

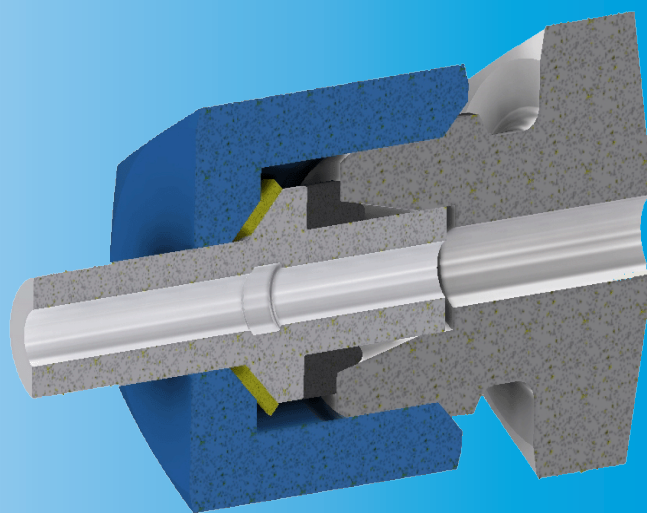
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RR-FORM

**TUBE COLD
FORMING
MACHINE**



CERTIFICATO N° 95/94/S



**RASTELLI
RACCORDI - s.r.l.**
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OUR ADRESSES

QUALITY CERTIFICATIONS



RINA

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-CERTIFICATE N° 95/94/S



THE INTERNATIONAL
CERTIFICATION NETWORK

-CERTIFICATE N° IT/2633

1. RR-FORM: TUBE FORMING MACHINE

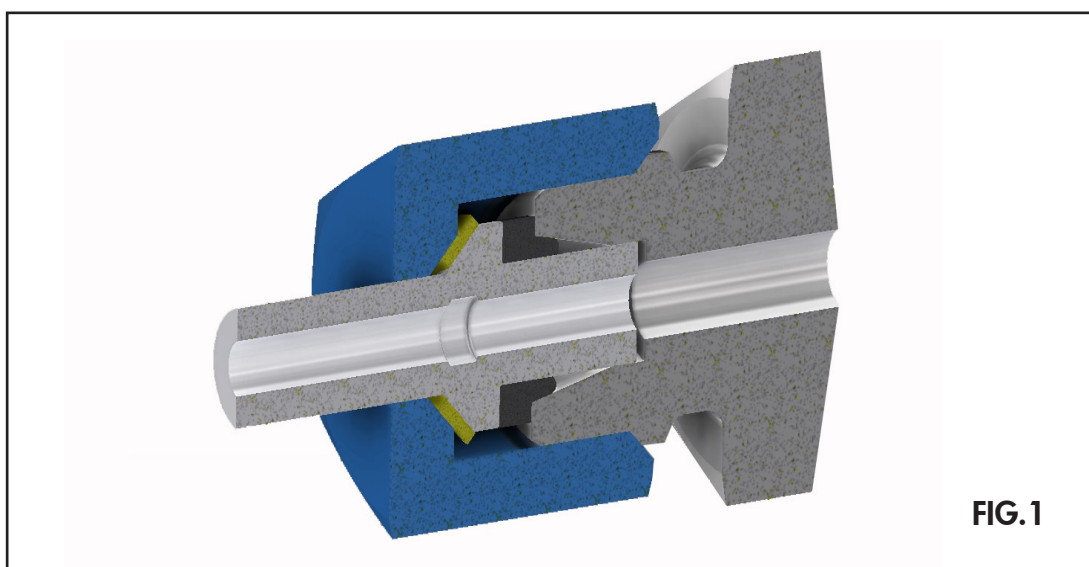
1.1 PRESENTATION

The new tube forming machine RR-FORM was conceived and designed at RASTELLI RACCORDI to obtain a tube deformation suitable to support ring AR3-FORM, so producing a fully reliable, tight system in all the applications where cutting ring TD88 cannot be used.

So far nipples TN299 were normally welded to the tube, for example in the metallurgical industry, construction of cranes and elevators, off-shore facilities or heavy-duty farming machines, but now the RR-FORM machine replaces the welding process with a faster and more reliable method.

The RR-FORM system guarantees perfect tightness thanks to the insertion of ring AR3-FORM also in the presence of vibration.

The RR-FORM system and ring AR3-FORM add to and complete the range of rings TN/TD88 and AR3.



