B7

SKILL and BALANCE

ISO 8434-1/DIN 2353 connection

CAST®

B7

The challenge of the single product:

AISI 316 Ti stainless steel ring (1.4571)
11SMnPb37/30 carbon steel ring

Three metal-to-metal sealing systems on a single bearing element that interact with each other, forming an original, innovative and reliable product.

Industrial patent pending at the deliberating bodies.

B7

Innovation and development:

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The technical objective:

The product we are presenting was created on the basis of an in-depth analysis of “known techniques” (patents), including some from CAST SpA, dated 1970 - 1974 - 1975 - 1986 and 1996, integrated with innovative geometric solutions, structural, thermal and dynamic, which allowed the achievement of the following objectives:

- *Joints without leakages and sweating, even in presence of particularly severe working conditions due to pressure and vibrations.*
- User friendly Simplified assembly, you can keep using the same tools to ensure proper functionality.
- *A variable geometry cutting ring with metal-to-metal seal, and no use of elastomeric components.*
- *Possibility of use on stainless steel electro-joined pipes with reduced wall in agreement with the manufacturer*
- Enhanced cutting ring clamping to the steel pipe, so to avoid any possibility of the tube being pulled out of the system.
- *A single one-piece element reducing the assembly costs of the system and the number of spare parts.*
- Total traceability of the product by means of the coding on the ring for the assumption of liability.
- *Improvement of the current state of the art for customer satisfaction and safeguarding the environment.*
- A reliable, innovative, recognizable, ecological product, with 100% recovery of the material used.
- *Confirmation of interchangeability with iSO 8434-1 / DIN 2353.*

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The advantages:

SAFETY

- Multi-cutting ring which, thanks to ingenious constructive design, upon deformation for clinching the pipe, is transformed into a multi-cutting ring with four cutting parts that clinch the pipe, for tightening in a fully reliable and anti-slip manner, increasing the safety coefficients compared to the state of art.
- Simplified pre-assembly, carried out automatically or manually up to the mechanical stop, avoids any possibility of error. The final closure of the joint on the machine/system will also be completed without the possibility of non-compliance with the simple respect of the prescribed values in Nm or the specified tightening torques.
- A check, in 100% of cases, of correct clinching of the steel pipe by the cutting ring “B7” as per the ISO 8434-1, DIN 3859-2 and CAST standards, also confirms the exceptional characteristics of the “B7”.
- Absolute water-tightness and no moisture, to guarantee non-slipping of the pipe, thanks to the implementation of the metal-to-metal seals and clinching points on the pipe.

TECHNIQUE

- Total interchangeability with all products in accordance with ISO 8434-1 / DIN 2353.
- Repeatability of assembly without any mechanical or sealing problems.
- Three metal-on-metal sealing systems placed on a single element, each interacting with the others thanks to the particular geometry, in the pre-assembly phases as well as in the final assembly on the machine.
- Seven metal-to-metal sealing points, three of which for external sealing and four for internal sealing (pipe clinching), are evidence of the precision of design and the brilliant result obtained.
- Small mechanical settlements may be recovered thanks to the flexibility and advanced geometry of the cutting ring, combined with the cohesion of the ring, tube, tightening nut and the fitting body.

MATERIALS

- The new ring “B7” can be mounted on carbon steel products as well as stainless steel products, using the same equipment and the same methods, and is particularly suitable for use on electro-joined stainless steel pipes with reduced tees.
- A single technological element for a correct cost reduction.

CLINCHING

In the context of this project, the geometry of the “B7” ring has been optimized with the implementation of two to four clinching points for the cutting ring on the steel pipe, making this operation safe for people, the environment and industrial plants.

SEALING
The seals, all metal-to-metal, have been increased from four to seven to make the sealing system completely watertight, ideal for structures with high temperatures and fire protection systems.

ANTI-UNTHREADING
The increased clamping points to the steel pipe of the multi-cutting edged ring “B7”, and the stop shoulder of the ring in contact with the fitting body, make the connection strong as a single piece which, combined with the anti-vibration characteristics of the ring, prevent self-unscrewing of the tightening nut.

VIBRATIONS
The unique geometry of the new “B7” multi-cutting ring guarantees the damping of system vibrations making it safer, as they are distributed over the entire working area of the tube-cutting ring.

PRE-ASSEMBLY
Pre-assembly can be carried out in a certain and safe way as it is simplified. It is sufficient to bring the stop shoulders of the cutting ring “B7” into contact with the front of the product used - fitting-pre-assembly tool-mandrel - to complete the operation properly. A sudden increase in the tightening torque indicates this condition is achieved.

PRE-ASSEMBLY CHECK IN 100% OF CASES
The peculiar characteristics of the new “B7” ring simplifies the check of the clamping of the ring to the steel pipe according to ISO 8434-1, DIN 3859-2 and CAST as follows: unscrew the nut, visually make sure that the stop shoulder of the cutting ring is in contact with the front of the fitting or tightening block, remove the pipe and check that the cutting ring “B7” is anchored to the steel pipe. If the ring moves longitudinally, the pre-assembly is not compliant, it cannot be used and must be repeated. It is a simple and objective check.
The axial rotation of the ring is normal and does not create any problem.

ASSEMBLY
Assembly can be carried out in accordance with ISO 8434-1 / DIN 3859-2 with no risk of confusing the standard rings with the new ring as the geometry of the cutting ring “B7” is totally different and makes it instantly and perfectly recognizable.

B7

The solution:

11SMnPb37/30 carbon steel ring

- **New cutting ring with seven seals.**
- **Made in carbon and stainless steel.**
- **Technology at the service of man.**

Industrial patent pending at the deliberating bodies.

B7

The solution:

AISI 316 Ti stainless steel ring (1.4571)

- **Three external metal-to-metal sealing points, 1-2-3.**
- **Four internal metal-to-metal sealing points, 4-5-6-7.**
- **Interchangeable with ISO 8434-1 / DIN 2353.**

Industrial patent pending at the deliberating bodies.

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OUTLINE DIAGRAM

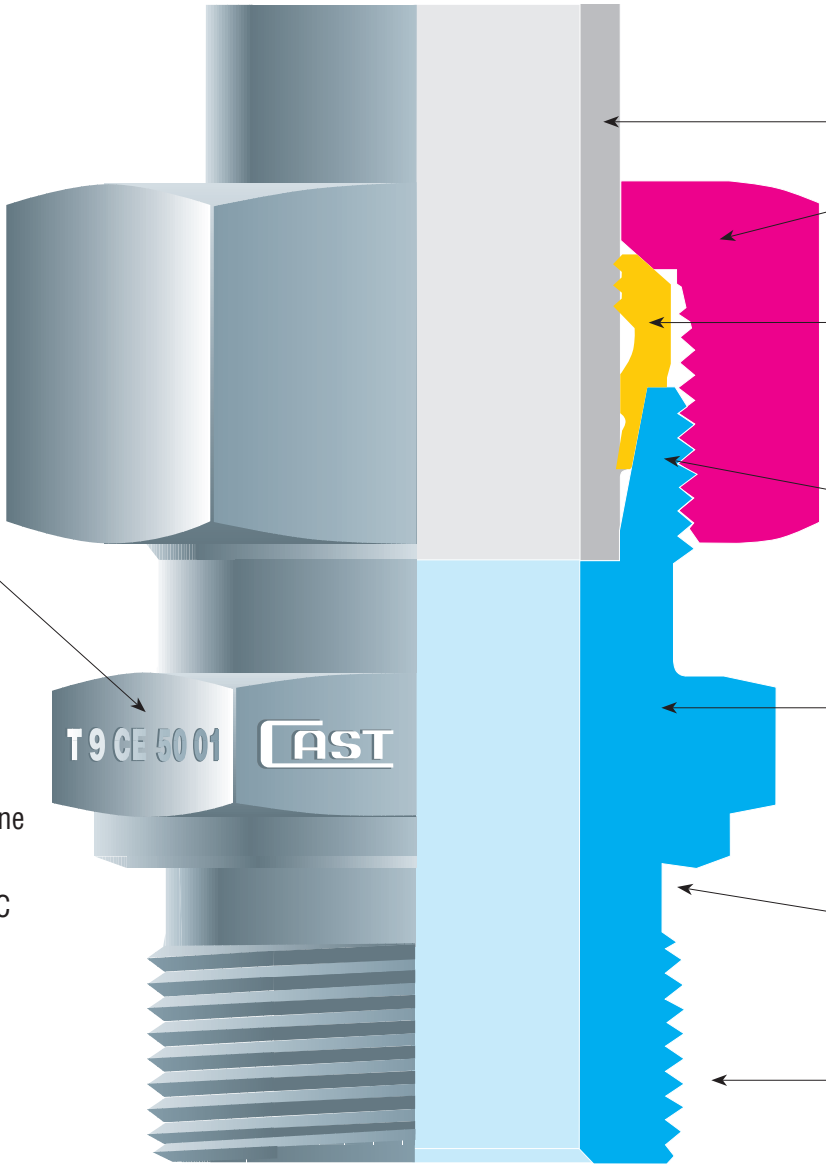
"B7" is a brand new type of multi-cutting ring with five clinchings and seven metal-to-metal seals depending on the diameter used, with cold deformation during tightening of the thrust nut.

It is assembled according to known techniques and is perfectly interchangeable with all types of cutting rings used on fittings with 24° cone conforming to ISO 8434-1 / DIN 2353.

The ring "B7" allows you to quickly create removable pipes and avoids welding, threading and flaring, greatly simplifying the concept of the system of rigid pipes on board the machine.

