



INTRODUCTION

THE OFFER

The offer consists of reinforced rubber hoses, fittings, hose assemblies and kits.

The Refrigeration **offer** is designed specifically to satisfy the most restricted requirements aimed to the development of:

- **bus air conditioning** and **mobile refrigeration** systems for “on-road industrial vehicles”
- **air conditioning systems** applied on off-highway industrial vehicles such as: agricultural machines, earth-moving machines, forestry machines, etc.

The above systems are supplied both directly to manufacturers which need significant product volumes and through specialized distributors operating as part of the Manuli Premier Distributors Network.



Bus air conditioning



Off highway air conditioning



Mobile refrigeration

“FIELD-ATTACHABLE” FITTING

The “field-attachable” fitting technology allows a convenient mounting and disassembly operation, in particular:

- Frigoclic® fitting range technology
- Reusable fitting range technology

Furthermore crimped fitting solution is completely integrated on all hose lines.

The following pages describe the main steps to correctly assembly our products.

- **Refrimaster with clamp**
- **Refrimaster with ferrule**
- **Refristar with reusable fittings**
- **Refristar with crimped fittings**
- **Refrifast with one-piece crimped fittings**

Please browse through the above procedures before consulting our catalogue and selecting the most suitable product for your need.

REFRIMASTER WITH CLAMP

The fitting operations are extremely simple, and consist of the following procedures:



1 Check the dimensions of the components.



2 Cut the end of the hose in a perpendicular direction, using the manual cutter.



3 Verify the end of the hose to be cut in a perpendicular direction.



4 Place the double clamp on the flexible hose in such a way that the tooth of bar A comes contact with the end of the hose that has been cut.

ASSEMBLING INSTRUCTIONS - REFRIMASTER PROCEDURE



5 Grease the end of the fitting joint with the same oil used in the air conditioning system.

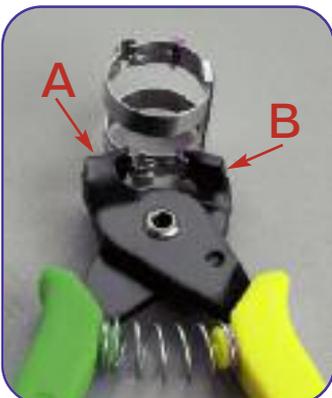


6 Find the correct orientation and insert completely the fitting into the hose.



7 A = round nose
B = thin nose

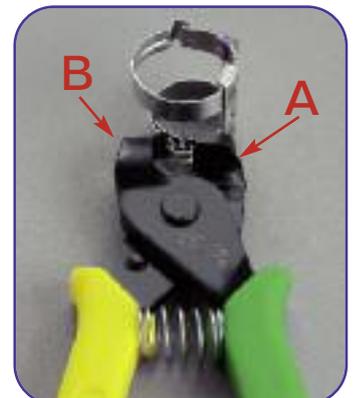
8 9 10 To place the fitting, position the round nose of the pliers (A) at the hook shaped end of the clamp and the thin nose (B) at the end with the hooked teeth. Tighten the double clamp until the click using the special "CLICK" open-close pliers. To disassemble, just reverse the position of the ends of the pliers on the clamp.



8 Closing



9 Tighting the double clamp until click to close. Reverse the position of the pliers to open.



10 Opening

WARNING: Do not reuse the clamp

ASSEMBLING INSTRUCTIONS - REFRIMASTER PROCEDURE



11 Verify the parallelism of the two clamps.



12 Pay attention in tightening clamp in the right way.

13 14 15 16

WARNING: Position correctly the clamp



13 Right
Solution with brazed insert



14 Wrong



15 Right
Solution with insert obtained by deformation



16 Wrong

REFRIMASTER MOUNTING KIT



1 Mounting kit.



2 Manual cutter.



3 "CLIC" open-close pliers.

The offer consists of:

- a practical mounting kit containing all tools necessary for the correct assembly of the Frigodic® coupling
- the separate supply of hose in rolls, relevant fitting and complete kits according to customer specifications

REFRIMASTER WITH FERRULE



1 Check the dimensions of the components.



2 Cut the end of the hose in a perpendicular direction, using the manual cutter.



3 Verify the end of the hose to be cut in a perpendicular direction.



4 Place the ferrule on the flexible hose so that the ferrule tooth touches the end of the cut hose.



5 Grease the end of the fitting joint with the same oil used in the air conditioning system.



6 Find the correct orientation and insert completely the fitting into the hose.

ASSEMBLING INSTRUCTIONS - REFRIMASTER PROCEDURE



7 Set up the crimping machine selecting the die set that is closed to the specified dimension. Crimp to the specified diameter (table a). Ensure the dies fully cover the ferrule length.



