



**INFINITY**

PLASTIC CONVOLUTED HOSE



**ZERO**

PLASTIC VIBRATION ABSORBER

Thermoplastic hoses and fittings for AC&R





# INFINITY

## PLASTIC CONVOLUTED HOSE

The range of assembled hoses for air conditioning and refrigeration, tailor made for every needs.

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Technical data \_\_\_\_\_ pag. 8



# ZERO

## PLASTIC VIBRATION ABSORBER

Thermoplastic and vibration-proof for air conditioning and refrigeration systems

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**Thermoplastic hose installation factors** \_\_\_\_\_ pag. 20

**General terms of sale** \_\_\_\_\_ pag. 22

**Check latest technical updates on our website [www.gomax.it](http://www.gomax.it)**

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**G O M A X<sup>®</sup>**

a brand of

**TRANSFER OIL**

# The Company

Transfer Oil first made its entrance into the flexible thermoplastic hose market in 1979, quickly reaching a leadership position in Europe through the use of avant-garde research and production tools.

In fact in 1993 it was the first company in its field to obtain the ISO 9001 certification. Transfer Oil's role in the international marketplace grew rapidly, and the establishment of the Gomax line gave way to the separate division dedicated specifically to representing refrigeration and air conditioning products.

Transfer Oil teamed up with a number of partners facilitating the production of the first flexible thermoplastic hoses replacing the traditional metal pipes.

In 1995 the international brand Gomax was officially launched, including the Zero, Infinity and Quadra lines.



Thanks to the decision to follow the path of research and quality innovation Transfer Oil offers avant-garde solutions to today's international markets.

Transfer Oil ensures quality by using specific equipment to check the incoming materials in its sophisticated laboratories. The laboratories carry out viscosity index analyses needed to forecast the behaviour of the materials during processing, as well as granular humidity tests.

The careful attention to quality control follows the product throughout all processing phases, thanks to the hard work of the Test Laboratory.

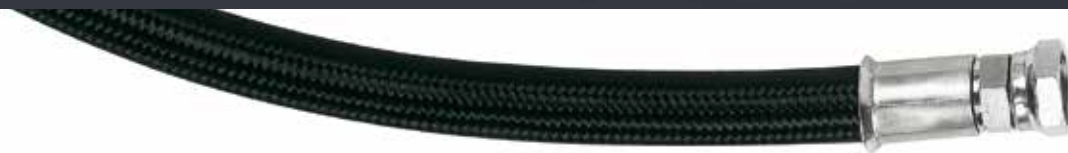
The tests carried out on the finished products are divided into the following: destructive tests, to guarantee the mechanical characteristics such as bursting and assembling tests, and other controls to measure the gas seal, which subject the products to a higher working pressure than that for which they were designed for in order to guarantee maximum reliability. Transfer Oil's collaboration with Milan Polytechnic and the technicians from Perkin Elmer have assured even further progress in the quality analysis and determination of gas permeability, thanks to the combined use of FT-IR spectrophotometer and a custom-made software, which records quantitative information.



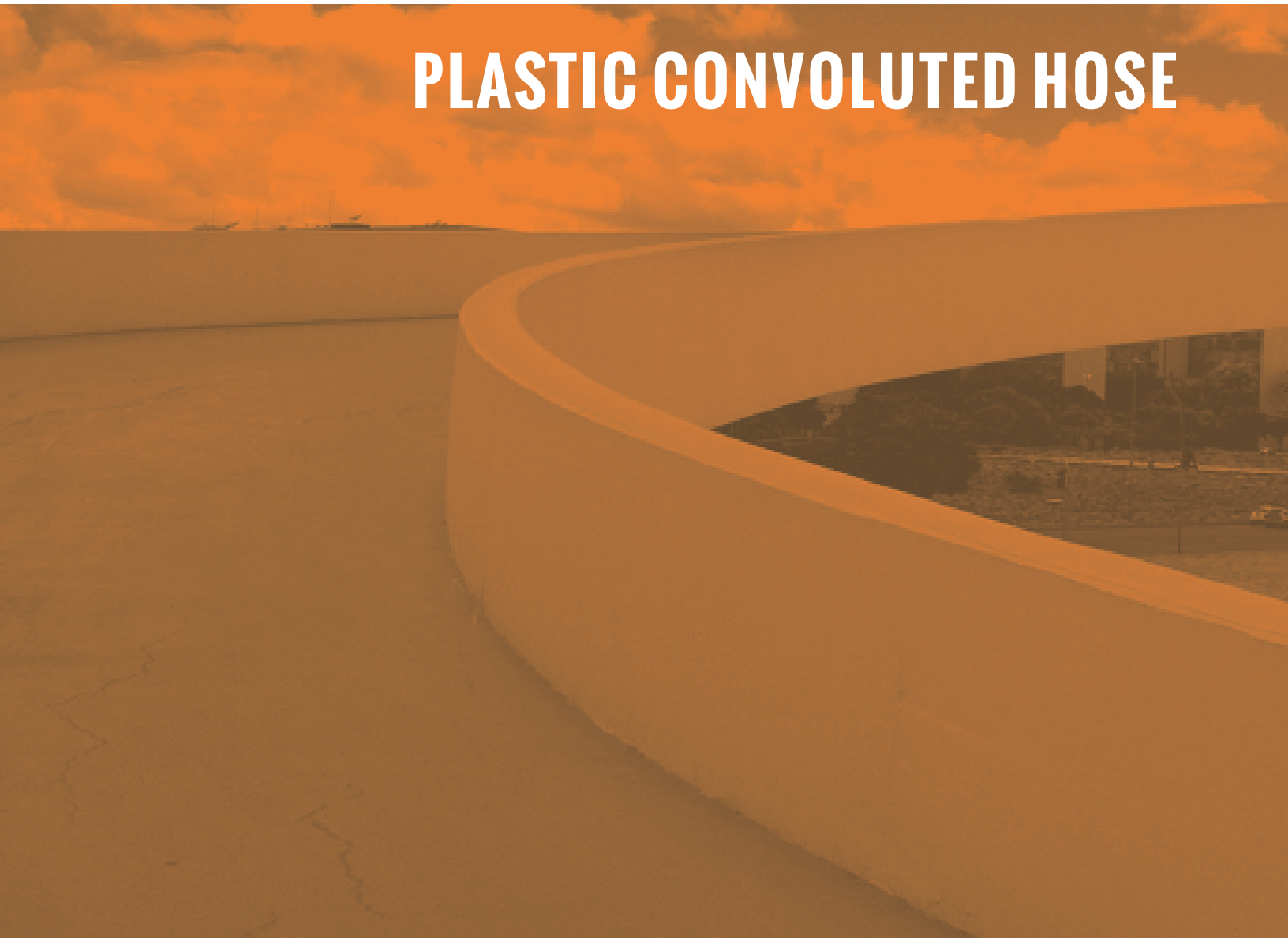
**Quality, research  
and development**

The range of assembled hoses  
for air conditioning and refrigeration,  
tailor made for every needs

**INFINITY**



**PLASTIC CONVOLUTED HOSE**



**Silent,  
resistant, flexible**

**Infinite advantages for  
air conditioning  
and refrigeration**

**The flexible  
thermoplastic system  
that fits any circuit**



**INFINITY**  
PLASTIC CONVOLUTED HOSE

**INFINITY**

PLASTIC CONVOLUTED HOSE

**ZERO C**

PLASTIC VIBRATION ABSORBER



# INFINITY

PLASTIC CONVOLUTED HOSE



All INFINITY hoses now can be used with CO<sub>2</sub> up to 50 bar / 724 psi from -45°C up to +110°C / from -49°F up to +230°F.