During tightening caused by the nut in the pre-assembly phase, the front part of the ring deforms according to the bore of the 24° cone of the fitting and penetrates the steel pipe causing a deep and visible incision for lifting an external edge on the diameter of the steel pipe in use. Subsequently, the stop shoulders on the head of the ring will come into contact with the front of the fitting body, creating the end of the preassembly. Assembly of the pre-assembled pipe on the machine / system will require further tightening of the nut to complete clinching of the cutting ring at the back, with two or three other clinchings/seals on the steel pipe depending on the diameter used, ensuring absolute safety of the assembly.

DIN 2353 JOINT SYSTEM



Reference requirements:

- Pipe E 235 EN 10305-4
- Nut DIN 3870
- Cutting Ring "B7" Interchangeable DIN 3861- B
- Form of the seat DIN 3861
- Fitting body ISO 8434-1
- Seat of metal-to-metal seal ISO 1179-4
- Threaded end ISO 1179-4

Decoding of traceability:

FAST = producer

- T = Production site
- 9 = Anno di fabbricazione
- CE = Produced in the EEC
- 50 = Type of steel used
- 01 = Casting no of the steel used

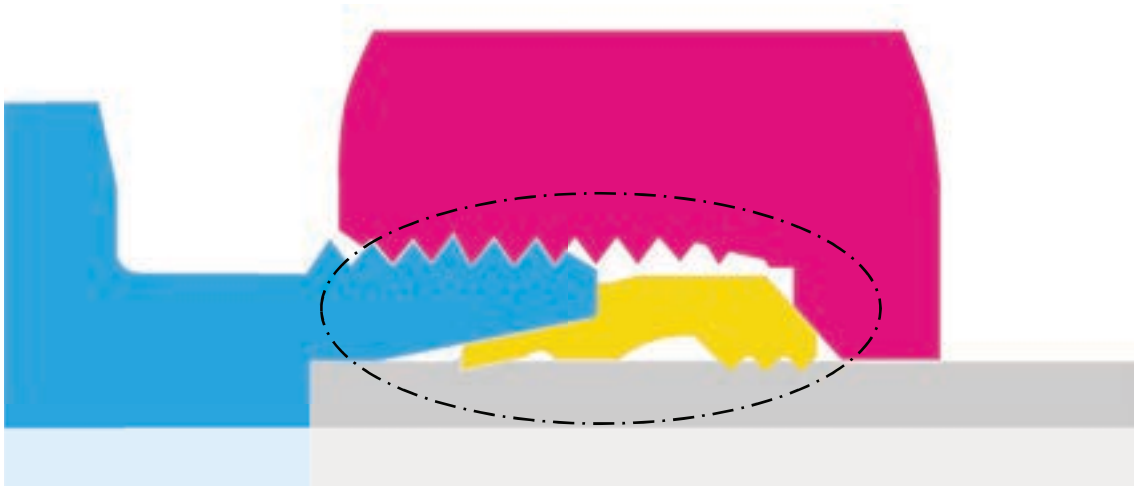
INNOVATIVE CONTENT

Over the years, the market has increasingly demanded components for hydraulic systems that can meet four key requirements: SECURE CLINCHING, SIMPLICITY OF ASSEMBLY, WATERTIGHT SEALS, AND THE AVOIDANCE OF SUBJECTIVE CHECKS THAT CAN POSE A SAFETY RISK.
These elements, now indispensable for occupational safety (Legislative Decree 81/08), for product liability (Presidential Decree 224-EEC 85/374) and for the entire environmental and ecological guarantee system, led us to create the new ring “B7” which solves the aforementioned issues at the source, also with an objective check of clinching of the ring on the steel pipe.

To realize on a single component, several fastenings / sealing points, strictly metal on metal, distributed over the entire “B7” variable geometry cutting ring.
The front part takes care of the pre-assembly, the central part stop shoulder adjusts the depth of the incision of the first cutting edge on the external diameter of the steel pipe and automatically determines, with a sealing stop, the end of the pre-assembly and protection of the 24° conical seat of the ISO 8434-1 / DIN 2353 fitting.
The rear part, during the final assembly on the machine / plant, makes two or three further incision / sealing points, depending on the diameter of the pipes used, ensuring the absolute sealing of the complete system.

Before assembly on the metal pipe

After assembly on the metal pipe



Force range after assembly

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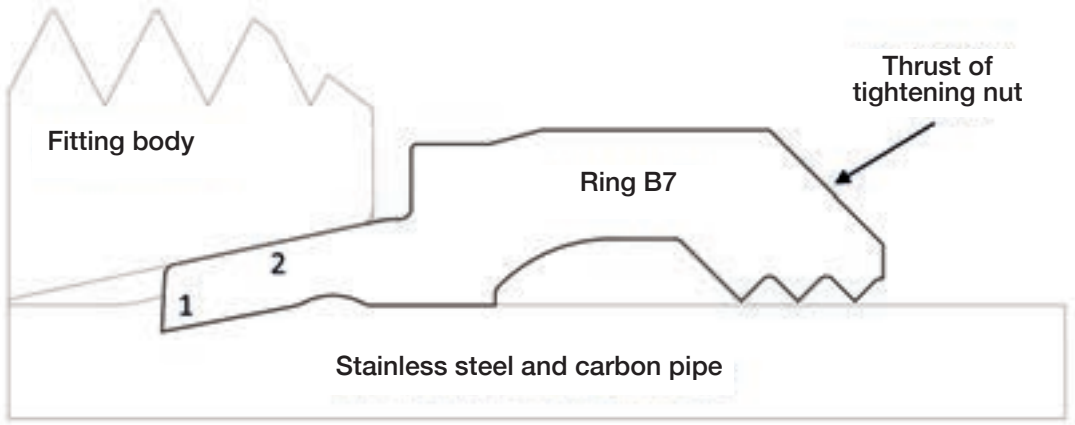
PRODUCT DEVELOPMENT

The improvement of the “B7” cutting ring, consists in having designed three multiple sealing / clamping points on a single base body, with sequential variable geometry which, although starting from a single thrust point, created by the tightening nut, allows ‘’ B7 ‘’ ring to obtain more sealing / clamping points in different areas of the steel pipe, according to a predefined designed sequence.

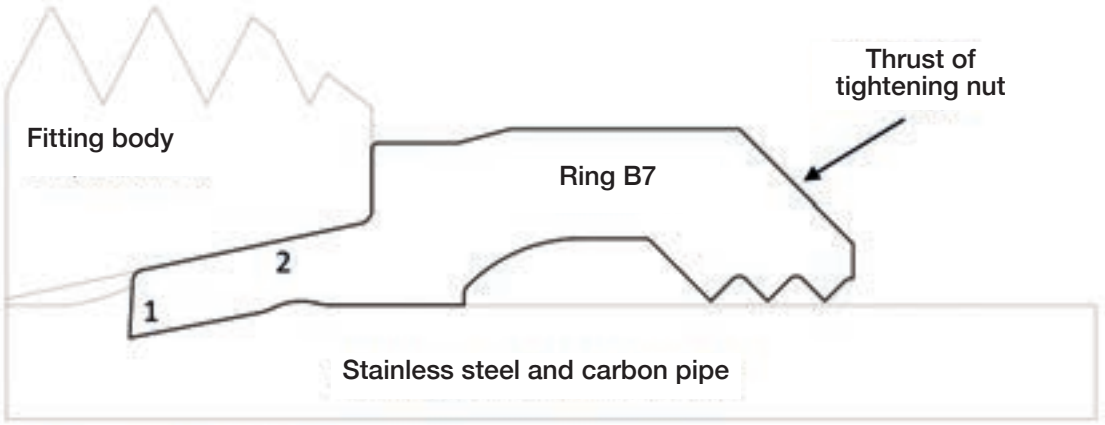
PHASE 1 PRE-ASSEMBLY - CLINCHING AT THE FRONT



Sealing points “B7” 1 – 2

The particular and sophisticated geometric structure of the ring “B7”, subjected to the thrust of the tightening nut, permits clinching at the front for pre-assembly on the steel pipe (Phase 1).

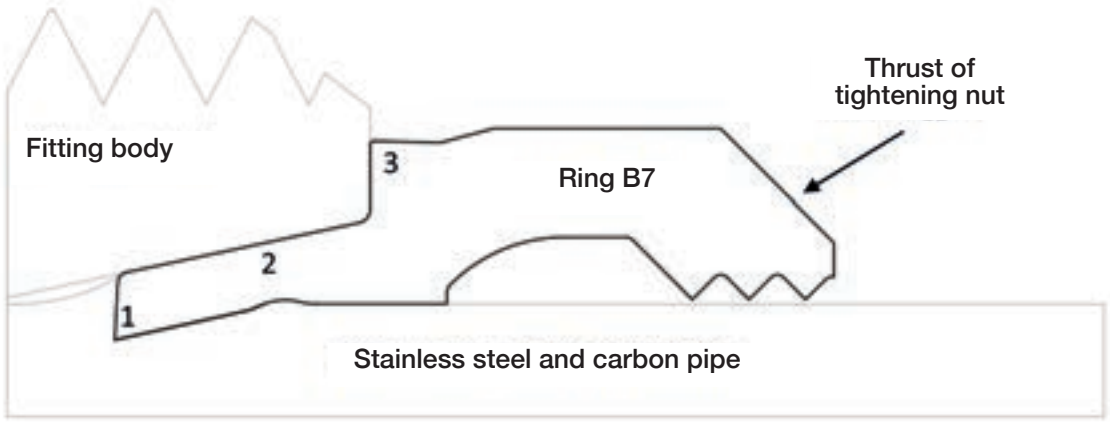
PHASE 2 PRE-ASSEMBLY - MECHANICAL STOP



Sealing points “B7” 1 – 2

Continuing with the thrust of the tightening nut, the stop shoulder of the ‘’ B7 ‘’ ring comes into contact with the front of the fitting body and determines the end of the anterior pre-assembly. This condition is announced by a sudden increase in the tightening torque (Phase 2).

