5
25	GA2MBE25	20	19	82	120	57	55	78	260	31	5.5
32	GA2MBE32	25	22	87	131	68	67	86	380	40	6.5
40	GA2MBE40	32	26	98	150	86	83	100	655	45	8
50	GA2MBE50	40	31	101	163	98	91	110	925	50	8
63	GA2MBE63	50	38	121	197	122	111	130	1695	50	8



GIRPI

GIRAIR® SYSTEM

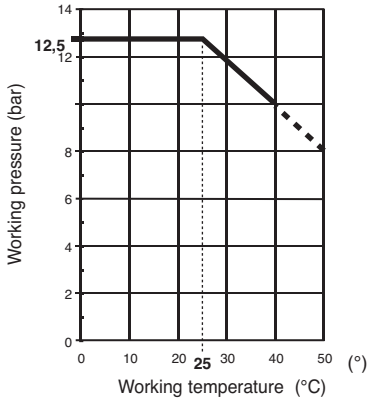
DOUBLE UNION BALL VALVES
CEMENTED SOCKET ENDS

Technical Sheet

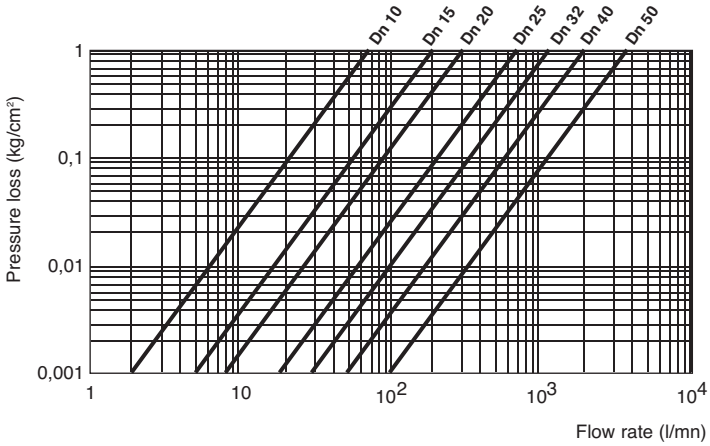
8.2

ø 16 to 63

WORKING PRESSURE/TEMPERATURE



PRESSURE LOSSES ACCORDING TO FLOW RATES



FLOW COEFFICIENT AT FULL OPENING

d-G	16-3/8"	20-1/2"	25-3/4"	32-1"	40-1"1/4	50-1"1/2	63-2"
Dn-G	10-3/8"	15-1/2"	20-3/4"	25-1"	32-1"1/4	40-1"1/2	50-2"
KV*	70	190	350	700	1000	1650	3100

* KV: coefficient (litre/minute) calculated with $\Delta P = 1$ kg/cm²

FIELD OF APPLICATION:

- The same as that of GIRAIR® fittings
- Max. working temperature: 40°C
- The nominal pressure (PN) in normal use, i.e. for compressed air at 20°C maximum, is:
  - 12.5 bar for ø 16 to 63 mm.

OPERATION TORQUE (PRESSURE 12.5 BAR)							
Ø	16	20	25	32	40	50	63
Torque Nm	2.0	3.0	3.0	5.0	6.0	9.0	9.0

Assembly:

- Remove backing nuts (1) and slide them onto the pipes.
- Glue the sockets (2) on GIRAIR® pipes.
- Place valve body (3) between sockets with “ADJUST” end upstream if the flow direction needs to be respected.
- Use threaded inserts supplied with the valves for supporting.
- Tighten and block the nut (1) on the opposite side to the one marked “ADJUST”, then progressively tighten the nut (1) on the “ADJUST” side until complete airtightness is obtained.

Dismantling:

- Close valve.
- Unscrew nuts completely (1).
- Remove handle (6) by pulling it off.
- Insert the handles’ notches into the ball support (5) and unscrew by rotating handle anticlockwise.
- Remove ball (4).
- Depress stem (7) and extract from the inside of the valve body (3).
- Remove PTFE ball seats from ball supports (5) and body (3).
- Replace o-rings if needed.
- Re-assemble by repeating the above steps in reverse sequence.

Actuation

- Valves can be actuated pneumatically or electrically. Ask for our technical information.