Directive 2011/65/EU

"Restriction of the use of certain hazardous substances in electrical and electronic equipment"

All INFINITY products meet the minimum requirements of the RoHS directive.

## Inner tube material

1

Thermoplastic polymer.

## Reinforcing material

2

Polyester braid of high tensile strength with high modulus.

## Cover material

3

Black polyester braid of high textile strength, abrasion resistant.

## INFINITY



6

The reinforcing layers are made of stress-resistant polyester fibre.

The external cover is made of anti-abrasion materials.

INFINITY can be applied to refrigeration and air conditioning systems and is compatible with cooling fluids in the HCFC, HFC families.



# INFINITY KEY-ELEMENTS

## THE BRAZING FITTING

INFINITY convoluted hose for cooling systems is equipped with a brazing fitting patented by Transfer Oil (patent no.1326357).

The fitting couplings are pre-set for heat dissipation, thanks to the radiator, which facilitates and simplifies the brazing operation, eliminating the need for supplementary auxiliary cooling systems.

The lateral fins, which vary according to the hose diameter, are used to dissipate the heat before it damages the thermoplastic hose the fitting is connected to.

Tests show that under normal environmental and time conditions, they never exceed 90°C at the point of coupling between the hose and the fitting.



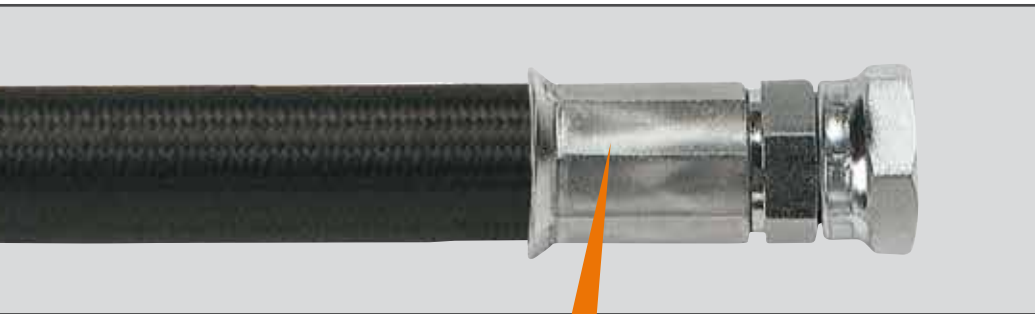
## THE ROTALOCK FITTING

The Infinity hose with Rotalock fitting enables to make fast and safe connections without the use of any welding.

Rotalock fittings are available in different sizes.

**INFINITY is supplied with either brazing fittings or Rotalock screw fittings.**

**Design and manufacturing of the hose are in compliance with DIR 97/23/EC "Pressure equipment".**



**Classification of Infinity hose**  
according to Directive 97/23/CE

DN	Classifications
15-21-28	paragraph 3 article 3
38-54	category I (marking CE)



# TECHNICAL DATA BRAZING FITTING

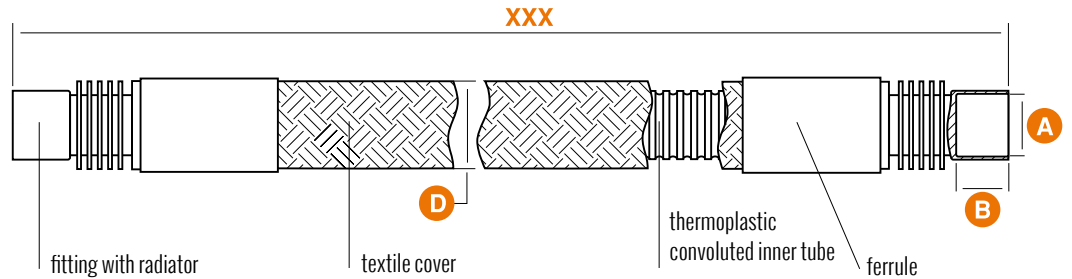
## INFINITY

PLASTIC CONVOLUTED HOSE

### Brazing fitting assembly instructions

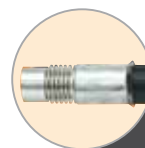
Once the copper tube of suitable diameter has been fitted in the brazing fitting, heat the two ends until the filler material begins to melt.

Continue the brazing around the whole circumference of the brazing fitting.



### INFINITY HOSE with brazing metric fitting

part number	DN	A for tube O.D. (mm)	B mm	D mm	Minimum bending radius
CA1XXX	15	12	12	24	15
CA2XXX	15	16	15	24	15
CA3XXX	21	18	17	31	30
CA4XXX	21	22	19	31	30
CA5XXX	28	28	24	39	40
CA6XXX	38	35	30	49	80
CA7XXX	38	42	38	49	80
CA8XXX	54	54	48	69	110



### INFINITY HOSE with brazing inch fitting

part number	DN	A for tube O.D. (inches)	B mm	D mm	Minimum bending radius
CARXXX	15	1/2	12	24	15
CASXXX	15	5/8	15	24	15
CATXXX	21	3/4	17	31	30
CAUXXX	21	7/8	19	31	30
CAVXXX	28	1-1/8	24	39	40
CAWXXX	38	1-3/8	30	49	80
CAXXXX	38	1-5/8	38	49	80
CAYXXX	54	2-1/8	48	69	110

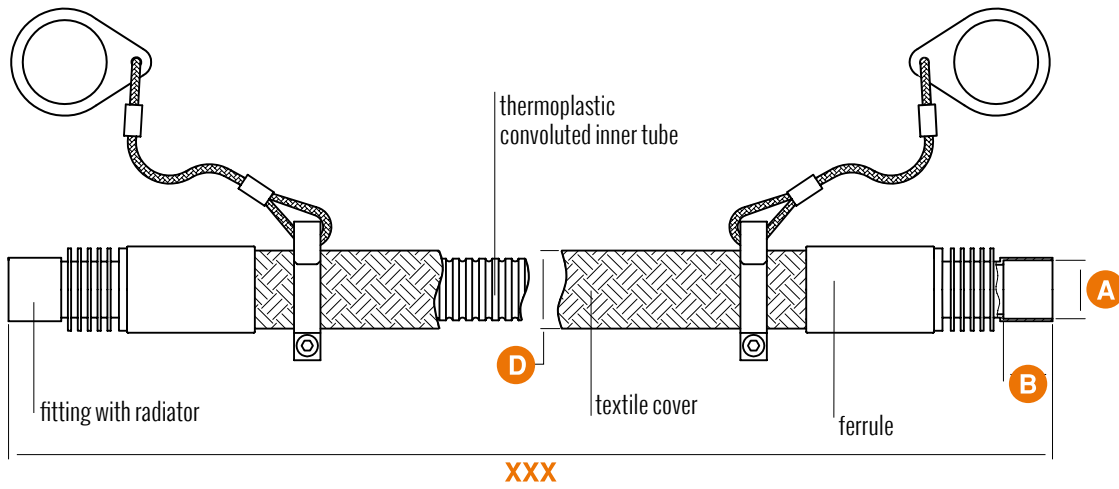
**1** insert the copper tube

**2** heat the two ends

**3** start brazing around the whole circumference

XXX total length of INFINITY hose in cm (multiple lengths of 10 cm)