THE RR-FORM SYSTEM GUARANTEES:

- a) EASY ASSEMBLING
 - b) ABSOLUTE SEAL
 - c) AUTOMATIC CLAMPING
 - d) INTERCHANGEABILITY ON ALL CUTTING RING FITTINGS
- 24° DIN 2353 (ISO 8434-1)

1.2 GUARANTEED EXPERIMENTS, TRIALS, TESTS

Sealing ring AR3-FORM (Fig.1) was studied, designed and tested with the methods applied to the control and check of new products following a FLOWCHART defined in CERTIFICATION ISO 9001, that RASTELLI RACCORDI has implemented in its plants.

2. CHARACTERISTICS

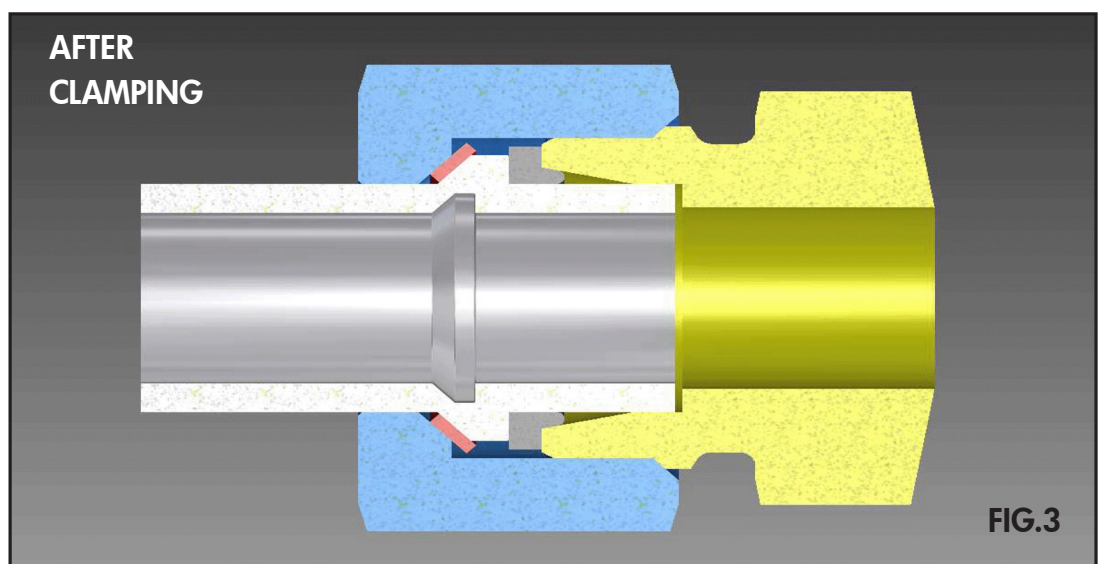
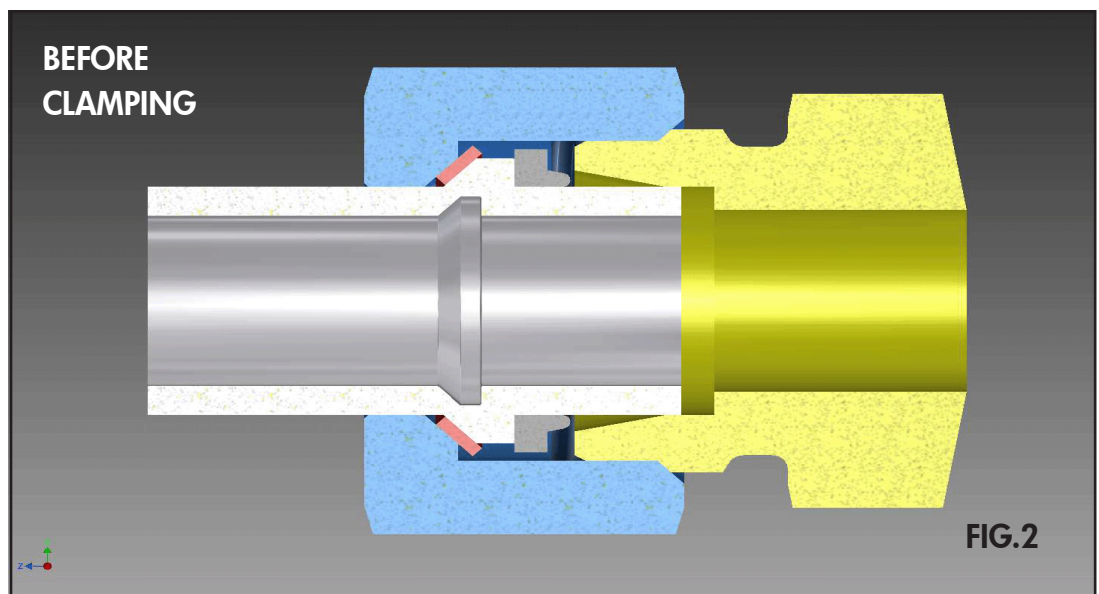
2.1 EASY ASSEMBLING

With the new sealing ring AR3-FORM costly and time-consuming operations and controls are eliminated, as the assembling operator has no longer to make sure that the ring cuts into the tube by:

- 1) Marking tube and nut to check the number of revolutions of the nut and so be sure that tightening is right;
- 2) Utilizing dynamometric wrenches to measure the torque (Nm) needed for tightening.