GIRPI

GIRAIR® SYSTEM

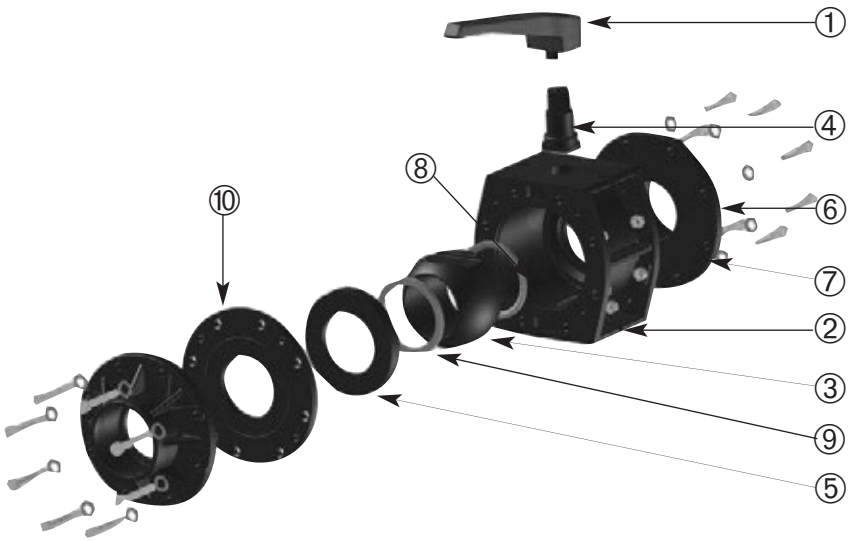
FLANGED BALL VALVES
CEMENTED SOCKET ENDS

Technical Sheet

8.3

2017

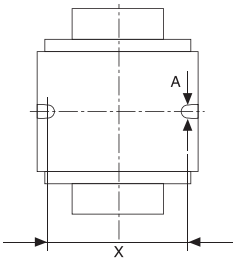
ø 75 to 110



KEY

①	Handle
②	Body
③	Ball
④	Spindle
⑤	Support
⑥	Flanged socket
⑦	Bolt
⑧	Ball seat
⑨	O ring
⑩	Counterplate

ANCHORING SYSTEM

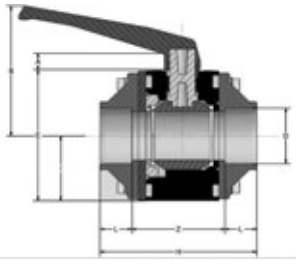


Ball valve Ø	A	X (mm)
75	11	110
90	11	110
110	11	135

The weight of the ball valve and its correct use require its anchoring on a convenient support.

There are two holes underneath the valve body which allow to hang it with bolts on the correct support. The table above gives the width of the holes and their spacing.

- Valves in Ø 75 to 110 are carefully assembled in our workshops. It is strongly recommended NOT to dismantle the counterplates which ensure good valve operation. The flanged sockets may be dismantled.
- Observe the flow direction.



DIMENSIONS										Weight
d	Ref. EPDM	l	z	h	e	b	c	a	i	(kg)
75	GA2MFE75	43	148	234	211	177	210	25	105	7
90	GA2MFE90	52	148	252	211	177	210	25	105	7
110	GA2MFE110	63	174	300	252	220	255	30	121	11