# TECHNICAL DATA BRAZING FITTING



## INFINITY HOSE with brazing metric fitting (with safety clamp)

part number	DN	A for tube O.D. (mm)	B mm	D mm	Minimum bending radius
-------------	----	-------------------------	---------	---------	------------------------

CB1XXX	15	12	12	24	15
CB2XXX	15	16	15	24	15
CB3XXX	21	18	17	31	30
CB4XXX	21	22	19	31	30
CB5XXX	28	28	24	39	40
CB6XXX	38	35	30	49	80
CB7XXX	38	42	38	49	80
CB8XXX	54	54	48	69	110

## INFINITY HOSE with brazing inch fitting (with safety clamp)

part number	DN	A for tube O.D. (inches)	B mm	D mm	Minimum bending radius
-------------	----	-----------------------------	---------	---------	------------------------

CBRXXX	15	1/2	12	24	15
CBSXXX	15	5/8	15	24	15
CBTXXX	21	3/4	17	31	30
CBUXXX	21	7/8	19	31	30
CBVXXX	28	1-1/8	24	39	40
CBWXXX	38	1-3/8	30	49	80
CBXXX	38	1-5/8	38	49	80
CBYXXX	54	2-1/8	48	69	110



XXX total length of INFINITY hose in cm (multiple lengths of 10 cm)



# TECHNICAL DATA ROTALOCK FITTING

## INFINITY

PLASTIC CONVOLUTED HOSE

### Rotalock fitting assembly instructions



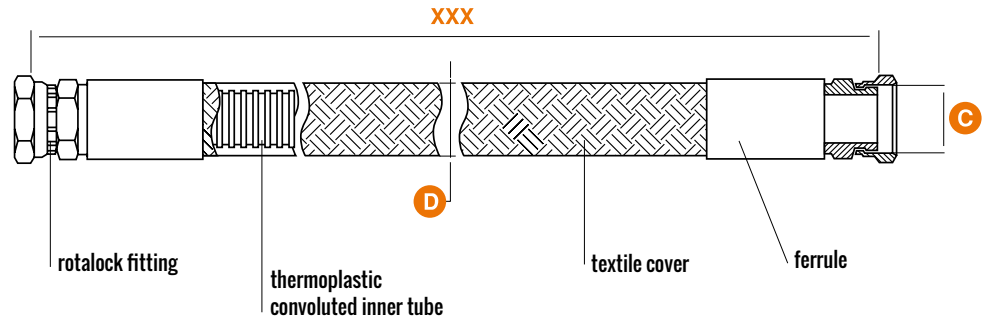
**1** Position the fitting near the male coupling.



**2** Screw the fitting thread onto the male fitting, clockwise by hand for the first few turns.

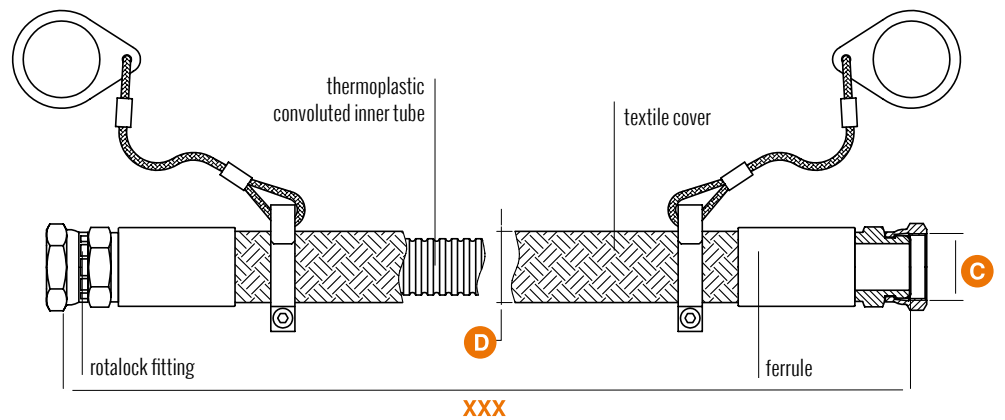


**3** Screw on fully in a clockwise direction using spanners and counter spanners.



### INFINITY HOSE with rotalock fitting

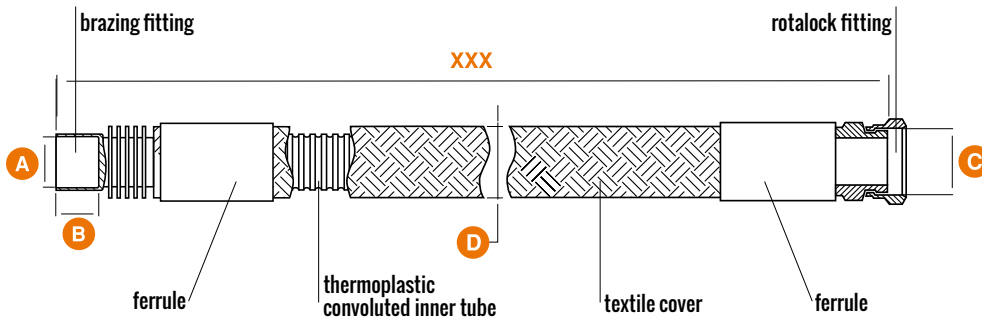
part number	DN	C ROTALOCK (inches)	D mm	Minimum bending radius
CAIXXX	15	1	24	15
CAKXXX	21	1-1/4	31	30
CAMXXX	28	1-3/4	39	40
CANXXX	38	1-3/4	49	80
CAQXXX	54	2-1/4	69	110



### INFINITY HOSE with rotalock fitting (with safety clamp)

part number	DN	C ROTALOCK (inches)	D mm	Minimum bending radius
CBIXXX	15	1	24	15
CBKXXX	21	1-1/4	31	30
CBMXXX	28	1-3/4	39	40
CBNXXX	38	1-3/4	49	80
CBQXXX	54	2-1/4	69	110

# TECHNICAL DATA BRAZING/ROTALOCK FITTING



## INFINITY HOSE with Rotalock fitting and brazing metric fitting

part number	DN	A for tube O.D. (mm)	B mm	C inches	D mm	Minimum bending radius mm
CCRXXX	15	12	12	1	24	15
CCSXXX	15	16	15	1	24	15
CCTXXX	21	18	17	1-1/4	31	30
CCUXXX	21	22	19	1-1/4	31	30
CCVXXX	28	28	24	1-3/4	39	40
CCWXXX	38	35	30	1-3/4	49	80
CCXXX	38	42	38	1-3/4	49	80
CCYXXX	54	54	48	2-1/4	69	110