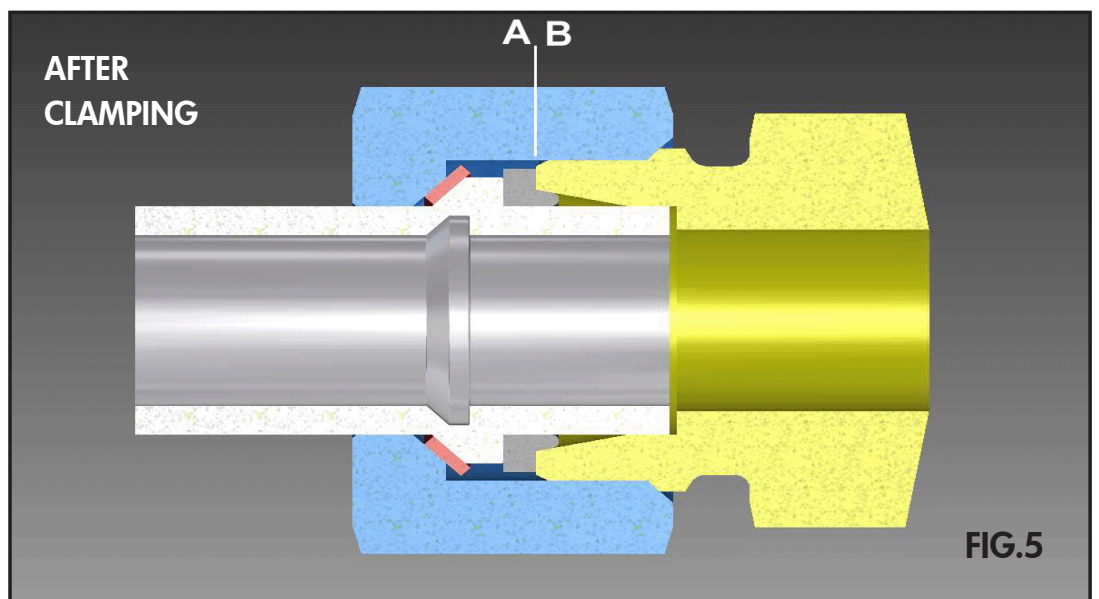
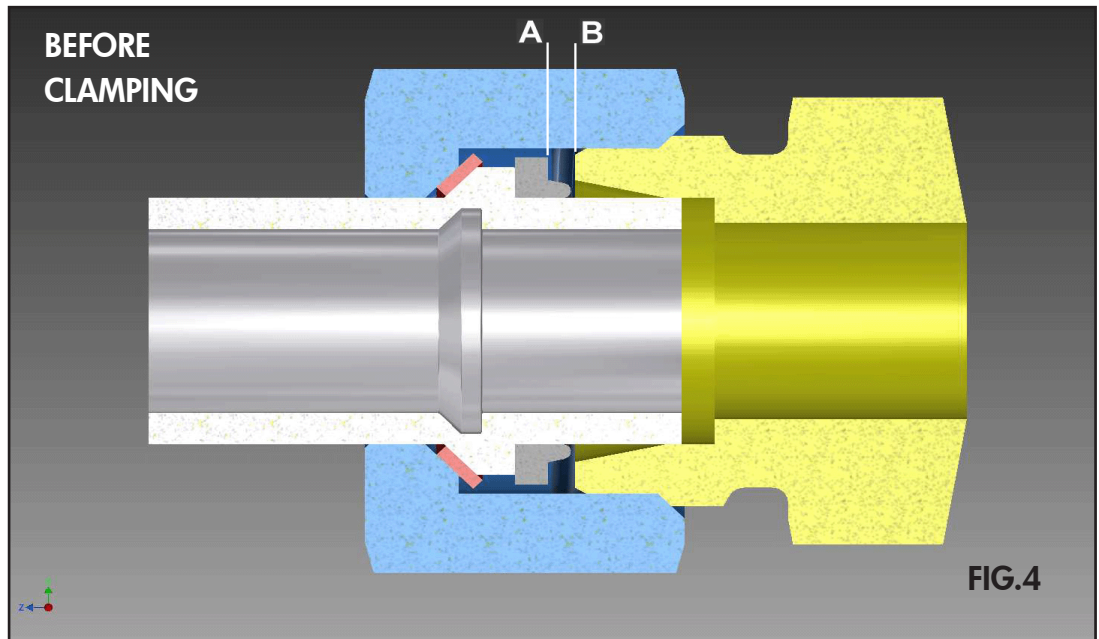
2.2 ABSOLUTE SEAL

The new sealing ring AR3-FORM ensures perfect tightness thanks to the elastomeric packing placed in the front which fills the space between tube and 24°-taper during the clamping procedure, so that the connection is absolutely tight also when low-viscosity fluids like water or gases are transported.