GIRPI

GIRAIR® SYSTEM

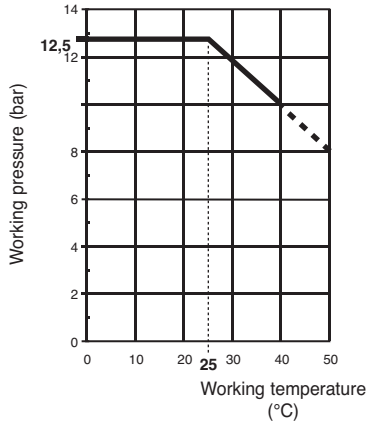
FLANGED BALL VALVES
CEMENTED SOCKET ENDS

Technical Sheet

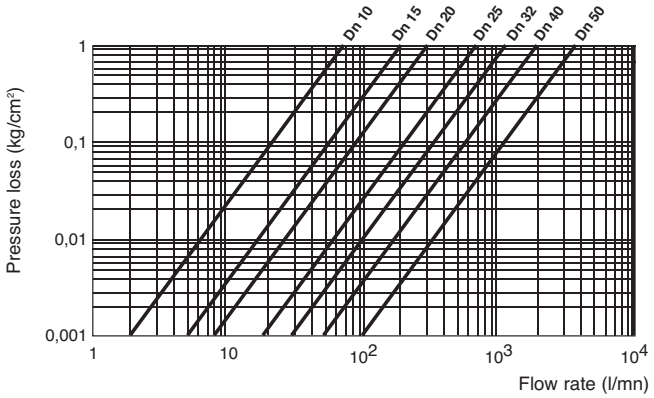
8.4

ø 75 to 110

WORKING PRESSURE/TEMPERATURE



PRESSURE LOSSES ACCORDING TO FLOW RATES



FLOW COEFFICIENT AT FULL OPENING

d-G	75-2”1/2	90-3”	110-4”
Dn-G	65	80	100
KV	5000	7000	12000

OPERATION TORQUE (PRESSURE 12.5 BAR)			
Ø	75	90	110
Torque Nm	65.0	65.0	110.0

FIELD OF APPLICATION:

- The same as that of GIRAIR® fittings
- Max. working temperature: 40°C
- The nominal pressure (PN) in normal use, i.e. for compressed air at 20°C maximum, is:
  - 12.5 bar for ø75 to ø110 mm.

Assembly:

N.B.: there is an arrow on the valve’s body showing the direction of flow (the arrow’s head is located close to the fixed ball seat support).

- Insert o-ring (9) and PTFE ball seat (8) into their own seats inside the body.
- Insert spindle (4) through body, equipped with one o-ring in groove, two PTFE bearings and one o-ring at bottom.
- The spindle’s pivot being located in alignment of the valve, place the ball (3).
- Fit the moving ball seat support (5) with the O-ring (9) and the PTFE ball seat (8).
- Place the equipped moving ball seat support inside the body (2).
- Place the flange socket’s o-ring into the groove located between the body and the moving ball seat support.
- Screw flange socket with 8 stainless steel bolts (each bolt contains a hexagonal head screw + washer + nut).

Attention: there is a mark on the body of the valve and an other one on the flange end to know the right position of assembly.

- Assemble the handle (1), taking care to put it correctly with regard to the ball (on spindle’s top, a furrow shows the piping’s direction).

Dismantling:

N.B.: there is an arrow on the valve’s body showing the direction of flow (the moving ball seat support is located upstream of the arrow).

- Put the handle (1) in closed position.
- Unscrew the screws (7).
- Remove the flange socket (6).
- Extract moving ball seat support by pulling or by pushing it with the ball, using a tool that cannot damage the ball (beware not to lose the flange socket’s o-ring).
- Take the ball out (3).
- Take the spindle out (4) after removing the handle (1), by pushing it towards the inside of the body (2).

Actuation:

- Valves can be actuaded pneumatically (single or double action) or electrically. Ask for our technical information.

GIRPI

GIRAIR® SYSTEM

CHEMICAL RESISTANCE TABLES

Technical Sheet

9.1

2017

The table below lists some compressor oils whose formulation was tested at the mentioned dates. The compatibility of those oils with GIRAIR® was established based upon those tests. It must be noted that the nature of chemical elements, the way they are mixed, the presence of impurities can significantly influence the indications below. Reliable results can only be obtained by carrying out concrete tests. It is the installation owner's responsibility to ensure that the chemical agents composing its formulation have not been changed since the testing year below, by consulting his supplier. Those tests were carried out on the plastic components of the GIRAIR® system. For any question concerning compatibility with other components of the GIRAIR® system (brass, gaskets, etc.), contact the oil manufacturers. The indications below shall in no case engage our responsibility. The chemical agents are classified in alphabetical order.

GIRPI's Technical Support team can be consulted at: **be.girpi@aliaxis.com**

OILS		
BRAND	REFERENCE	TESTING YEAR
ANDEROL	ANDEROL 3046	1996
	ANDEROL 500	2000
ATLAS COPCO	ROTOINJECTFLUID	2001
CASTROL	AIRCOL PD 68	1989
	CRD30	1989
	HYSPIN AWS 46	1989
	MAGNA 68	1989
ELF	BARELF SM 46	2002
	DACNIS P 100	1990
	ELFOLNA DS 46	2002
	DACNIS VS 46	1990
ESSO	COMPRESSOR OIL RS32	1994
	COMPRESSOR OIL RS68	1994
	TERESSO 46	1988
HAFA	STATEX	1992
INGERSOLL RAND	FOOD GRADE COOLANT	1989
KAESER	SIGMA-FLUID PLUS	2003
	SIGMA-FLUID MOL	2008
KLUBER-SUMMIT	HYSYN FG100	1998
	HYSYN FG46	1998
MATTEI	ROTOROIL 2000	1993
MOBIL	RARUS SHC 924	1989
MOTUL	SAFCO CPS 100	1993
SHELL	COMPTELLA 46	1989
	TONNA T220	1990
TOTAL	AZOLLA ZS 32	1989
	EQUIVIS ZS 46	1989
	PRESLIA 46	1989
	RUBIA H10	1989
	RUBIA H30	1989
	CORTUSA SY150	1989