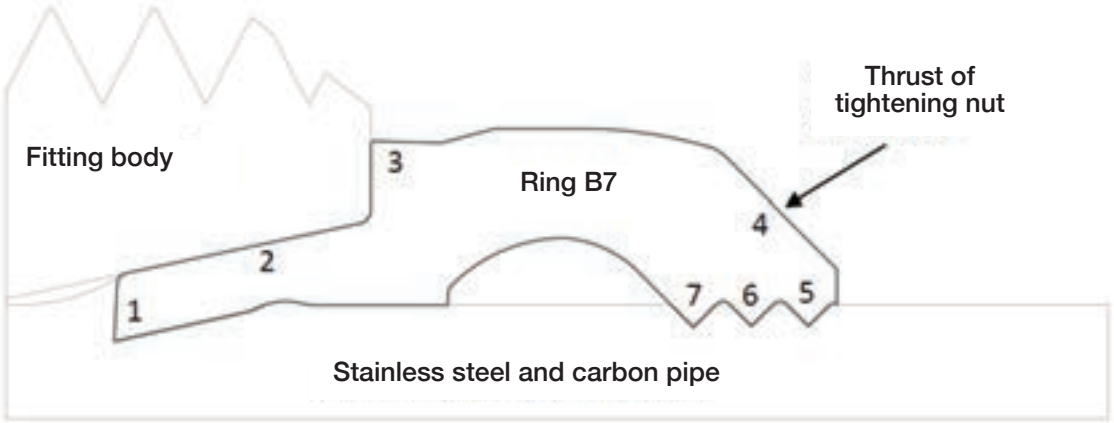
PHASE 3 ANCHORING - FRONT FITTING



Sealing points "B7" 1 – 2 – 3

Still under the thrust of the tightening nut, the stop shoulder of the ring comes into contact with the front of the fitting body, creating an important sealing point on the outside of the joint system. By tying the nut, ring and fitting body components, it limits the deformation of the 24 ° conical seat of the ISO 8434-1 fitting (Phase 3).

PHASE 4 FINAL ASSEMBLY - REAR CLINCHING



Sealing points "B7" 1 – 2 – 3 – 4 – 5 – 6 – 7

The particular shape of the back part of the cutting ring with multiple clinchings of sequential variable geometry, under the normal thrust of the tightening nut, will complete closure of the rear clinching or final fitting, thanks to a controlled deformation, limited by the penetration of the differentiated clinchings (5 - 6 - 7, Phase 4).

One single body, for two rings that work separately and in different times, according to a mathematical sequence, which creates an innovative product which will allow to simplify the control of the clamping of the ring to the steel pipe, making it finally objective.

The exceptional technical performance, the ease of use, the confirmed interchangeability with the components according to ISO 8434-1 / DIN 2353, makes the new ring "B7" an exceptional product which will positively change the technology and costs of hydraulic systems.

The distribution of the forces necessary for clinching of the cutting ring on the steel pipe over the entire length of the cutting ring, allows for the use of steel pipes with reduced walls/flanges, especially in the case of stainless steel pipes, and absorbs the vibrations deriving from the system.

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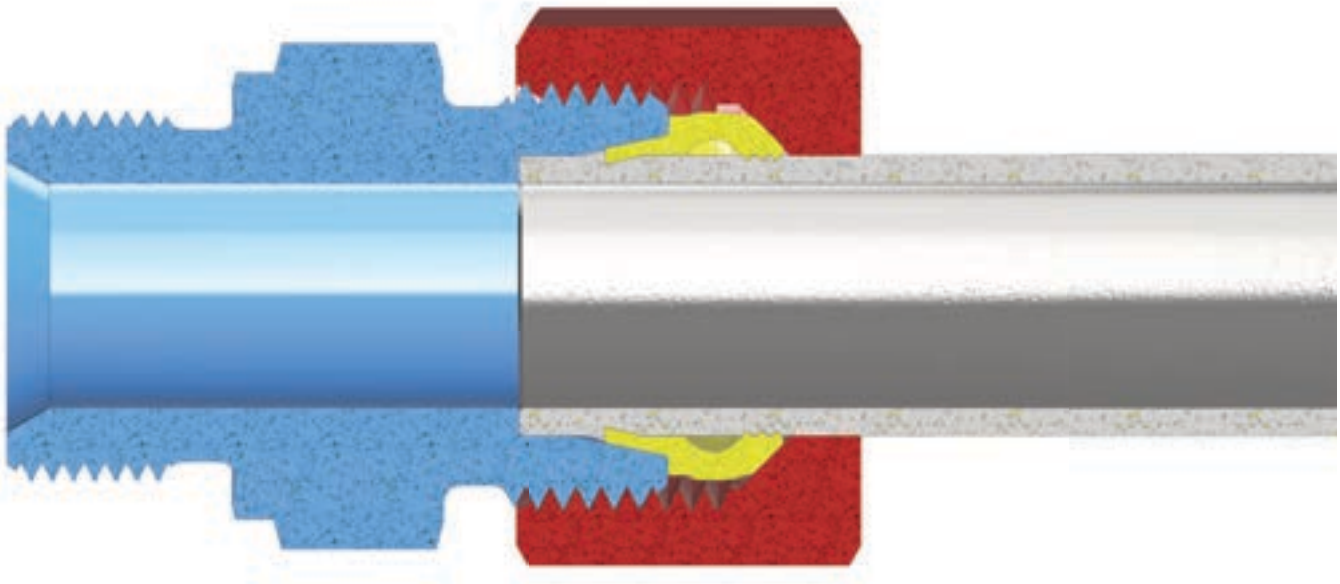
USEFULNESS OF THE PRODUCT

Solving the problem of simplifying the control of the correct clamping of the ring to the pipe and making it objective, is an important step forward to avoid the serious consequences of the slipping of the ring from the steel pipe. The new `` B7 '' ring makes the entire pre-assembly and final assembly process automatic and objective, guaranteeing the safety of the entire hydraulic system, in compliance with the tightening values stated by the manufacturer. The '' B7 '' has exponentially enhanced the fastenings between ring and steel pipe, creating optimal safety conditions. The same thing happened for the external sealing points. The "B7" makes it possible to use stainless steel electro-welded pipes with thin wall section, with a previous agreement with the manufacturer and with the preventive definition of the technical operating characteristics of the system.

TECHNICAL FEATURES

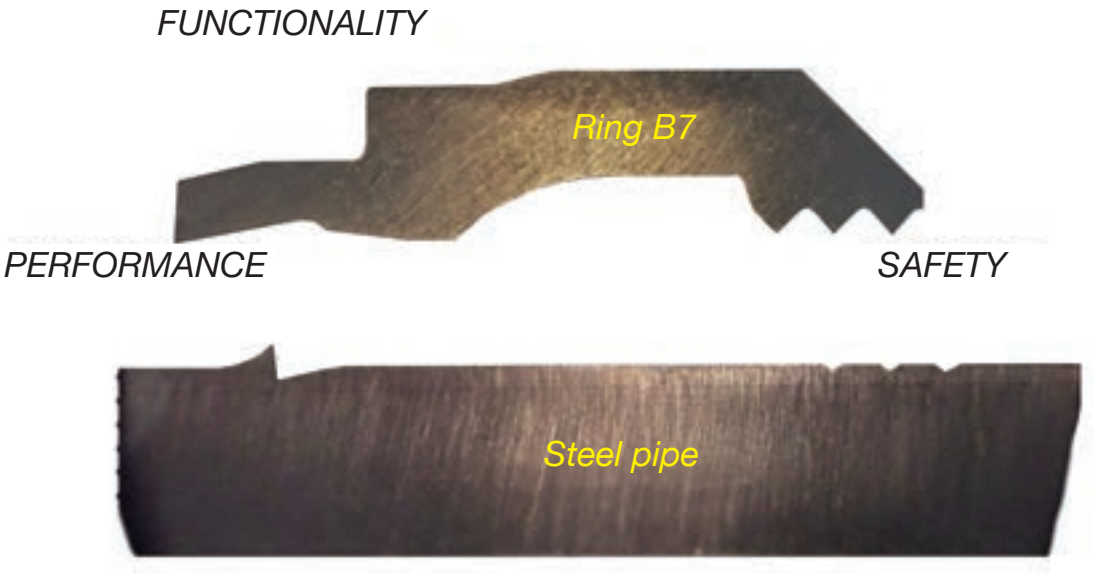
The "B7" guarantees perfect sealing of the circuit, regardless of the fluid used, as long as no corrosive fluids are used and the nominal pressures of the fittings are respected. The products on which the rings "B7" are mounted are built in two series, which are used according to the required operating conditions. Light "L" series, for systems with medium-high pressures, maximum above standard pressure of 500 bar. Heavy "S" series, for heavy duty use, with high temperatures and a maximum above standard pressure of 800 bar. Normal vibrations do not alter the performance of the "B7" which, even at maximum values, maintains its optimal characteristics, as a ring of absolute guarantee. The pressure values indicated refer to components made of carbon steel. For the pressure values of components in stainless steel, see the table on p. 20.
The tightening of the cutting ring's front part, realizes the clamping of the ring to the pipe, while the contact between the stop shoulder of the ring and the front of the fitting body determines the end of the pre-assembly. The final assembly on the machine/system, performed according to the torque and/or angle values set by the manufacturer, determines the tightening of the cutting ring's rear part to the pipe and automatically completes the installation of the system, ensuring its functionality.

SECTION OF THE SYSTEM



TALENT AND INGENUITY

The new “B7” sequential variable geometry cutting ring is a true technical, economic, technological, safe, simple and original masterpiece, with exceptional performances which solves a wide variety of existing problems in hydraulic systems including an objective pipe incision control, assembly simplification, substantial economic savings, improved competitiveness in the globalized world as well as a new ecological approach that can no longer be postponed to protect all of us and the future generations.