## INFINITY HOSE with Rotalock fitting and brazing inch fitting

part number	DN	A for tube O.D. (inches)	B mm	C inches	D mm	Minimum bending radius mm
CC1XXX	15	1/2	12	1	24	15
CC2XXX	15	5/8	15	1	24	15
CC3XXX	21	3/4	17	1-1/4	31	30
CC4XXX	21	7/8	19	1-1/4	31	30
CC5XXX	28	1-1/8	24	1-3/4	39	40
CC6XXX	38	1-3/8	30	1-3/4	49	80
CC7XXX	38	1-5/8	38	1-3/4	49	80
CC8XXX	54	2-1/8	48	2-1/4	69	110

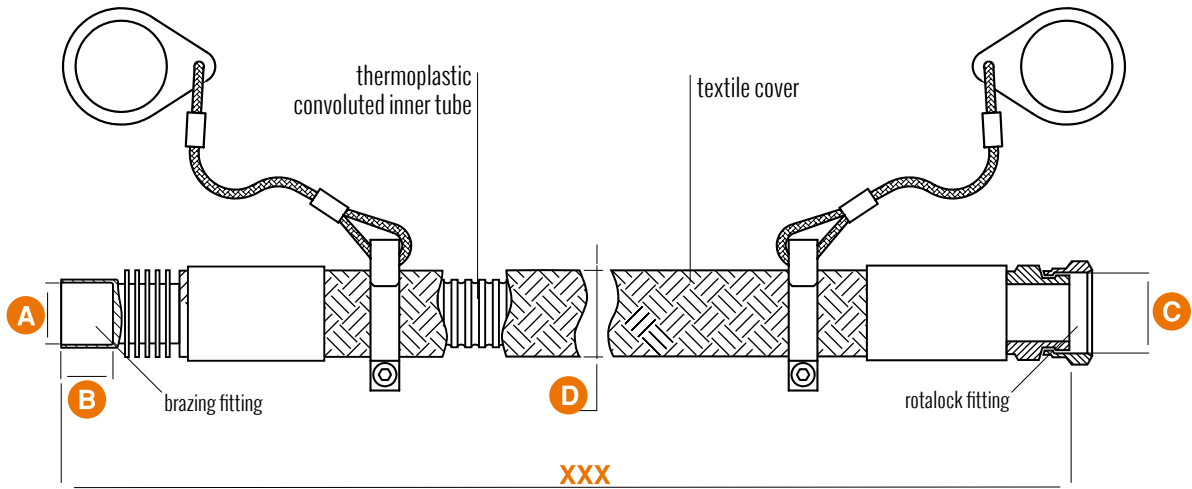
XXX total length of INFINITY hose in cm (multiple lengths of 10 cm)



# TECHNICAL DATA BRAZING/ROTALOCK FITTING

## INFINITY

PLASTIC CONVOLUTED HOSE



### INFINITY HOSE with Rotalock fitting and brazing metric fitting (with safety clamp)

part number	DN	A for tube O.D. (mm)	B mm	C inches	D mm	Minimum bending radius mm
CDAXXX	15	12	12	1	24	15
CDBXXX	15	16	15	1	24	15
CDCXXX	21	18	17	1-1/4	31	30
CDDXXX	21	22	19	1-1/4	31	30
CDEXXX	28	28	24	1-3/4	39	40
CDFXML	38	35	30	1-3/4	49	80
CDGXXX	38	42	38	1-3/4	49	80
CDHXXX	54	54	48	2-1/4	69	110

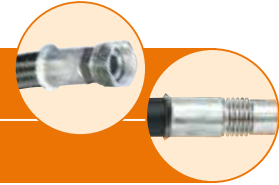
### INFINITY HOSE with Rotalock fitting and brazing inch fitting (with safety clamp)

part number	DN	A for tube O.D. (inches)	B mm	C inches	D mm	Minimum bending radius mm
CDIXXX	15	1/2	12	1	24	15
CDJXXX	15	5/8	15	1	24	15
CDKXXX	21	3/4	17	1-1/4	31	30
CDLXXX	21	7/8	19	1-1/4	31	30
CDMXXX	28	1-1/8	24	1-3/4	39	40
CNDXXX	38	1-3/8	30	1-3/4	49	80
CDPXXX	38	1-5/8	38	1-3/4	49	80
CDQXXX	54	2-1/8	48	2-1/4	69	110

# PERFORMANCE AND CONDITION OF USE

## INFINITY hose fittings




fitting type	material used	surface treat.	coupling process to be used for installation	filler material for installation
brazing fittings with heat dissipator radiator (Patent no.1326357 released 21/01/05)	drawn steel	zinc plating	hard brazing	silver alloy with low melting point
Rotalock	drawn steel	zinc plating	screw-on	none



## PERMEABILITY

The permeability value provides an indication of the maximum leakage at constant conditions of use of the hose at 100°C for a whole year. The real permeability value must therefore be measured considering the effective working times and temperatures to which the hose is subjected, remembering that significant and detectable values are obtained with temperatures of more than 50°C and that the permeability increases proportionally to the temperature. The permeability values obtained at 100°C for the GOMAX hose range, of approximately 1 kg/m<sup>2</sup>/year, are much lower than those set in the standard UNI EN 1736, which foresees a maximum permeability value of 5 kg/m<sup>2</sup>/year.

## PERFORMANCE and condition of use

WP 			BP 			WT 	
max working pressure			min. bursting pressure			allowable temp.	
bar	MPa	psi	bar	MPa	psi	min	max
50	5,0	724	250	25	3620	-45°C / 49°F	+110°C / +230°F

## PERMITTED FLUIDS

Type of Gas	Type of Oil
HFC (R134a, R404A, R407A, R407B, R407C, R410A, R507)	polyol ester based
HCFC (R22)	mineral oils
CO <sub>2</sub>	polyol ester based

## PRESSURE DROP and permeability

DN	Pressure Drop				Permeability at 100°C	
	(bar/m)				(g/year)	
	10 m <sup>3</sup> /h	20 m <sup>3</sup> /h	50 m <sup>3</sup> /h	100 m <sup>3</sup> /h	R134a	R407C
15	0,0318	0,1275			52	73
21	0,0059	0,0237			70	97
28		0,0056	0,0348		89	123
38			0,0076	0,0304	78	110
54			0,0053	0,0014	112	156

## PRESSURE DROP

The values refer to measurements performed by use of air on 1 m length of INFINITY hose.

Thermoplastic and  
vibration-proof for air conditioning  
and refrigeration systems

**ZERO**



**PLASTIC VIBRATION ABSORBER**







**Thermoplastic, flexible  
and reliable**

**Equipped with brazing fittings  
with heat dissipator**

**Made of anti-abrasion  
material**



**ZERO**

PLASTIC VIBRATION ABSORBER



# ZERO

PLASTIC VIBRATION ABSORBER



All ZERO hoses now can be used with CO<sub>2</sub> up to 50 bar / 724 psi from -45°C up to +110°C / from -49°F up to +230°F.



## Directive 2011/65/EU



“Restriction of the use of certain hazardous substances in electrical and electronic equipment”

All ZERO products meet the minimum requirements of the RoHS directive.