9 Inspect the crimping dimension using a calibrated vernier. Check the diameter at the centre of the ferrule following the values in table a.

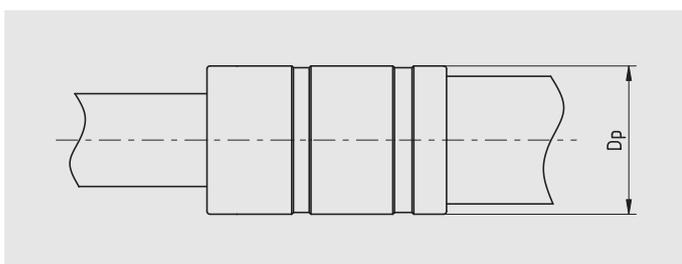
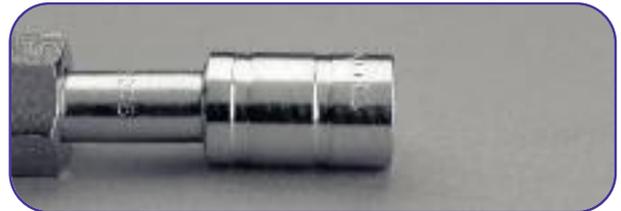


Table a



before



after

Solution with insert obtained by deformation



before



after

Solution with brazed insert

8 Pay attention in coupling insert and ferrule.

HOSE SIZE			Dp (±0,1 mm)
DN	Dash	Inch	mm
8	- 06	5/16"	16,9
10	- 08	13/32"	19,9
13	- 10	1/2"	21,8
16	- 12	5/8"	26,0

REFRISTAR WITH REUSABLE FITTINGS



1 Check the dimensions of the components.



2 Wrong cut



3 Right cut

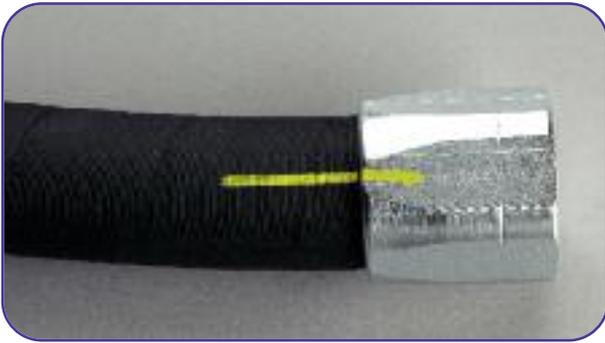


4 Cut the hose by using a proper sharpened disc (see fig. 4), **do not use an abrasive disc**. The hose must be square and clean cut. Avoid cutting the hose not perpendicularly or cutting the hose causing damages on its wire braid (see fig. 2, 3) for a proper cutting hose operation. Clean the hose carefully from any cutting residue.



5 Secure in position the socket i.e. by using a benchvise. Screw the hose counterclockwise into the socket until it reaches the bottom. Unscrew 1/4 turn to prevent damage in screwing.

ASSEMBLING INSTRUCTIONS - REFRISTAR PROCEDURE



6 Mark the socket and the hose using an indelible felt tip pen, to verify any absence of hose rotation inside the socket during the fittings crewing.



7 Position the hose complete with socket i.e. by using a bench vise. Grease with a lot of oil the threading and the taper of the fitting as well as the inside of hose.

WARNING: Use the same lubricant used in the A/C system.



8 Insert the fitting into the hose. Press slightly and screw by hand turning clockwise the first threads. Then by using an appropriate spanner or a screwspanner on the hexagon, screw the fitting into the socket with a continuous and constant rotation motion and verify any absence of hose rotation inside the socket during the fitting screwing. Complete the screwing until the fitting reaches the bottom against the socket. Never overtighten. Assembling is now finished.



9 You can leave a margin of max 3 mm between the hexagon of the fitting and the socket. Verify alignment.

REFRISTAR WITH CRIMPED FITTINGS

It is important that hose assemblies for A/C vehicles (for instance off highway), A/C Buses and Mobile Refrigeration using Manuli Hose, Ferrules & Fittings are manufactured to the procedures below:



1 Check the dimensions of the components.



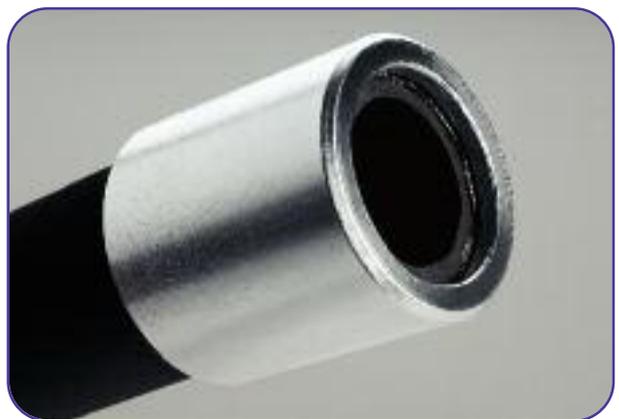
2 Wrong cut



3 Right cut



4 Cut the hose by using a proper sharpened disc (see fig. 4), **do not use an abrasive disc**. The hose must be square and clean cut. Avoid cutting the hose not perpendicularly or cutting the hose causing damages on its wire braid (see fig. 2, 3) for a proper cutting hose operation. Clean the hose carefully from any cutting residue.