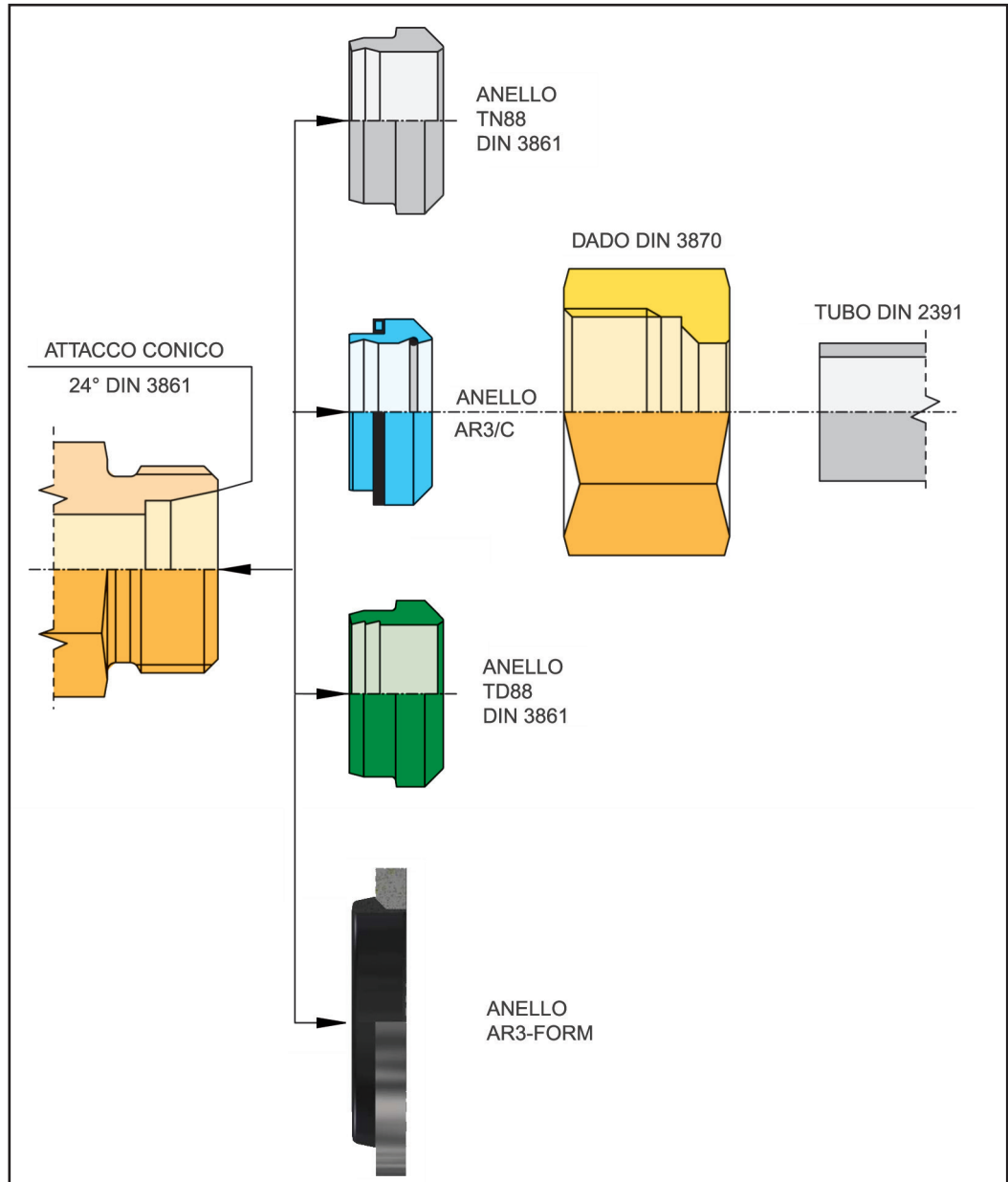
2.3 AUTOMATIC TIGHTENING LIMIT also said: AUTOMATIC CLAMPING

The automatic clamping of ring AR3-FORM on the fitting body occurs when ring AR3-FORM, due to nut tightening effect, moves on the 24° taper of the fitting body (Fig. 4) until surfaces A and B join together, forming one body. At this point the operator must stop tightening.