The reinforcing layers are made of stress-resistant polyester fibre, while the external cover is made of anti-abrasion materials. ZERO can be applied to refrigeration and air conditioning systems and is compatible with cooling fluids in the HCFC, HFC families.

### 1 Inner tube material

Thermoplastic polymer.

### 2 Reinforcing material

Polyester braid of high tensile strength with high modulus.

### 3 Cover material

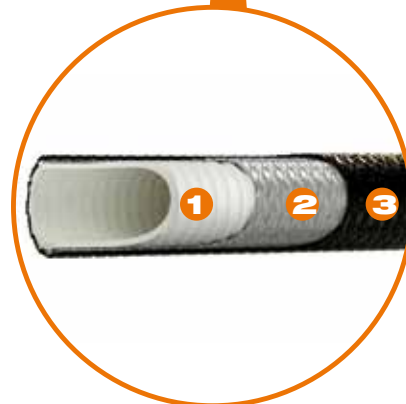
Black polyester braid of high textile strength, abrasion resistant.

The tests carried out by Transfer Oil involve the comparison of two systems: ZERO and the traditional metal anti-vibration system. Under equal conditions of disturbing acoustic and sub-acoustic frequencies, ZERO is much better at absorbing vibrations than other types of anti-vibration systems.

## Vibration-proof ZERO



Thermoplastic material



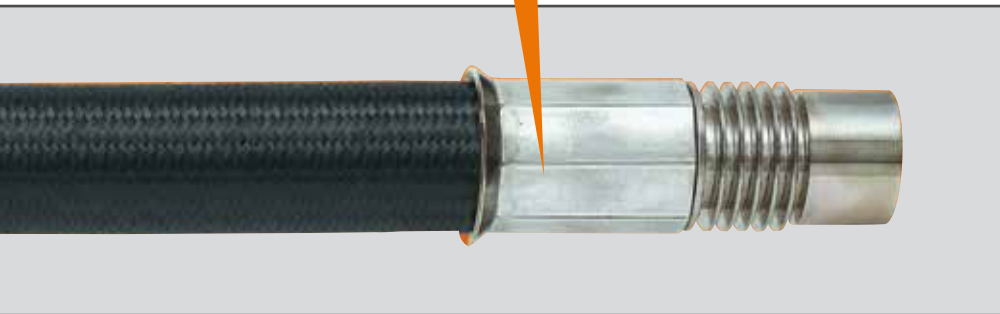
## THE BRAZING FITTING

The ZERO vibration absorber is fitted with a brazing fitting patented by Transfer Oil (patent no.1326357).

The couplings are pre-set for heat dissipation, thanks to the radiator, which facilitates and simplifies the brazing operation eliminating the need for auxiliary cooling systems. The lateral fins, which vary according to the hose diameter, are used to dissipate the heat before it damages the thermoplastic hose the fitting is connected to. Tests show that under normal environmental and time conditions, in the brazing phase, they never exceed 90°C at the point of coupling between the hose and the fitting.



the brazing fitting



**Classification of Zero hose**  
according to Directive 97/23/CE

DN	Classifications
15-21-28	paragraph 3 article 3
38-54	category I (marking CE)

## Brazing fitting assembly instructions

Once the copper tube of suitable diameter has been fitted in the brazing fitting, heat the two ends until the filler material begins to melt. Continue the brazing around the whole circumference of the brazing fitting.

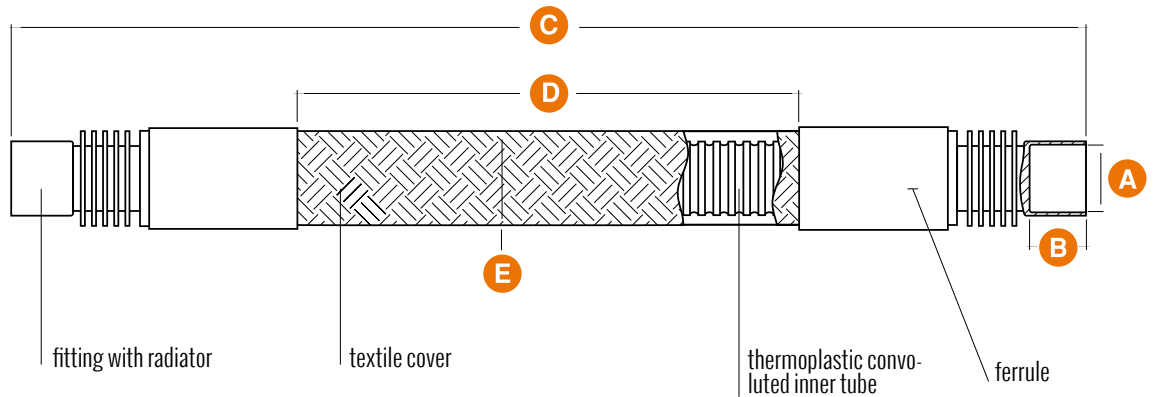
- 1 Insert the copper tube
- 2 heat the two ends
- 3 start brazing around the whole circumference



# TECHNICAL DATA

## ZERO

PLASTIC VIBRATION ABSORBER

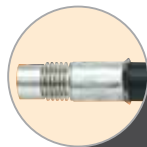


### ZERO VIBRATION ABSORBER with brazing metric fitting



part number	DN	A for tube O.D. (mm)	B mm	C mm	D mm	E mm	Weight Kg
C9M12	15	12	12	332	170	24	0,28
C9M16	15	16	15	340	170	24	0,29
C9M18	21	18	17	397	200	31	0,58
C9M22	21	22	19	401	200	31	0,58
C9M28	28	28	24	499	260	39	0,93
C9M35	38	35	30	559	260	49	1,68
C9M42	38	42	38	577	260	49	1,73
C9M54	54	54	48	635	260	69	3,44

### ZERO VIBRATION ABSORBER with brazing inch fitting



part number codice	DN	A for tube O.D. (inches)	B mm	C mm	D mm	E mm	Weight Kg
C9I12	15	1/2	12	332	170	24	0,28
C9I16	15	5/8	15	340	170	24	0,29
C9I18	21	3/4	17	397	200	31	0,58
C9I22	21	7/8	19	401	200	31	0,58
C9I28	28	1-1/8	24	499	260	39	0,93
C9I35	38	1-3/8	30	559	260	49	1,68
C9I42	38	1-5/8	38	577	260	49	1,73
C9I54	54	2-1/8	48	635	260	69	3,44



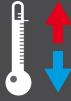
# PERFORMANCE AND CONDITION OF USE

## FITTINGS in the ZERO vibration absorber range

fitting type	material used	surface treatment	coupling process to be used for installation	filler material for installation
brazing fittings with heat dissipator radiator (Patent no.1326357 released 21/01/05)	drawn steel	zinc plating	hard brazing	silver alloy with low melting point



## PERFORMANCE and condition of use

WP 			BP 			WT 	
max working pressure			min. bursting pressure			allowable temp.	
bar	MPa	psi	bar	MPa	psi	min	max
50	5,0	724	250	25	3620	-45°C / -49 °F	+110° / +230°F

## PERMEABILITY

The permeability value provides an indication of the maximum leakage tested at constant conditions of use of the hose at 100°C / 212°F for an entire year.