WATER-TIGHTNESS

The “B7” ring is a multi-cutting metal-to-metal seal ring, which doubles during use even in the case of a single base body. The innovative geometry of the new cutting ring has made it possible to create a type of water-tightness that is truly certain, safe and optimal. The transition from four sealing points to as many as seven sealing points makes for an especially strong seal. Metal-to-metal seals set no limits to the use of this extraordinary ring.

QUALITY ASSURANCE ACCORDING TO UNI EN ISO 9001:2015

The Quality Assurance System complies with the UNI EN ISO 9001:2015 standard, certificate (N.90/94/S) issued by the RINA certification body recognized at European level by the IQNET.
At the request of the purchasing body, our Quality Service issues certificates of origin relating to the materials used in the construction of the parts supplied.
The technicians of the Quality department are at your disposal at any time to offer their advice, to show you around our facilities, metrology room and dynamic and destructive testing room, and to tell you about the traceability system used for all our product ranges.

STANDARD TESTING

The CAST fittings, in addition to the normal dimensional checks made during the machine processes, the on-the-spot checks of the finished products, and the practical tightness and fatigue tests, are tested for the efficiency of coupling between the various component parts. At the request of the purchasing body, our Testing Service issues the certificate of the tests performed: dimensional and geometric control, static seal at low and high pressure, dynamic seal at high pressure (maximum operating pressure + 33%) according to ISO 19879, ISO 6803 and ISO 1402.
At the request of the Client, tests and related certifications are carried out by various Third Parties including: RINA - DVGW - Lloyd's of Shipping - Det Norske veritas - American Bureau of Shipping (to be specified when ordering).

SAFETY FACTORS

"B7" solves the problem of safety, since double clinching, at the front and rear of the incisions on the steel pipe (obtained by means of a particular geometry of the ring) automatically determine values of absolute functional guarantee between the ring, the steel pipe and the fitting body, ensuring the integrity of the 24° seat of the fitting body.
In fact, while on the one hand we increase the safety of anchoring, on the other we set a precise mechanical limit to incision of the pipe, with the certainty of correct functionality even in case of excessive closure of the joint. It is understood that the reliability of our products is guaranteed only if they are interconnected entirely with parts provided by us.
CAST production fully respects the construction parameters of the standard of reference.
The operating temperature is between -40°C and + 120°C for carbon steel and between -60°C and + 200°C for stainless steel. The nominal operating pressures (bar) shown in the catalogue represent the maximum allowed pressures (including pressure peaks). The safety factor of 4:1 must be understood with static load and with the temperature at the indicated values. To use characteristics higher than the values indicated, or to use components that do not comply with the standard, it is imperative to carry out tests relating to the intended use, in agreement with the manufacturer. The latter requirement must be observed.

TEST ROOM

PRODUCT LIABILITY, PRESIDENTIAL DECREE 224-EEC 85/378

The CAST company declines all responsibility if the user does not strictly and fully apply the following: STANDARD OF USE - ASSEMBLY INSTRUCTIONS - REQUIRED OPERATING PRESSURES. Failure to comply with these requirements can compromise the functional safety of the products and render the warranty null and void.

STANDARD OF USE

Before starting pre-assembly or fitting of a hydraulic system, check that all the equipment and materials to be used are in good working order. The checks must be carried out after every 45-50 tightening processes.
Use the appropriate buffers and control instruments, and replace anything that is not compliant.

CARBON STEEL FITTING

To ensure correct use and the technical performance of the carbon fitting, it is essential to use high quality pipes. The use of a pipe that does not correspond to the stated characteristics can greatly compromise the performance of the same fitting. Our company recommends using exclusively: cold drawn and seamless calibrated pipes, normalized with inert gas, in E 235 material according to EN 10305-4 (ST 37.4 according to DIN 1630 / DIN 2391). The maximum allowed hardness, measured on the external diameter of the pipe, is 75 HRB.
The ring “B7” allows you to mount all the fittings of the light and heavy series directly on the machine, provided that all the instructions on pages 18-19 of this catalogue and pages 15-16 -17-18-23-24 and 25 of this technical newsletter are respected.
Particular care must be taken when fitting un-annealed shank fittings; these must always be pre-assembled on a hardened pre-assembly tool with a 24° cone, lubricating the threads of the nut and fitting and the friction surfaces of the ring.

STAINLESS STEEL FITTING

To ensure the correct use and technical performance of the stainless fitting it is essential to use high quality pipes. The use of a pipe that does not correspond to the stated characteristics can greatly compromise the performance of the same fitting. Our company recommends using exclusively: polished, cold drawn and seamless calibrated pipes, in material 1.4571 according to UNI EN 10216-5 tab.6 or ASTM 269, with dimensional tolerances according to EN 10305-1. The maximum allowed hardness, measured on the external diameter of the pipe, is 85 HRB. Electro-joined pipes can also be used upon agreement with manufacturer, provided that they comply with the mechanical tolerances of the aforementioned standards and the relative hardness.
The ring “B7” can be mounted on pipecatalogue s measuring up to Ø12 mm directly on the machine, provided that all the instructions on pages 18-20 of this and pages 15-16 -17-18-23-24 and 25 of this technical newsletter are respected. For assembly of all other diameters, use hardened tools.
Particular care must be taken when fitting un-annealed shank fittings; these must always be pre-assembled on a hardened pre-assembly tool with a 24° cone, lubricating the threads of the nut and fitting and the friction surfaces of the ring.

LUBRICATION

Correct lubrication of the components involved in tightening is essential to ensure proper functioning of the system: mineral oil for carbon fittings, anti-seize compound for stainless fittings.

GENERAL INSTRUCTIONS

During the entire tightening phase, it is essential that the pipe is in contact with the internal shoulder of the fitting body; otherwise, the ring advances with the pipe instead of cutting it, creating a defective coupling that must necessarily be redone, as it is not functional. Rotation of the ring on itself, once tightened, is not the sign of a defect, but evidence only of correct elasticity of the ring. The pressures indicated in the catalogue are valid only for steel pipes.
If you wish to use thin-walled pipes, particularly malleable pipes or pipes in RILSAN or similar, it is possible to do so, provided that the relative pressure sleeve is inserted in the terminal part of the pipe, which is being clinched, and reduces the pressure of use. The pressure sleeve must be inserted to use the above materials.
Before connecting the pre-assembled pipe to the machine’s on-board system, it is necessary to check the alignment between the pipe and the fitting. The fittings must not be used to correct misalignment or to support the pipes. Long or heavily stressed pipes must be fixed with brackets in order to avoid excessive vibrations. Misalignment can compromise the functionality of the system.

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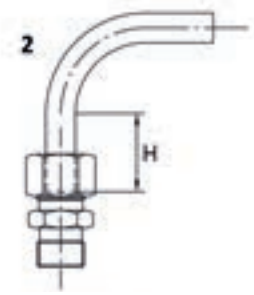
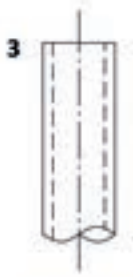
ASSEMBLY INSTRUCTIONS

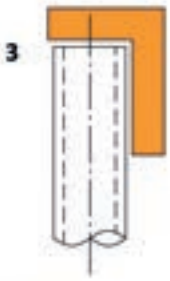
1. Before starting pre-assembly, make sure that all the tools to be used are in perfect working order. Replace any that are non-compliant.
2. The segment of the pipe where pre-assembly is to be carried out must have a straight part at least twice the length of the nut (length H). The roundness must comply with DIN 2391/ EN 10305.
3. Cut the pipe at a right angle using the appropriate hacksaw (do not use roller pipe cutters). Check that the cut is made correctly at 90°. Gently remove the internal and external burrs.
4. Lubricate the thread of the nut, the cutting ring, the 24° seat and the thread of the body with appropriate products (See 4)
5. Fit the nut and the cutting ring on the pipe as shown; the larger diameter of the cutting ring with the traceability codes must face the inside of the clamping nut.
6. Pre-assembly: insert the pipe into the cone at 24° until it rests on the stop of the fitting. Tighten the nut with the wrench or torque wrench, without letting the steel pipe turn, until the stop shoulder of the ring comes into contact with the front of the fitting or block, depending on what is used. This condition is signaled by a sudden increase in the tightening torque.
7. One hundred percent pre-assembly check according to ISO 8434-1, DIN 3859-2 and according to CAST as follows: unscrew the nut, visually make sure that the stop shoulder of the cutting ring is in contact with the front of the product used (fitting or block), remove the pipe and check that the “B7” cutting ring is blocked on the steel pipe. If the ring moves longitudinally, the pre-assembly is not compliant, it cannot be used and must be redone. The rotation of the ring on its axis is normal and doesn’t create any functional problems.
8. Once pre-assembly has been carried out, fit the pipe on the machine/system, tightening the nut with the torque wrench until it reaches the value set by the manufacturer in Nm according to the table, series and type of material used, checking that the pipe is correctly aligned with the axis of the fitting and preventing its rotation.
9. In the absence of a torque wrench, fit the pre-assembled pipe on the machine/system as follows: fit the pipe into the 24° seat of the fitting body, tighten the nut with the wrench until the joint is compacted and perform final tightening of the nut as the fraction of a turn specified by the manufacturer from this point tighten with a further 1/4 turn.