2.4 INTERCHANGEABILITY ON ALL CUTTING RING FITTINGS 24° DIN 2353 (ISO 8434-1)

The new sealing rings AR3-FORM perfectly interchange, like all the other sealing rings with one cutting edge or two cutting edges used on 24° tapered fittings DIN 2353 (ISO 8434-1).



For its characteristic of ABSOLUTE SEAL, ring AR3-FORM is especially recommended for use with all fitting with NBR (iron) or FPM (stainless steel) SOFT SEAL gaskets, which ensure the same performance of ring AR3/C, i.e. no leaking or sweating, with tubes staying externally dry.

In particular, it is recommended to adopt fittings of Series TN400 (TN419-420-421-426-432) that replace those of Series TN1 19-120-121-126-132.

3 . TECHNICAL DATA

3.1 SPECIFICATIONS

MATERIALS AND MAX. ALLOWABLE WORKING TEMPERATURES TB (DIN 2401)

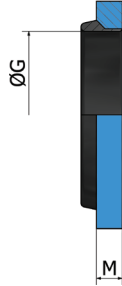
Metal component: steel (DIN 3859) temp. range -40°C to 120°C
 Rubber component: NBR (Perbunan® Bayer) temp. range -35°C to 100°C

PRESSURE

Nominal pressure PN corresponds to safety factor PN four-fold.

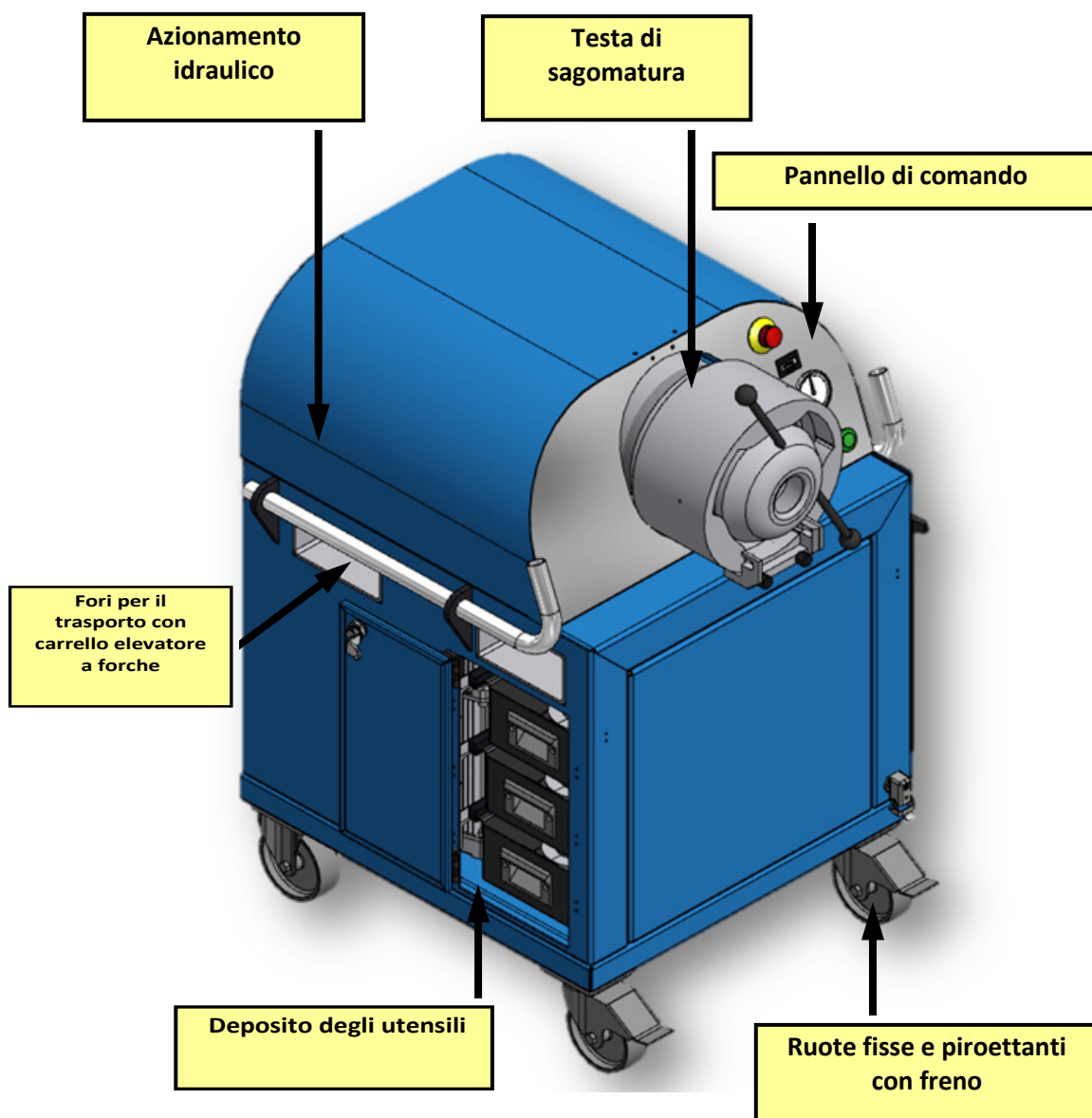
The below indicated pressures are MAXIMUM WORKING PRESSURES, including peak values in NORMAL working conditions and with MAX. ALLOWABLE WORKING TEMPERATURES TB (DIN 2401).