The real permeability value must therefore be measured considering the actual working time and temperatures to which the hose is subjected, keeping in mind that significant and detectable values are obtained with temperatures of more than 50°C / 122 °F and that the permeability increases proportionally to the temperature. The permeability values obtained at 100°C / 212°F for the GOMAX hose range, of approximately 1 kg/m<sup>2</sup>/year, are much lower than those set in the standard UNI EN 1736, which foresees a maximum permeability value of 5 kg/m<sup>2</sup>/year.

## PERMITTED FLUIDS

Type of Gas	Type of Oil
HFC (R134a, R404A, R407A, R407B, R407C, R410A, R507)	polyol ester based
HCFC (R22)	mineral oils
CO <sub>2</sub>	polyol ester based

## PRESSURE DROP and permeability

DN	Pressure Drop				Permeability at 100°C	
	(bar/m)(g/year)				R134a	R407C
	10 m <sup>3</sup> /h	20 m <sup>3</sup> /h	50 m <sup>3</sup> /h	100 m <sup>3</sup> /h		
15	0,0054	0,0217			9	12
21	0,0012	0,0047			14	19
28		0,0015	0,009		23	32
38			0,002	0,0079	20	38
54			0,0003	0,0014	29	40

## PRESSURE DROP

The values refer to actual tests performed using air

# THERMOPLASTIC HOSE INSTALLATION FACTORS

## THERMOPLASTIC HOSE INSTALLATION FACTORS

The specifications and particular conditions of use also determine the limits for the correct use of Gomax products. Accordingly, Transfer Oil can neither declare nor guarantee that any item will be suitable for a given applications: it is the business of users to apply their knowledge of the relevant details and carry out such tests as may be needed to ensure the selection of the item best suited for the particular requirements, eliminating risks to themselves, to the product, and to third parties. Users are strongly advised in their own interest, before making any final decision on the item, to consult the full range of information supplied in the Transfer Oil technical literature, catalogues and appendixes. To eliminate any element of doubt, the Transfer Oil sales department will obviously be at the customer's disposal to provide further information and respond to any request for clarification.

## IMPORTANT NOTE FOR USERS

Hose assemblies require caution in use not only to provide long service life but also to guard against potentially dangerous failure. Serious injury, death and destruction of property can result from the rupture or blowing apart of a hose assembly that is damaged, worn out, badly assembled or installed incorrectly. Users should follow good maintenance practices. Avoid expensive downtime by establishing a program of inspection, testing and replacement of hose assemblies before failure occurs: taking into account factors including: severity of application, frequency of equipment use, past performance of hose assemblies. Document your maintenance, inspections and testing. Only properly trained persons should inspect, test or service hose assemblies and this training should be updated regularly. Users should carefully observe the precautions listed below as well as following closely our recommendations for the selection of hose and couplings. In addition, care should be taken not to go below the minimum bend radius listed for each hose size and type. Maximum operating pressure and temperature should not exceed the pressures listed. Instruction for assembling fittings to different hoses should be followed carefully to ensure the safe performance of the complete assembly. By following the recommendations on hose assembly routing and installation, improved safety and longer service life of any hose installation will result. Gas and/or oil under pressure can be potentially dangerous! An explosive burst or stream of escaping gases or oils can cause damage to equipment as well as serious injury to persons nearby.

## SALIENT INFORMATION

Highly pressurized gas and/or oil escaping from a small pinhole can be almost invisible and, yet, exert extreme force capable of penetrating the skin and other body tissues, causing possible severe injury. Hot gases / oils or chemicals can cause severe burns. Pressurized gases or oils, if released uncontrolled, can exert a tremendous explosive force. Some gas and/or oil are highly flammable.

## PRECAUTIONS

Always position a shield between you and any pressurized lines when working next to them or shut the pressure off. Wear safety glasses. Do not use your hands to check for leaks. Do not touch a pressurized hose assembly with any part of your body, if fluid punctures the skin, even if no pain is felt, a serious emergency exists. Obtain medical assistance immediately. Failure to do so can result in loss of the injured body part or death. Stay out of hazardous areas while testing hose assemblies under pressure. Use proper safety protection. If an injury or reaction occurs, get medical attention right away. GOMAX hose and fitting (ZERO, INFINITY and QUADRA) are designed, engineered and tested to be used together in an assembly. The use of GOMAX fittings on other manufactures hose or the use of GOMAX hose with other manufactures fittings may result in the production of unreliable or unsafe assemblies. Hose (and hose assemblies) has a limited life dependent on service conditions to which it is applied. Subjecting hose (and hose assemblies) to conditions more severe than the recommended limits significantly reduce service life. Exposure to combinations of recommended limits (i.e. continuous use at maximum rated working pressure, maximum recommended operating temperature and minimum bend radius) will also reduce service life.

## PRESSURE

After determining the system pressure for a system, hose selection must be made so that the recommended maximum operating pressure specified by a given hose, is equal or greater than the maximum system pressure. Continuous use at maximum temperatures together with maximum pressures should always be avoided. Continuous use at or near the maximum temperature rating will cause a deterioration of physical properties of the tube and cover of most hose. This deterioration will reduce the service life of the hose. Pressure surges which exceed the maximum working pressure (pressure relief valve setting) affect the service life of system components, including a hose assembly and therefore need to be taken into consideration. Hoses used for suction lines must be selected to ensure the hose will withstand the potential

negative pressure of the system.

## BURST PRESSURE

These are test values only and apply to hose assemblies that have not been used and have been assembled for less than 30 days.

## HIGH PRESSURE GAS

High pressure gaseous systems especially over 15 bar or 250 psi are very hazardous and should be adequately protected from external shock and mechanical or chemical damage. They should also be suitably protected to prevent whiplash action in the event of failure. TRANSFER OIL Thermoplastic hose is not recommended for high pressure pure oxygen charging applications.

## TEMPERATURE

Care must be taken to ensure that the operating temperature of the gas and/or oil being conveyed and ambient temperatures do not exceed the limitations of the hose. Special care must be taken when routing near hot manifolds or molten metal.

## INSULATION

Where the fittings of a QUADRA capillary hose can possibly be subject to permanent condensation or icing (for example on a suction line or an evaporator), we recommend to include the hose fitting within the insulation, in order to avoid unnecessary corrosion over time.

Insulate the capillary hose up to 5 cm (2 inches) from the end of the ferrule with a rubber type insulation hose or insulation tape.

## GAS AND OILS COMPATIBILITY

Hose selection must assure compatibility of the hose tube, cover, reinforcement, and fittings with the gas and/or oil used. Additional caution must be observed in hose selection for gaseous applications. Some fire resistant fluids require the same hose as petroleum oil. Some use a special hose.

## PERMEATION

Permeation (that is, seepage through the hose) will occur from inside the hose to outside when hose is used with gases, liquid and gas fuels, solvents and other media, and refrigerants (including but not limited to such materials such as helium, fuel oil, natural gas or refrigerant gas). This permeation may result in high concentrations of vapours which are potentially flammable, explosive, or toxic, and in loss of gas and/or oil. Even though the gas and/or oil compatibility is acceptable, you must take into account the fact that permeation will occur and could be hazardous. Permeation of moisture from outside the hose to inside the hose will also occur. If this moisture permeation would have detrimental effects (particularly but not limited to refrigeration and air conditioning systems), incorporation of sufficient drying capacity in the system or other appropriate system safeguards should be selected and used.