Never use oils or any fluids containing esters, ethoxyls or amines, as they may be incompatible with GIRAIR®.

Concerning oils or fluids that are not listed in the table above, GIRPI invites you to contact its **Technical Support team at: +33 (0)2 32 79 58 00 or be.girpi@aliaxis.com**

DESCRIPTION FOR SPECIFICATION

Piping system made from a ductile vinyl based alloy for the construction of compressed air distribution networks.

FIELD OF APPLICATION:

Compressed air distribution networks.

IDENTIFICATION – RANGE:

The system shall consist of:

- Pipes and fittings of one same origin, made from a ductile vinyl based alloy, all of blue colour (incorporated in the mass of its resin).
- Pipes that shall be delivered in plastic bags, in order to ensure a good level of cleanliness until installation.
- A large range of fittings with brass threaded inserts, in order to enable safe connections with metallic threads.
- Drop bends and wall plates allowing for drop pipes and top-down connections to ensure good air quality.
- A dedicated welding polymer that can be used as a welding indicator thanks to its colour (dark blue), in order to simplify the execution of installation works and avoid errors on building sites.
- A dedicated range of supporting brackets enabling expansion and contraction factors to be accounted for, whilst respecting the manufacturer's recommendation.

QUALITY - CERTIFICATIONS:

The system shall come from an ISO 9001, ISO 14001 and OHSAS 18001 certified company.

The system shall have a test report proving its Euroclasses fire reaction Bs1d0 rating according to EN 13501-1 standard.

The product's quality certifications shall be marked on the pipes, as well as the information enabling its production traceability.

The pipe sizes shall range from diameter 16 to 110 mm with a PN 12.5 nominal pressure rating (with a safety coefficient of 2.5 for 50 years). Those pipes shall be designed to withstand 1 hour pressure tests amounting to 4.2 times that PN rating.

Beyond those tests, fittings shall be submitted to static pressure tests, and to pressure cycling tests of 20/50 bar, at a rate of:

- 5.000 cycles at a 1 hertz frequency for diameters 16 to 90
- 2.500 cycles at a 0.42 hertz frequency for diameter 110

according to NF T 54-094 standard.

TECHNICAL SUPPORT:

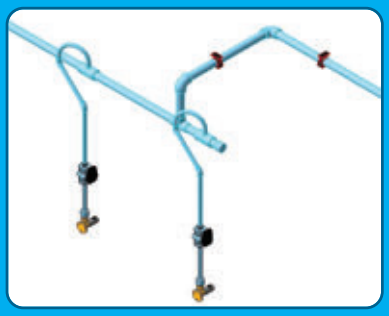
The manufacturer shall be able to:

- propose its BIM product library,
- produce drawings to help the implementation of its products, based upon the drawings and dimensioning data supplied by the appointed contractor,
- propose professional training sessions on the building site or on its own premises, to help with the implementation of its product.

ENVIRONMENT :

The system shall be recyclable through an existing recovery network.

More SERVICES from GIRPI...



NETWORK DESIGN AND TECHNICAL ASSISTANCE

Our technical assistance and design service can help optimize network drawings

- **Drawings featuring all GIRPI articles.**
- **Complete bill of materials.**
- **Calculations of bracketing,...**

Contact : be.girpi@aliaxis.com

HOTLINE +33 2 32 79 58 00

Our hotline is at your disposal to answer your questions and help you successfully install our products on your building projects.

TRAINING

Our training center gives installers and decision-makers modular training courses about installation techniques.

CUSTOM-MADE ITEMS

Our fabrication workshop can manufacture your special items as per your requirements and can also prefabricate pipework sections.

Please consult us for prices and deliveries.

Visit our website www. **www.girpi.com**

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