For rings AR3-FORM with packing, please comply with standards DIN 7716 on RUBBER PRODUCTS, storage, cleaning and maintenance norms.

AR3-FORM SEALING RING 					
SERIES	Ø TUBE	PN	Ø G	M	ORDERING CODE
L	6	315	6	2,2	AR3-FORM - 6 LS
	8		8	2	AR3-FORM - 8 LS
	10		10	2	AR3-FORM - 10LS
	12		12	2	AR3-FORM - 12LS
	15		15	2	AR3-FORM - 15L
	18		18	2	AR3-FORM - 18L
	22	160	22	2,5	AR3-FORM - 22L
	28		28	2,5	AR3-FORM - 28L
	35		35	3	AR3-FORM - 35L
	42		42	3	AR3-FORM - 42L
S	6	630	6	2,2	AR3-FORM - 6 LS
	8		8	2	AR3-FORM - 8 LS
	10		10	2	AR3-FORM - 10LS
	12		12	2	AR3-FORM - 12LS
	14		14	2	AR3-FORM - 14S
	16	400	16	2,5	AR3-FORM - 16S
	20		20	2,5	AR3-FORM - 20S
	25		25	2,5	AR3-FORM - 25S
	30		30	3	AR3-FORM - 30S
	38	315	38	3	AR3-FORM - 38S

4. THE RR-FORM MACHINE

The RR-FORM machine is a semi-automatic equipment for high-pressure cold forming of tubes having diameters of 6-38 mm and 6-42 mm.



The machine is essentially composed of a base containing the machine body and the tube forming device. The tube forming device is hydraulically operated.

With the machine come a hydraulic unit to operate the tube forming device, an electric cabinet with master switch and PLC control and a control panel for the machine.

The machine is also equipped with a tool compartment that allows an easily accessible and clean storage of essential tools.

The high-performance hydraulic unit and rugged forming tools make this machine totally reliable.

5. TUBE FORMING PROCESS

a) INTERNAL AND EXTERNAL PREPARATION OF TUBE

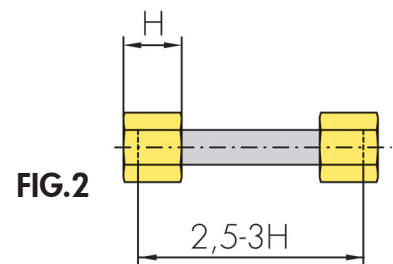
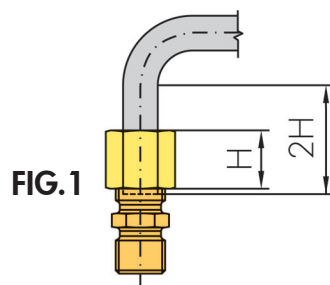
- a.1) Cut tube at right angle. Maximum allowable deviation from tube axis: 0.5° .
- a.2) For cutting tube at right angle it is recommended to use a manual cross cut saw with suitable tool.

ATTENTION! Do not use TUBE CUTTERS or CUTTING-OFF DEVICES.

- a.3) Slightly trim inside and outside of tube making sure to keep a bearing plane (max. chamfering: $0.2 \times 45^\circ$).

b) MINIMUM TUBE LENGTH

- b.1) Minimum length of straight tube in bending: at least 2 times the height of nut TN81 (H) (see Fig. 1)
- b.2) Minimum length of tube between two fittings: at least 2.5-3 times the height of nut TN81 (H) (see Fig. 2).



c) PREPARATION OF FITTING (LUBRICATION)

- c.1) Oil thread of nut TN 81, oil taper seat and thread of the fitting.
- c.2) Put ring AR3-FORM through up to the end of formed tube with the rubber side of the ring (protruding part) facing the tapered side of the fitting.

d) COLD FORMING OF TUBE WITH MACHINE RR-FORM

- Machine preparation



d.1) Choose the suitable forming tool according to material, diameter and thickness of tube.