## ROUTING

Attention must be given to optimum routing to minimise inherent problems. Restrain, protect or guide hose with the use of clamps if necessary to minimise risk or damage due to excessive flexing, whipping or contact with other moving parts or corrosives. Determine hose lengths and configurations that will result in proper routing and protection from abrasion, snagging or kinking and provide leak resistant connections.

## ENVIRONMENT

Care must be taken to ensure that the hose and fittings are either compatible with or protected from the environment to which they are exposed. Environmental conditions including but not limited to ultraviolet light, heat, ozone, moisture, water, salt water, chemicals, and air pollutants can cause degradation and premature failure and, therefore, must be considered.

## REFRIGERANT GASES

Special care should be taken when working with refrigeration systems. Sudden escape of refrigerant gases can cause blindness if the escaping gases contact the eye and can cause freezing or other severe injuries if it contacts any other part of the body.

## ATOMIC RADIATION

Atomic radiation affects all materials used in hose assemblies. Since the long-term effects may be unknown, do not expose hose assemblies to atomic radiation.

## MECHANICAL LOADS

External forces can significantly reduce hose life. Mechanical loads which must be considered include excessive flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type fittings or adaptors may be required to ensure no

twist is put into the hose. Unusual applications may require special testing prior to hose selection.

#### EXTERNAL PRESSURE

In certain applications, such as in autoclaves or under water, the external environmental pressures may exceed the gas and/or oil pressure inside the hose. In these applications, consider the external pressures, and, if necessary, consult the manufacturers.

#### ABRASION

While a hose is designed with a reasonable level of abrasion resistance, care must be taken to protect the hose from excessive abrasion which can result in erosion, snagging, and cutting of the hose cover. Exposure of the reinforcement will significantly accelerate hose failure.

#### PROPER END FITTING

GOMAX hoses (QUADRA, INFINITY and ZERO) have been designed to be used exclusively with genuine GOMAX fittings, accessories and tools.

Using third party fittings, accessories or tools may cause malfunctioning of GOMAX hoses, with consequent risk of leakages of gas and/or oil, as well as damage to equipment and serious injury to persons nearby.

In the same way GOMAX fittings, accessories and tools are designed to be used exclusively with GOMAX hoses. Using GOMAX fittings, accessories and tools with third party hoses may cause malfunctioning, gas and/or oil leakages, as well as damage to equipment as well as serious injury to persons nearby.

#### HOSE-ASSEMBLY FABRICATION

Persons fabricating hose assemblies should be trained in the proper use of equipment and materials. The manufacturers' instructions must be followed. Properly assembled fittings are vital to the integrity of a hose assembly. Improperly assembled fittings can separate from the hose and may cause serious injury or property damage from whipping hose, or from fire or explosion of vapour expelled from the hose.

#### LENGTH

When establishing proper hose length, motion absorption, hose length changes due to pressure, as well as hose and machine tolerances must be considered.

#### SPECIFICATIONS AND STANDARDS

When selecting hose and fittings, government, industry and manufacturer's specifications and recommendations must be reviewed as applicable.

#### STATIC-ELECTRIC DISCHARGE

Gas and/or oil passing through hose can generate static electricity resulting in the possibility of static-electric discharge. This may create sparks that can puncture hose. If this potential exists, than adequate measures should be taken to insulate the product from potential earthing points that may contact the exterior surface of the hose.

#### MINIMUM BEND RADIUS

Installation of a hose at less than the minimum listed bend radius may significantly reduce the hose life. Particular attention must be given to avoid sharp bending at the hose/fitting juncture.

#### TWIST ANGLE AND ORIENTATION

Hose installations must be such that relative motion of machine components does not produce twisting.

#### SECUREMENT

In many applications, it may be necessary to restrain, protect, or guide the hose to protect it from damage by unnecessary flexing, pressure surges, a contact with other mechanical components. Care must be taken to ensure such restraints do not introduce additional stress or wear points.

#### PROPER CONNECTION OF PORTS

Proper physical installation of the hose requires a correctly installed port connection while ensuring that no twist or torque is transferred to the hose.

#### EXTERNAL DAMAGE

Proper installation is not complete without ensuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage, or damage to sealing surfaces are corrected or eliminated.

#### UNINTENDED USES

Hose assemblies are primarily designed for the internal forces of conducted gas and/or oil. Do not pull hose or use it for purposes that may apply external forces for which the hose or fittings were not designed.

#### HOSE AND FITTING MAINTENANCE INSTRUCTIONS

Even with proper selection and installation, hose life may be significantly reduced without a continuing maintenance program. Frequency should be determined by the severity of the application and risk potential. A maintenance program must be established and followed to include the following as a minimum:

#### VISUAL INSPECTION HOSE/FITTING

Any of the following conditions require immediate shut down and replacement of the hose assembly: Damaged, cut or abraded cover (any reinforcement exposed). Hard, stiff, heat cracked, or charred hose. Cracked, damaged, or badly corroded fittings. Leaks at the fitting or in the hose. Kinked, crushed, flattened or twisted hose. Blistered, soft, degraded, or loose cover.

#### VISUAL INSPECTION ALL OTHER

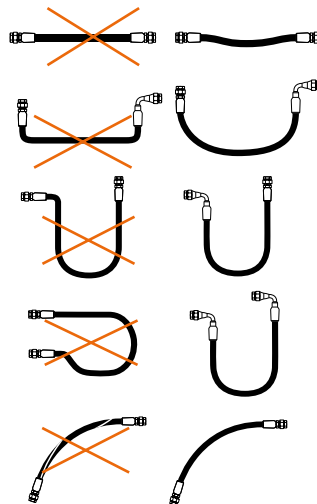
The following items must be tightened, repaired or replaced as required: Leaking port conditions. Clamp, guards, shields. System fluid level, fluid type and any air entrapment. Remove excess dirt build - up.

#### REPLACEMENT INTERVALS

Specific replacement intervals must be considered based on previous service life, government or industry recommendations, or when failures could result in unacceptable downtime, damage, or injury risk.

#### CORRECT ASSEMBLY INSTALLATION

Satisfactory performance and appearance depend upon proper hose installation. Excessive length destroys the trim appearance of an installation and adds unnecessarily to the cost of the equipment. Hose assemblies of insufficient length to permit adequate flexing, expansion or contraction will cause poor power transmission and shorten the life of the hose. The diagrams below offer suggestions for proper hose installations to obtain the maximum in performance and economy.



Since hose may change in length under the surge of high pressure, provide sufficient slack for expansion and contraction.

Hose should exit coupling in a straight position rather than side loaded. The minimum bend radius must not be exceeded to avoid kinking of hose and flow restriction.

Where the radius falls below the required minimum, an angle adapter should be used to avoid sharp bends in hose.

Avoid sharp twist or bend in hose by using proper angle adapters.

Hose is weakened when installed in twisted position. Also, pressure pulses in twisted hose tend to fatigue wire and loosen fitting connections. Design so that machine motion produces bending rather than torsion.