5 Place the ferrule on the flexible hose so that the ferrule tooth touches the end of the cut hose.

ASSEMBLING INSTRUCTIONS - REFRISTAR PROCEDURE



6 Grease the end of the fitting joint with the same oil used in the air conditioning system.



7 Find the correct orientation and insert completely the fitting into the hose.



8 Set up the crimping machine selecting the die set that is closed to the specified dimension. Crimp to the specified diameter. Ensure the dies fully cover the ferrule length.



9 Inspect the crimping dimension using a calibrated vernier. Check the diameter at the centre of the ferrule following the values on the table b.

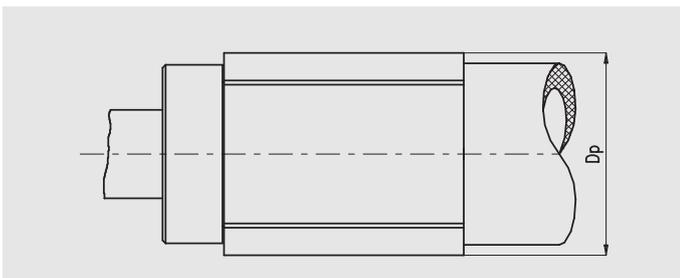
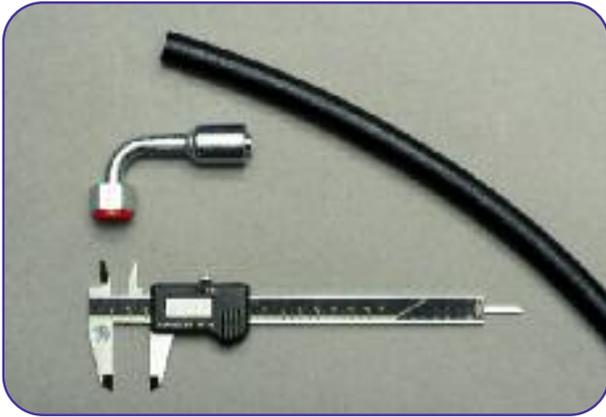


Table b

HOSE SIZE			Dp (±0,1 mm)
DN	Dash	Inch	mm
5	- 04	3/16"	15,2
8	- 06	5/16"	20,2
10	- 08	13/32"	21,3
12	- 10	1/2"	26,0
16	- 12	5/8"	30,8
22	- 16	7/8"	34,4
28	- 20	1.1/8"	42,5

REFRIFAST WITH ONE-PIECE CRIMPED FITTINGS

The fitting operations are extremely simple, and consist of the following procedures:



1 Check the dimensions of the components.



2 Cut the end of the hose in a perpendicular direction, using the manual cutter.



3 Verify the end of the hose to be cut in a perpendicular direction.



4 Grease the end of the fitting joint with the same oil used in the air conditioning system.

ASSEMBLING INSTRUCTIONS - REFRIFAST PROCEDURE



5 Find the correct orientation and insert completely the fitting into the hose.



6 Check the correct position of the hose through the proper hole in the ferrule.



7 Set up the crimping machine selecting the die set that is closed to the dimension specified diameter. Place the fitting on the proper positioner to ensure that it is in the correct position (table c).



8 Inspect the crimping dimension using the proper calibrated vernier. Check the dimensions following the values in table c.



Strictly use Manuli die sets bubble crimping.

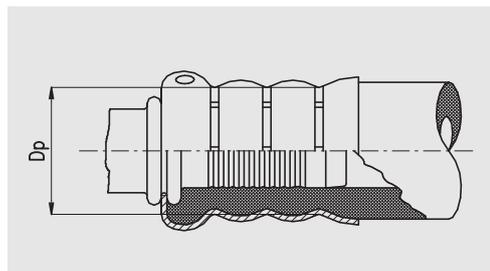


Table c

HOSE SIZE			Dp ±0,2 mm
DN	Dash	Inch	mm
8	- 06	5/16"	14,8
10	- 08	13/32"	16,3
12	- 10	1/2"	18,8
16	- 12	5/8"	21,1