ATTENTION! Check that forming tool is not dirty, worn out or damaged.

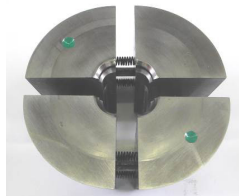


d.2) Use magnetic device to insert the forming tool.



d.3) Turn clockwise until hearing the sound that indicates that the bayonet cap is engaged.

d.4) Release the forming tool while keeping the magnetic device with one hand and turning handle clockwise with the other hand.



d.5) Select the suitable vice according to outer diameter and thickness of tube.

ATTENTION! Use a separate tool set for each type of material to avoid corrosion caused by contact with stainless steel tubes.

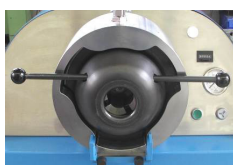


d.6) Check that tube vice is not dirty, worn out or damaged.

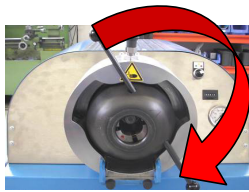
d.7) Use magnetic device to insert tube vice.



d.8) To release tube vice, release magnetic device first.



d.9) Manually lift tool connection with aid of the lever and insert it into bayonet cap.



d.10) Turn clockwise to lock bayonet cap.



d.11) Close up the locking pin on top of forming head.

- Tube forming

d.12) Switch ON machine RR-FORM.

ATTENTION! Press RESET button every time you switch on the machine.



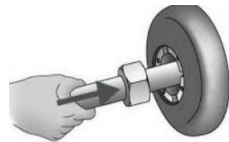
d.13) Machine RR-FORM resets its start position and vice closes. When RESET button is lit, the machine is ready to work.



d.14) Pressure is selected according to tube diameter:
Green: 300 bar for small diameter tube
Yellow: 500 bar for medium diameter tube
Red: 700 bar for big diameter tube

d.15) Make sure that tube end is free from burrs, chips or filth

d.16) Lubricate tube end internally and externally.

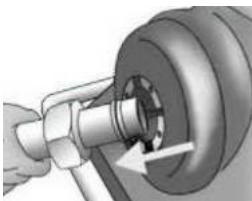


d.17) Place nut and anti-loosening tapered ring on tube and introduce tube end with nut into the open tool down to the stop.

d.18) Press tube end against stop.



d.19) Press START and keep button pressed until tube is damped. Instead of the START button, the pedal control can be used.

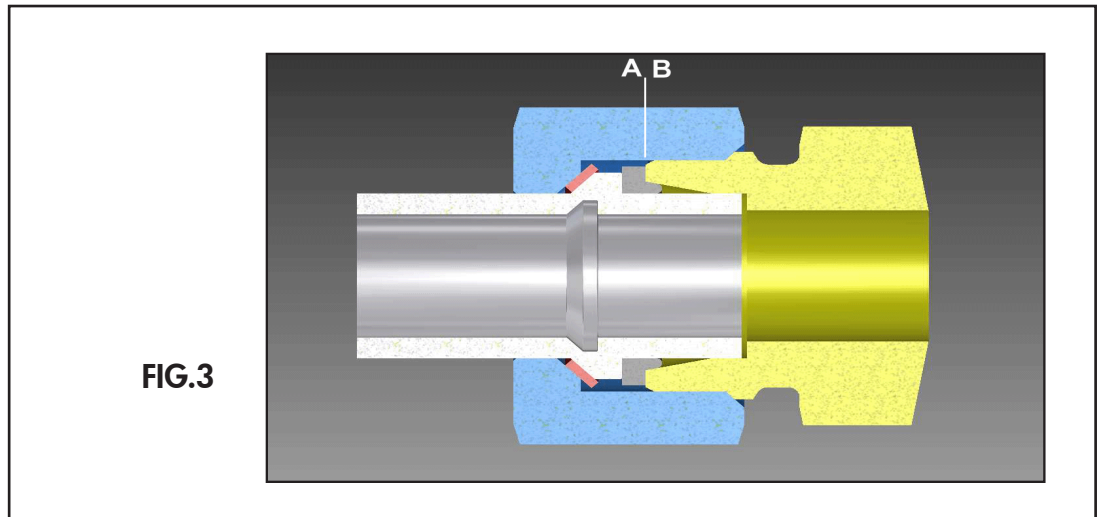


d.20) Take out formed tube after opening the tube vice.

d.21) The RESET button lights up and machine RR-FORM is ready for the next forming operation.

e) DIRECT ASSEMBLING ON FITTING BODY

- e.1) Introduce tube into the fitting down to the stop and manually tighten nut TN81 until it is completely clamped.
- e.2) Tighten nut TN81 until feeling a strong (sudden) resistance to clamping caused by the contact of surfaces A and B (AUTOMATIC CLAMPING) (see Figure 3). Check that tube is not turning with nut TN81.



f) CONTROL

- f.1) Loosen nut TN81 and check that surfaces A and B are perfectly in contact around their circumference.
ATTENTION! The disassembled tube ends shall be reassembled on the same fitting used for clamping.

g) RE-ASSEMBLING

- g.1) Every time the tube connection is disassembled, nut TN81 shall be re-tightened on the fitting with the aid of a NORMAL WRENCH in the same way as in the first assembling, applying the same torque, supporting the fitting with a second wrench.