Minimum length

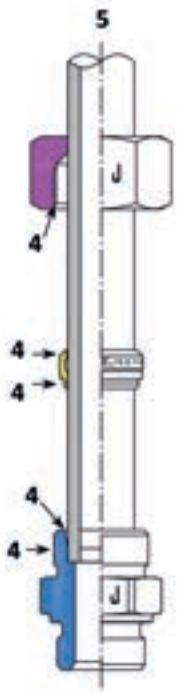


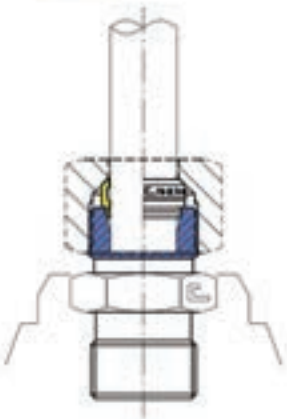
Cutting of pipe with hacksaw

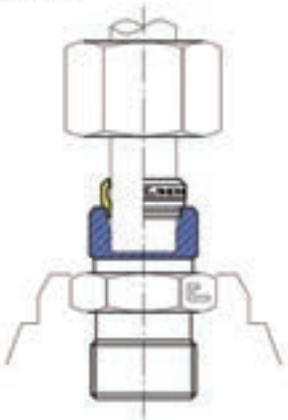


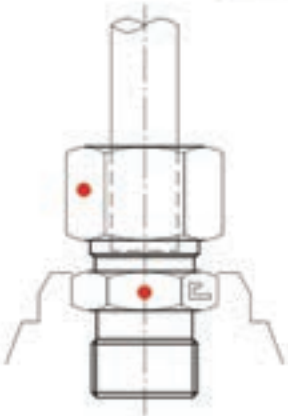
Cut control

Slight burr




End of pre-assembly


Pre-assembly check


Final assembly
pages 19 - 20

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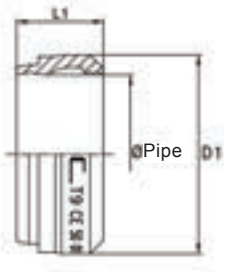


CUTTING RING

Type: 1001… 7 in carbon steel

Series	PN [Bar]		Carbon order	Ø Pipe	L1	D1	Tightening - stainless steel		
							Pre-assembly	Final assembly	
	Standard ISO 8434-1	Above Standard					Stop shoulder contact	Nm	Turns of nut
L	250	500	100104.7	6	9,5	10	End of operation	32	1/4
			100105.7	8	9,5	12	End of operation	45	1/4
			100106.7	10	10	14	End of operation	45	1/4
		400	100107.7	12	10	16	End of operation	85	1/4
			100108.7	15	10	19	End of operation	105	1/4
	160		100109.7	18	10	23	End of operation	170	1/4
		250	100110.7	22	10,5	27	End of operation	250	1/4
	100		100111.7	28	11	33	End of operation	370	1/4
			100112.7	35	13	41	End of operation	590	1/4
			100113.7	42	13	48	End of operation	660	1/4
S	630	800	100104.7	6	9,5	10	End of operation	35	1/4
			100105.7	8	9,5	12	End of operation	55	1/4
			100106.7	10	10	14	End of operation	55	1/4
		630	100107.7	12	10	16	End of operation	90	1/4
	400		100118.7	14	10	19	End of operation	140	1/4
			100119.7	16	10,5	21	End of operation	170	1/4
		420	100120.7	20	12	26	End of operation	280	1/4
			100121.7	25	12	32	End of operation	500	1/4
	250		100122.7	30	13	36	End of operation	620	1/4
			100123.7	38	13	44	End of operation	780	1/4

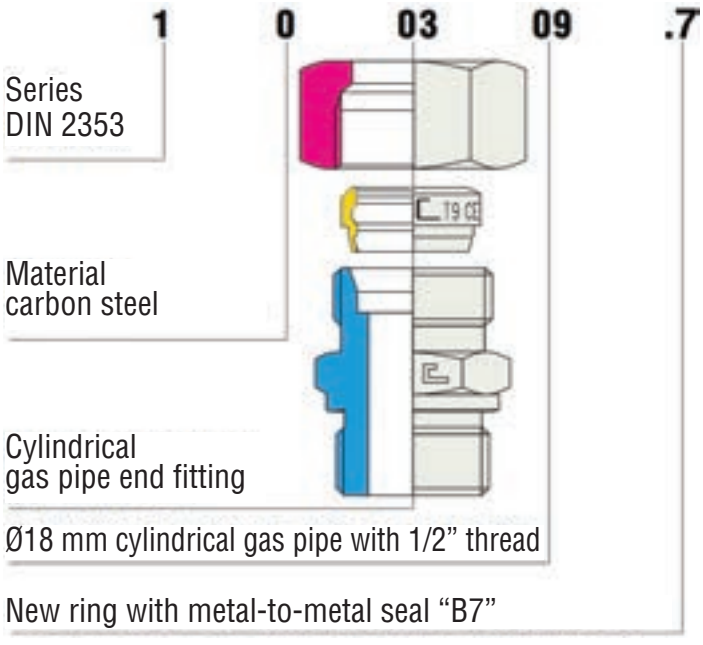
The ring “B7” is assembled in the same way and with the same equipment used for the other cutting rings in accordance with ISO 8434-1/DIN 2353.

Repeated assemblies of the system may be performed without damaging the parts involved. The ISO 19879 standard provides for a maximum of six reassemblies of the same parts, to be carried out on the same inlet, increasing by 5° of a turn at each further closure. During the pre-assembly phase, the tightening of the nut brings the ring shoulder surface in contact with the front of the fitting or of the block, depending on what is used, calibrating the incision of the first cutting edge.

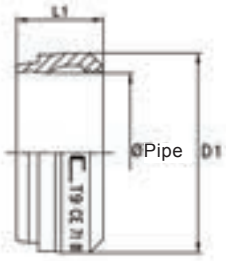
During the final fitting phase on the machine/system, the nut is tightened according to the values of the tables prepared by the manufacturer in Nm or fraction of turn of the nut, in order to complete clinching of the multi-cutting ring on the steel pipe used, guaranteeing all the metal-to-metal seals necessary for water-tightness and safety.

• **EXAMPLE OF ORDER**

If you wish to have a straight end fitting for an Ø18 mm cylindrical gas pipe with 1/2” thread in carbon steel with the ring “B7”, ask for:



B7



CUTTING RING

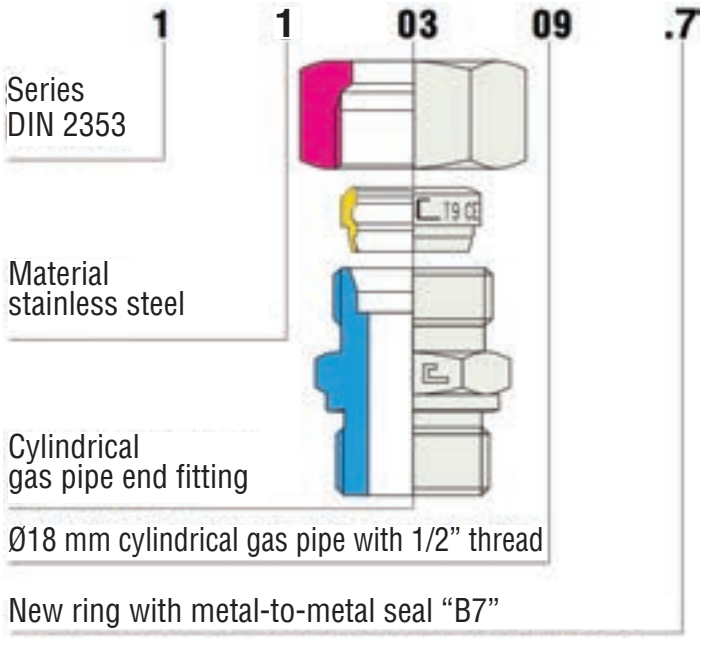
Type: 1101… 7 in stainless steel

Series	PN [Bar] Standard ISO 8434-1	Above Standard	Stainless Steel order	Ø Pipe	L1	D1	Tightening - stainless steel		
							Pre-assembly	Final assembly	
							Stop shoulder contact	Nm	Turns of nut
L	250	315	110104.7	6	9,5	10	End of operation	50	1/4
			110105.7	8	9,5	12	End of operation	85	1/4
			110106.7	10	10	14	End of operation	115	1/4
			110107.7	12	10	16	End of operation	160	1/4
			110108.7	15	10	19	End of operation	210	1/4
	160		110109.7	18	10	23	End of operation	350	1/4
		160	110110.7	22	10,5	27	End of operation	520	1/4
	100		110111.7	28	11	33	End of operation	550	1/4
			110112.7	35	13	41	End of operation	1100	1/4
			110113.7	42	13	48	End of operation	1500	1/4
S	630	630	110104.7	6	9,5	10	End of operation	85	1/4
			110105.7	8	9,5	12	End of operation	130	1/4
			110106.7	10	10	14	End of operation	140	1/4
			110107.7	12	10	16	End of operation	200	1/4
			110118.7	14	10	19	End of operation	310	1/4
	400	400	110119.7	16	10,5	21	End of operation	350	1/4
			110120.7	20	12	26	End of operation	560	1/4
			110121.7	25	12	32	End of operation	700	1/4
	250		110122.7	30	13	36	End of operation	1100	1/4
		315	110123.7	38	13	44	End of operation	1600	1/4

The ring “B7” is assembled in the same way and with the same equipment used for the other cutting rings in accordance with ISO 8434-1/DIN 2353.
Repeated assemblies of the system may be performed without damaging the parts involved. The ISO 19879 standard provides for a maximum of six reassemblies of the same parts, to be carried out on the same inlet, increasing by 5° of a turn at each further closure. During the pre-assembly phase, the tightening of the nut brings the ring shoulder surface in contact with the front of the fitting or of the block, depending on what is used, calibrating the incision of the first cutting edge.
During the final fitting phase on the machine/system, the nut is tightened according to the values of the tables prepared by the manufacturer in Nm or fraction of turn of the nut, in order to complete clinching of the multi-cutting ring on the steel pipe used, guaranteeing all the metal-to-metal seals necessary for water-tightness and safety.