# GENERAL TERMS OF SALE

## General introduction

The following terms of sale will be applied to every contract concluded through a purchase order placed via the Internet, telefax, electronic mail and ordinary mail, and relating to the standard products listed in the site or in the Transfer Oil catalogues, at the appropriate page. Any different and specific terms and every order relating to personalised products may/must be the subject of a different, separate agreement. In the event of a contrast between these standard terms and any special term agreed to between the parties, the special term will take priority, but without prejudice to all the other general terms, as per the points below, wherever compatible. The general introduction forms an integral part of every purchase and sale contract concluded through the sending of the order form, whether by e-mail, by post or by telefax.

1. Preamble: Transfer Oil, hereafter also referred to as the Seller, sells the products listed and described in the "Products" page that can be found in official Transfer Oil web site or in one of the Transfer Oil catalogues, hereafter also referred to as the Products, which may be purchased under the terms as per the clauses below.

2. Conclusion of the contract. The purchase order on the Internet site must be compiled by the Purchaser according to the instructions in the appropriate "Orders" WEB page. The sending of the order form on the site, compiled as per the instructions, shall imply acceptance on the part of the purchaser of all the clauses outlined below. The sale and purchase contract, also in the event that the order is sent by the purchaser via telefax, e-mail or post, will in any case be considered as concluded and complete with the dispatch, on the part of Transfer Oil, of the due acceptance of the purchase order by telefax or electronic mail.

3. Cancellation and/or modification of orders. Penalty. Any cancellations, reductions and/or modifications of orders already accepted by Transfer Oil may be made within and not later than five days from the date of the order, by means of a written communication to be sent via fax or by registered letter with advice of receipt to the seller party. Any cancellation and/or modification notified after the above indicated period, or by other means different from those provided for in the previous paragraph shall imply a penalty of 10% of the price of the already ordered goods. The penalty referred to in the above paragraph will be invariably equal to 50% of the price should the object of the sale be personalised products according to the purchaser's wishes and requirements.

4. The Products. The Products that may be purchased, and the order of which implies - if accepted - total agreement with the general terms of sale, are those listed in the appropriate WEB page in the official Transfer Oil site, or in one of the Transfer Oil catalogues. The availability on stock of the above mentioned products is not guaranteed. In consideration of the particular applications of some products, the acceptance of the order can be subjected to a quantity equal to the economic batch of production in use at the moment of the order. In the event that the subject of the sale are personalised products according to the purchaser's wishes and requirements, having as a result different characteristics from standard products, these general terms of sale shall be equally applicable and binding, but without prejudice to any different, special condition that shall take priority should it be the subject of specific, separate agreement. Should the purchaser's offer or the seller's acceptance make reference to a specific sample, the product which is the subject of the relative sale, except in the event of a different written agreement, is binding with respect to the sample characteristics only within the limits of reasonable approximation.

5. Price and payment. The price shall be fixed according to the products chosen by the purchaser on the date of dispatch of the order and shall remain unchanged, except with reference to the provisions of the following clause, also if the delivery is deferred by agreement but nevertheless within six months from the date of the order. The customer has the right to the price relating to the products effectively collected with reference to that order for a period of six months. The seller has the right to revise the prices of the products on the basis of the price dynamics of raw materials, labour and packaging, but must notify the purchaser about new prices at least 30 days before their application, and in such cases, the purchaser has the right to withdrawal. Payment must categorically be made following the methods specified by Transfer Oil in the completed order form and according to the terms therein prescribed.

6. Express resolatory clause. In accordance and by the effects of art. 1456 of the civil code (c.c.), in the event of breach on the part of the purchaser of the obligations referred to in art. 5 (Price and payment), the seller shall have the right to cancel the contract/s already concluded, by means of a registered letter with advice of receipt, in which it declares to have made recourse to this clause, without prejudice, however, to any possible action for compensation for damages. Any change in the purchaser's balance sheet situation such as to endanger the correct fulfilment of the obligation of payment of the price, shall give the seller, in accordance with art. 1461 c.c., the right to suspend deliveries already agreed, and to cancel the contract by means of a simple written notice, without prejudice, however, to the payment

of the amounts due for services already carried out. Equally, any incorrect or failed compliance with the obligations relating to the payment of the price shall give the seller the right to suspend deliveries already agreed, also those not relating to the breach in question, in accordance with art. 1460 c.c. It should be understood, in particular, that:

7. Delivery. The sale is considered as Ex-Works, and as a result, the costs of transport are fully borne by the purchaser. Transfer Oil shall arrange to deliver the Products sold to the carrier indicated by the purchaser in the order form.

8. Cancellation. The seller may cancel the contract and not fulfil the obligation to deliver whenever, by reason of force majeure and in any case of unforeseen and extraordinary events, the execution of the delivery service becomes excessively onerous or in any case impossible.

9. Quality. Transfer Oil carries out a random check of its products on each production batch. Any technical modifications will be subject to acceptance by the purchaser for orders in progress.

10. Warranty. Transfer Oil guarantees the conformity of the products supplied to the characteristics expressly indicated in the relative WEB page and in its catalogues. The warranty for defects in the products is categorically limited only to manufacture defects attributable to the seller. The warranty has a limited duration of twelve months, starting from the date of delivery, and is dependent on the regular reporting of the defect by the purchaser in accordance with the following paragraphs, as well as on the express written request to the seller to take action under the warranty. As a consequence of the aforementioned request, the seller may, at its own choice and alternatively: a) supply ex-works free of charge to the purchaser, products of the same type and quantity as those found to be defective or non-conforming to what was agreed; b) declare the cancellation of the contract in writing, offering the return of the price against restitution of the supplied products. Except in the event of malice or gross negligence on the part of the seller, any possible compensation for damages to the purchaser may not in any case exceed the invoice price for the disputed products. The warranty here agreed to assimilates and replaces legal guarantees for defects and deformities, and excludes any other liability on the part of Transfer Oil in any way arising from the supplied products: specifically, the purchaser may not make other requests for compensation for damages, a reduction in the price or the cancellation of the contract. Once the duration of the warranty has elapsed, no claim may be made against the seller. The seller may not be held liable with respect to the purchaser for any loss of profit, non-use, loss of production, loss of contracts or any other indirect or consequential damage, but only for proven damages to persons or things, attributable to the sold products, in the event of its proven gross negligence and/or incompetence in their manufacture.

11. Claims. Claims relating to quantity, colour, or to quality faults and defects or to non-conformity that the purchaser may detect as soon as they come into possession of the goods, must be made by the purchaser in writing by means of a registered letter with advice of receipt, on penalty of forfeiture, not later than eight days from the moment in which the products arrive at their place of destination. Should the claim turn out to be unfounded, the purchaser shall be bound to reimburse the seller all costs borne by the latter for carrying out checks (any travel costs, expert opinions, etc.).

12. Interpretations. Any reference made to general terms, list prices, various attachments or to other material of the seller or of third parties, must be considered as referring to the terms and documents applied upon the conclusion of the contract.

13. Applicable law and competent court. These General terms of Sale, together with the Contract to which they refer, shall be regulated by Italian laws. The Court of Parma shall be the exclusive competent court for any dispute relating to, or deriving from, the Contract.









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