6. TOOLS

It is important to match the tool with the tube size, that is its outer diameter and thickness. Therefore, the tool to use for tubes having the same diameter but a different thickness shall fit the thickness.

To the purpose of normalizing our set of tools, a number of standard, mostly used tools are available for the RR-FORM machine, marked in bold type.

Below the full range

TUBE VICE CODE	TUBE DIAMETER	TUBE THICKNESS	FORMING TOOL CODE
RR-FORM-M-06	6	1	RRFORMP06X1
		1.5	RRFORMP06X1,5
		2	RRFORMP06X2
RR-FORM-M-08	8	1	RRFORMP08X1
		1.5	RRFORMP08X1,5
		2	RRFORMP08X2
		2.5	RRFORMP08X2,5
RR-FORM-M-10	10	1	RRFORMP10X1
		1.5	RRFORMP10X1,5
		2	RRFORMP10X2
RR-FORM-M-12	12	1.5	RRFORMP12X1,5
		2	RRFORMP12X2
		2,5	RRFORMP12X2,5
		3	RRFORMP12X3
RR-FORM-M-14	14	2	RRFORMP14X2
		3	RRFORMP14X3
RR-FORM-M-15	15	1	RRFORMP15X1
		1.5	RRFORMP15X1,5
		2	RRFORMP15X2
RR-FORM-M-16	16	2	RRFORMP16X2
		2.5	RRFORMP16X2,5
		3	RRFORMP16X3
RR-FORM-M-18	18	1.5	RRFORMP18X1,5
		2	RRFORMP18X2
RR-FORM-M-20	20	2	RRFORMP20X2
		2.5	RRFORMP20X2,5
		3	RRFORMP20X3
		3.5	RRFORMP20X3,5
RR-FORM-M-22	22	1.5	RRFORMP22X1,5
		2	RRFORMP22X2
RR-FORM-M-25	25	2	RRFORMP25X2
		2.5	RRFORMP25X2,5
		3	RRFORMP25X3
		4	RRFORMP25X4
RR-FORM-M-28	28	2	RRFORMP28X2
RR-FORM-M-30	30	3	RRFORMP30X3
		4	RRFORMP30X4
		5	RRFORMP30X5
RR-FORM-M-35	35	2	RRFORMP35X2
		3	RRFORMP35X3
RR-FORM-M-38	38	3	RRFORMP38X3
		4	RRFORMP38X4
		5	RRFORMP38X5
		6	RRFORMP38X6
RR-FORM-M-42	42	2	RRFORMP42X2
		3	RRFORMP42X3

7. RECOMMENDATIONS

- With the plant in place, if the tubes are considerably long or submitted to particularly high stress, it is recommended to fasten and support the tubes with the clamps manufactured and supplied by RASTELLI. These clamps are made of polypropylene, Ultramid® polyamides and aluminium and are available in a wide size range.
- Vibrations of rubber tubes submitted to high pressure deserve special attention when fitting DIN 2353 is mounted on these tubes. In fact, the use of this fitting is officially restricted to steel tubes and the user is liable in case of accident.

8. MANUFACTURER'S LIABILITY

8.1 PRODUCT LIABILITY

RASTELLI RACCORDI is covered by a product liability insurance against any personal injury (including major damages) caused by its products.

However, according to D.P.R. 224/88 and Directive 85/374/EEC 1985, liability lies with the party that results to have handled the product with negligence.

The retailer, in turn, has the obligation to verify that customers are familiar with the operating mode and controls of the product.

The user is liable when he, though in possession of the operating instructions of the product, does not observe them, considering the same instructions unnecessary out of his personal opinion or superficiality.

Therefore, the legislation provides for a shared responsibility, because it is in the interest of all parties to prevent accidents and damages.

The Warranty of the manufacturer applies exclusively when all directions and precautions indicated in the Rastelli Catalogue/Handbook are observed. Failure to comply with directions may destroy the functional safety of products and lead to loss of Warranty rights.

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Measures and weights indicated in the tables herein are given as rough indication. RASTELLI RACCORDI reserves the right to make alterations in the look as well as in the technical and dimensional characteristics of its products.

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