• EXAMPLE OF ORDER

If you wish to have a straight end fitting for an Ø18 mm cylindrical gas pipe with 1/2” thread in stainless steel with the ring “B7”, ask for:



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General instructions Utilisation standards	Quality assurance Safety factors	Allowed temperatures Seals on threads	Finish treatments End treatments	Tubes to be used Tables follow up	Threaded ends Gas – Metric UNF - NPT	Prescriptions to comply with Assembly instructions
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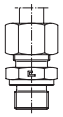
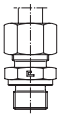
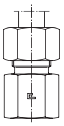
Type: 1101...BP 	Type: 1001.. 	Type: 1001...4 	Type: 1002.. 	Type: 1003.. BSPP Type: 1004.. Metric Paral. 	Type: 1005.. BSPP Type: 1006.. Metric Paral. 	Type: 1007.. BSPP Type: 1008.. Metric Paral. 
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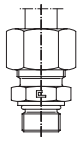
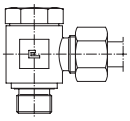
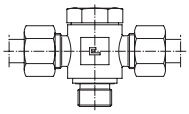
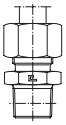
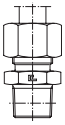
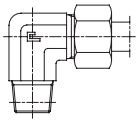
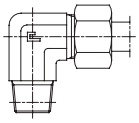
Type: 1009.. UNF/UN-2A 	Type: 1013.. BSPP Type: 1014.. Metric Paral. 	Type: 1015.. BSPP Type: 1016.. 	Type: 1017.. BSPT Type: 1018.. NPT 	Type: 1019.. Metric Taper 	Type: 1020.. BSPT 	Type: 1021.. NPT Type: 1022.. Metric Taper 
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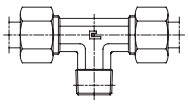
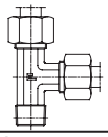
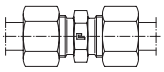
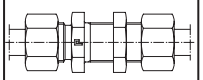
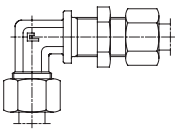
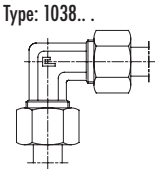
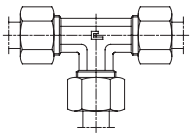
Type: 1025.. BSPT Type: 1026.. NPT 	Type: 1030.. BSPT Type: 1031.. NPT 	Type: 1035.. 	Type: 1036.. 	Type: 1037.. 	Type: 1038.. . 	Type: 1039.. 
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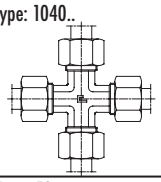
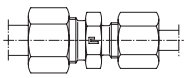
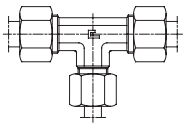
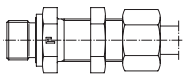
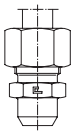
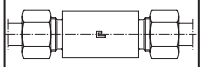
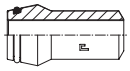
Type: 1040.. 	Type: 1041.. 	Type: 1045.. 	Type: 1049.. BSPP 	Type: 1055.. 	Type: 1056.. 	Type: 1057.. 
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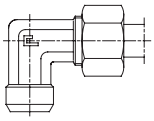
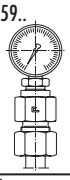
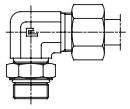
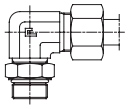
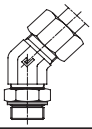
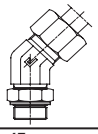
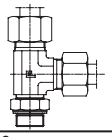
Type: 1058.. 	Type: 1059.. 	Type: 1061.. BSPP Type: 1062.. 	Type: 1063.. UNF/UN-2A 	Type: 1064.. BSPP Type: 1065.. 	Type: 1066.. UNF/UN-2A 	Type: 1067.. BSPP Type: 1068.. 
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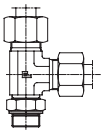
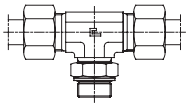
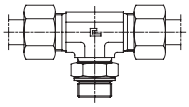
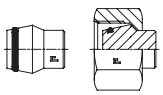
Type: 1069.. UNF/UN-2A 	Type: 1070.. BSPP Type: 1071.. 	Type: 1072.. UNF/UN-2A 	Type: 1073.. Type: 1073.. -D 	Type: 1074.. BSPP 	Type: 1075.. BSPP	Type: 1076.. BSPP Type: 1077..
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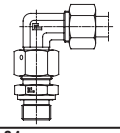
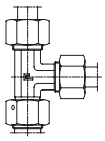
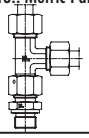
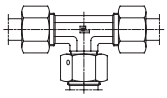
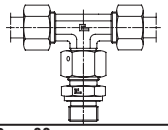
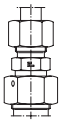
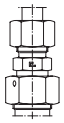
Type: 6043.. BSPP Type: 6044.. Metric Paral. 	Type: 6046.. 	Type: 6047.. BSPP Type: 6048.. Metric Paral. 	Type: 6050.. 	Type: 6051.. BSPP Type: 6052.. Metric Paral. 	Type: 6053.. . 	Type: 6054.. 
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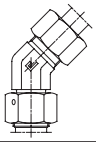
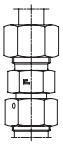
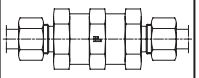
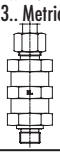
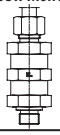
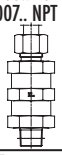
Type: 6055.. 	Type: 6060.. BSPP 	Type: 6061.. 	Type: 5001.. 	Type: 5002.. BSPP Type: 5003.. Metric Paral. 	Type: 5004.. BSPP Type: 5005.. Metric Paral. 	Type: 5006.. BSPT Type: 5007.. NPT 
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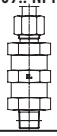
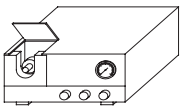
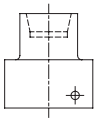
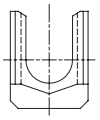
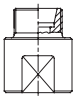
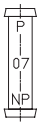
Type: 5008.. BSPT Type: 5009.. NPT 	Type: 100000 	Type: 1000.. 	Type: 1000.. 	Type: 1000.. 	Type: 1000.. . 	
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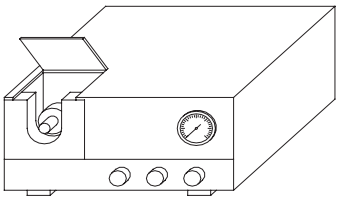
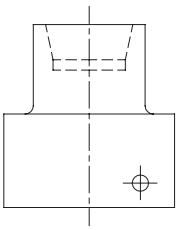
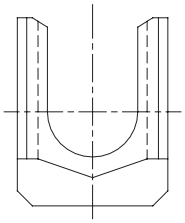
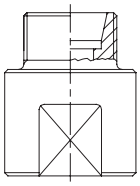
ASSEMBLY TOOLS DIN 2353 - ISO 8434-1

PREASSEMBLY MACHINE	MANDREL MACHINE	PLATFORM MACHINE	MANUAL PREASSEMBLY TOOL	24° TOOL
				

Series	Ø Tube	Ordering Machine	Ordering Mandrel	Ordering Platform	Ordering Preassembly	Ordering 24° tool
L	6	100000	100001	100021-83 M	100061	204
	8		100002	100022-83 M	100062	205
	10		100003	100023-83 M	100063	206
	12		100004	100024-83 M	100064	207
	15		100005	100025-83 M	100065	208
	18		100006	100026-83 M	100066	209
	22		100007	100027-83 M	100067	210
	28		100008	100028-83 M	100068	211
	35		100009	100029-83 M	100069	212
	42		100010	100030-83 M	100070	213
S	6	100000	100011	100031-83 M	100071	204
	8		100012	100032-83 M	100072	205
	10		100013	100033-83 M	100073	206
	12		100014	100034-83 M	100074	207
	14		100015	100035-83 M	100075	214
	16		100016	100036-83 M	100076	215
	20		100017	100037-83 M	100077	216
	25		100018	100038-83 M	100078	217
	30		100019	100039-83 M	100079	218
	38		100020	100040-83 M	100080	219

B7

SOME SECTORS OF USE

Hydraulics, thanks to its great ability to manage considerable powers through components of reduced sizes and weights, is widely applied in important sectors of industry of automation.

40 ANNIVERSARY CAST 1978 - 2018

Aree di vendita • Sales Areas

- Notiziario Tecnico, testi originali in lingua italiana da cui sono state ricavate le traduzioni per i testi dei cataloghi esteri, in caso di dissonanza interpretativa, questo è l'originale che fa testo.
- I dati tecnici, le misure, etc. menzionate sul presente notiziario tecnico sono riportati in buona fede ed a titolo informativo.
- In caso di modifiche, cambiamenti di modelli o abbandono di fabbricazione, non è possibile obbligarci a consegnare articoli con le caratteristiche precedenti, se sostituibili con altri di pari prestazione.
- Per le condizioni generali di fornitura, fanno testo gli accordi sottoscritti tra le parti a livello commerciale.
- La CAST si riserva il diritto di apportare senza preavviso tutte le modifiche di forma, dimensione, materie prime e prestazioni suggerite dal progresso tecnologico, derivante dalla ricerca e sviluppo della nostra società.
- Il presente Brochure si aggiunge al Catalogo Tecnico Commerciale in vigore.
- Edizione: 0 - Stampato: Aprile 2021

- *This technical news bulletin was originally made in Italian and then traslated.In case of misinterpretation or misunderstanding of the whole or of any of the parts here contained, it is the italian language legally binding.*
- *Technical data, measurements, etc. mentioned in this brochure are reported in good faith, for information purposes and can be modified according to the evolution of the state of the art.*
- *In case of modifications, change of model or phasing out, we cannot be obliged to deliver products with the previous characteristics, if replaced with others of equal performance.*
- *As for the general conditions of supply, please refer to the commercial agreements in use between the parties.*
- *CAST reserves the right to make all changes in shape, size, raw materials and performance suggested by technological progress, deriving from our company's research and development and from the continuous improvement of safety, without prior notice.*
- *N.B .: This Brochure, Edition 1 - Print: September 2021, is added to the Technical Commercial Catalogue in use and cancels and replaces the previous "zero" edition printed in April 2021.*

Technical newsletter extract

With specific reference to the new B7 ring

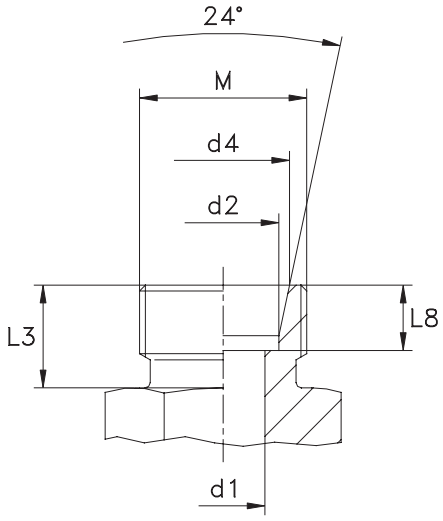
B7

CAST®

B7

DEFINITION OF SIZES OF ISO 8434 - 1 / DIN 3861 CONES

Valid for rings B3 - B4 - B6 - B7



Series	Bar ISO 8434-1	Ø Pipe	Metric thread M	d1	$d2^{B11}$	$d4^{+0,1}$	L3	$L8^{+0,3}$
LL	100	4	M8x1	3	4	5	8	4
		6	M10x1	4.5	6	7.5	8	5.5
		8	M12x1,5	6	8	9.5	9	5.5
L	250	6	M12x1,5	4	6	8.1	10	7
		8	M14x1,5	6	8	10.1	10	7
		10	M16x1,5	8	10	12.3	11	7
		12	M18x1,5	10	12	14.3	11	7
		15	M22x1,5	12	15	17.3	12	7
	160	18	M26x1,5	15	18	20.3	12	7.5
		22	M30x2	19	22	24.3	14	7.5
	100	28	M36x2	24	28	30.3	14	7.5
		35	M45x2	30	35(1)	38	16	10.5
		42	M52x2	36	42(1)	45	16	11
S	630	6	M14x1,5	4	6	8.1	12	7
		8	M16x1,5	5	8	10.1	12	7
		10	M18x1,5	7	10	12.3	12	7.5
		12	M20x1,5	8	12	14.3	12	7.5
		14	M22x1,5	10	14	16.3	14	8
	400	16	M24x1,5	12	16	18.3	14	8.5
		20	M30x2	16	20	22.9	16	10.5
		25	M36x2	20	25	27.9	18	12
	250	30	M42x2	25	30	33	20	13.5
		38	M52x2	32	38(1)	41	22	16

(1): Cast S.p.A. chose, for technical reasons, to make the pipe seats 035L, 042L and 038S with tolerance B11.

SELECTION OF THE FITTING

For maintenance technicians, fittings are strategic, delicate (and very expensive) components that must be checked systematically. The selection of a fitting suited to the type of system to be built is therefore something to be carried out with extreme care.

The main parameters to be evaluated are:

1. TYPE OF APPLICATION

Hydraulic steel fittings are components used to connect carbon steel and stainless steel pipes in hydraulic systems. Considering the high pressures used in this type of systems, the pipes and fittings used must be absolutely first-rate, normal, reliable, functional and interchangeable. Cast markets fittings produced according to the international standards of reference; they are easy to assemble and replace and their use in systems guarantees a high level of safety and functionality, due to strict quality controls carried out regularly during production.

In order to avoid slipping of the pipes, the leaking of fluid and unwanted breakages, the type of fittings to be used must be identified with extreme care. If, for example, the application requires very high pressures with maximum values of 630 bar, the use of DIN fittings according to ISO 8434-1 and ORFS fittings according to ISO 8434-3 are the most suitable solutions. If, on the other hand, it a fixed part is to be connected with a mobile part, it is necessary to use fittings for flexible pipes of the types and operating pressures as needed.

The main types for rigid pipes are cutting ring fittings, flared pipe fittings and welded fittings. In the field of flexible pipes it is possible to use fittings suitable for braided, spiral and thermoplastic rubber pipes.

It is important to choose the correct size of the fittings and diameter of the pipes in order to minimize the pressure losses, which can be easily generated in a hydraulic system.

Finally, it is essential to observe all the requirements, standards and manufacturer's instructions and to comply with all the laws in force on the protection of the environment and the safety of people.

2. TYPE OF FLUID

A "fluid" is the liquid or gaseous component of the system which transmits energy from a generator to a user. The main fluids used include oils, fresh water, sea water, air, steam and some gases. These last three transmission means, if used in systems, require specific design of the system from the point of view of safety. This is because the vector is compressible and all the possible negative consequences resulting from its use must be assessed in advance.

Mineral oil, on the other hand, is the fluid par excellence for hydraulic systems; it is preferred over other fluids such as water due to its many mechanical and hydraulic properties that are fundamental for power transmission systems:

Lubricating power
Greater resistance to deterioration
Higher viscosity
Almost unlimited resistance to pressure (being a liquid it is considered virtually incompressible)
Good thermal conductivity

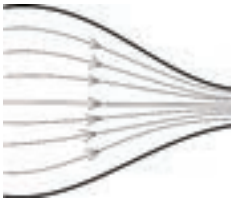
However, the use of water is indispensable in certain systems such as fire-fighting systems or in specific hydrodynamic systems that have particular safety requirements.

In marine or particularly corrosive environments, the use of AISI 316 Ti stainless steel fittings and pipes is recommended; while, for normal industrial applications, the carbon steel fitting is an excellent and economical solution.

3. PRESSURE

Pressure is by definition a force on a surface, i.e. the force required to do a certain job. The main units of measurement are bar and Pascal.
In the design phase, it is necessary to know the force needed by the user in order to establish the pressure of the system. All the various components of the system need to be considered, taking into account that the usable pressure is that of the less-structured product. Any pressure peaks and any pressure drops must also be assessed.
Cast offers various types of fittings with different pressures; the designer has to identify the fitting best suited to the system, without choosing one of too high a performance, and always considering the safety factors 4:1 and 2.5:1. Compliance with the standard pressures and manufacturer's pressures is essential.

4. THE FLOW RATE



The flow rate is the amount of fluid that passes through a section in a unit of time. It determines how long the work must take and its unit of measurement is litres per minute.
Once the flow rate for correct operation of the system has been established, the fitting and the pipes with the most appropriate internal diameter must be identified, observing the recommended speed of fluid of about 5 m/sec.

5. TEMPERATURE

The temperature of the hydraulic fluid must not exceed that prescribed by the supplier. At higher temperatures, the fluid could begin to deteriorate causing the viscosity level to drop too low to ensure correct lubrication of the components, compromising the technical characteristics envisaged in design. To ensure a long life of the oil, it is extremely important that the fluid remains clean and does not contain water.

6. DIMENSIONS AND MAINTENANCE

Increasingly, people are obliged to design systems in small and limited spaces with a view to reducing costs and protecting the environment. It is therefore essential to use fittings and components of the appropriate dimensions, and not use any that are oversized. They must also be selected bearing in mind the assembly phase and any future maintenance.

7. REFERENCE STANDARDS

The fittings produced by Cast are compliant with international standards. It is advisable to choose the most suitable standard of reference according to the characteristics of the system, and to therefore use the fittings that comply with the same standard. The end user may, when he deems it appropriate to do so, request product approval certificates or other quality control documents.

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GENERAL INFORMATION ON CAST FITTINGS

MATERIALS

Cast fittings are produced in carbon steel and stainless steel. The types of steel used are all of the highest quality and are purchased exclusively from leading steel mills in Europe. All batches used come with 3.1 test documentation specifying the casting number and chemical and mechanical characteristics of the steel.
The table below shows the main materials used for the production of CAST fittings:

TYPE OF FITTINGS	MATERIAL	DESIGNATION	REGULATION
Cutting rings	Carbon steel	11SMnPb37/30	UNI EN 10277
Tightening nuts		11SMnPb37/30 C10C, C45 C35	UNI EN 10277 UNI EN 10263-2 UNI EN 10277
Straight		11SMnPb37/30 S235JR/0/2 (Fe 37C)	UNI EN 10277 UNI EN 10277
Forged		28SMnPb28 (PR60) 36SMnPb14 (PR80) C15, C35	- UNI EN ISO 683-4 UNI EN 10277
Cutting rings	Stainless steel	Aisi 316 Ti (1.4571)	UNI EN 10088-3
Tightening nuts		Aisi 316 Ti (1.4571) Aisi 316 (1.4401) Aisi 316 L (1.4404) Aisi 304 (1.4301)	UNI EN 10088-3 UNI EN 10088-3 UNI EN 10088-3 UNI EN 10088-3
Straight		Aisi 316 Ti (1.4571) Aisi 316 (1.4401) Aisi 316 L (1.4404)	UNI EN 10088-3 UNI EN 10088-3 UNI EN 10088-3
Forged		Aisi 316 Ti (1.4571) Aisi 316 (1.4401) Aisi 316 L (1.4404)	UNI EN 10088-3 UNI EN 10088-3 UNI EN 10088-3

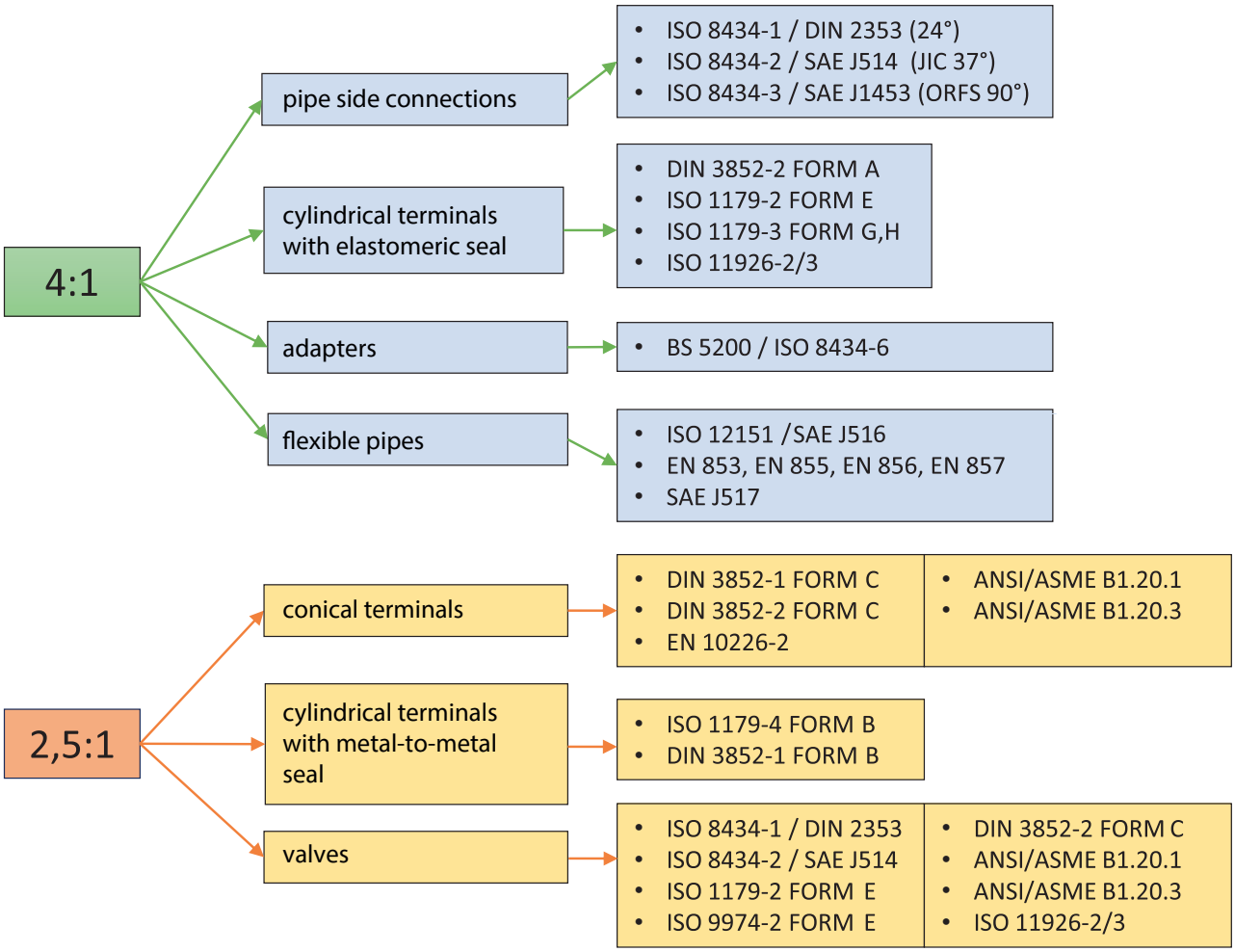
TEMPERATURES

The temperatures of the types of steel allowed according to ISO 8434 are:
- Carbon steel: from -40°C to + 120°C
- Stainless steel: from -60°C to + 200°C

For stainless steel, a reduction of the operating pressure of the system must be applied according to the operating temperature as indicated below:
- -4% with temperatures > 50°C
- -11% with temperatures > 100°C
- -20% with temperatures = 200°C

SAFETY FACTORS

The safety factor is the coefficient that determines the minimum burst pressure.
For CAST products it can be 4:1 or 2.5:1



Destructive test with AISI 316 Ti stainless steel pipe, Ø 30x5 mm according to UNI EN 10216-5, assembled with rings 110122.7. The pipe burst at 2214 bar, without registering leaks or damp at the sealing points.

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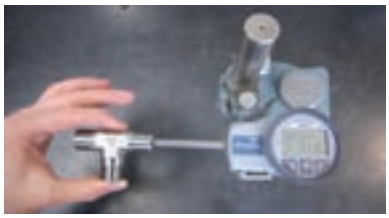
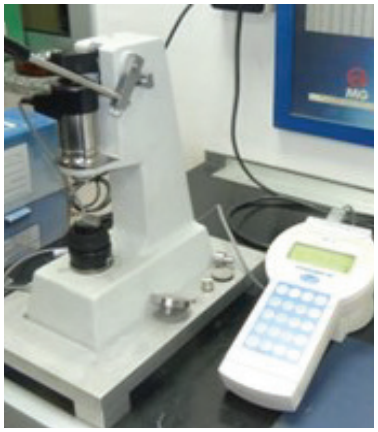
METROLOGY ROOM - QUALITY CONTROL





CAST S.p.A.'s internal Quality Service uses a metrology room with all the necessary equipment to guarantee product quality control during all phases of production, including hardness meters, digital micro-durometers, digital gauges, internal micro-meters, roughness gauges, profilometers, a metallography microscope, machines for corrosion testing in saline chambers, a machine for measuring the degree of contamination, a profile projector, comparators, a report meter, buffers, surface plates, etc.

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CARBON STEEL PIPES TO BE USED FOR ALL SERIES

- For carbon steel pipes, we recommend using cold drawn and seamless calibrated pipes, normalized with inert gas, in material E235 according to EN 10305 - 4 (ST 37.4 according to DIN 1630 / DIN 2391).
- The maximum allowable hardness measured on the outer diameter of the pipe is 75 HRB.
- The pressures indicated in the table below are generally valid with a constant load and at a temperature between - 40°C and + 120°C .

Ø Tube mm	Tolerance EN 10305-4 mm	Thickness mm	Static DIN 2413-I pressure [bar]	Dynamic DIN 2413-III pressure [bar]	Weight Kg/m
4	±0,08	0,5	313	274	0,047
4		1	522	502	0,075
6	±0,08	1	389	374	0,123
6		1,5	549	528	0,166
6		2	692	665	0,197
8	±0,08	1	333	289	0,222
8		1,5	431	441	0,240
8		2	549	528	0,296
8		2,5	658	632	0,339
10	±0,08	1	282	249	0,222
10		1,5	373	358	0,314
10		2	478	460	0,395
10		2,5	576	553	0,462
10		3	666	641	0,518
12	±0,08	1 (1)	235	210	0,271
12		1,5	353	305	0,388
12		2	409	393	0,493
12		2,5	495	476	0,586
12		3	576	553	0,666
12		3,5	651	627	0,734
14	±0,08	1,5	302	265	0,462
14		2	403	343	0,592
14		2,5	434	417	0,709
14		3	507	487	0,814
14		3,5	576	553	0,906
15	±0,08	1,5	282	249	0,499
15		2	376	323	0,641
15		2,5 (3)	409	393	0,771
15		3	478	460	0,888
16	±0,08	1 (3)	176	161	0,370
16		1,5 (2-3)	264	234	0,536
16		2	353	305	0,691
16		2,5	386	372	0,832
16		3	452	435	0,962
18	±0,08	1 (3)	157	143	0,419
18		1,5 (1)	235	210	0,610
18		2	313	274	0,789
18		2,5	392	335	0,956
18		3	409	393	1,111
18		4 (3)	522	502	1,381

Ø Tube mm	Tolerance EN 10305-4 mm	Thickness mm	Static DIN 2413-I pressure [bar]	Dynamic DIN 2413-III pressure [bar]	Weight Kg/m
20	±0,08	2 (2-3)	282	249	0,888
20		2,5	353	305	1,079
20		3	373	358	1,258
20		3,5	426	410	1,424
20		4	478	460	1,578
22	±0,08	1,5 (3)	192	174	0,758
22		2 (1)	256	228	0,986
22		2,5	320	280	1,202
22		3	385	329	1,406
22		4 (3)	441	424	1,766
22		5 (3)	532	512	2,367
25	±0,08	2 (1)	226	202	1,134
25		2,5	282	249	1,387
25		3	338	294	1,628
25		4	394	379	2,072
25		4,5	437	420	2,275
25		5 (3)	478	460	2,466
28	±0,08	2 (1)	201	182	1,282
28		2,5	252	224	1,572
28		3	302	265	1,850
28		4 (3)	403	343	2,368
28		5 (3)	434	417	2,836
30	±0,08	2 (2-3)	188	171	1,381
30		2,5	235	210	1,695
30		3	282	249	1,998
30		4	376	323	2,565
30		5 (3)	409	393	3,083
32	±0,15	3 (3)	265	235	2,146
32		4 (3)	353	305	2,762
32		5 (3)	387	372	3,329
35	±0,15	2 (1)	161	147	1,628
35		2,5	201	182	2,004
35		3	242	216	2,367
35		4	322	281	3,058
38	±0,15	3 (2-3)	223	200	2,589
38		4	297	261	3,354
38		5	371	319	4,069
42	±0,2 (4)	3	201	182	2,885
42		4	269	238	3,749

(1) Pipes which require the pressure sleeve, only for fittings according to DIN 2353
(2) To be used only for ISO 8432-2/SAE J514 compliant 37° fittings
(3) To be used only for ISO 8432-3 / SAE J1453 compliant ORFS fittings
(4) Cast S.p.A. chose, for technical reasons, to make the pipe seat 042L with tolerance B11.

CALCULATION PRESSURES

The calculation of the pressure with static stresses is performed according to DIN 2413 - I with unit yield strength $K = 235N/mm^2$.
For pipes with an external / internal diameter ratio > 1.35, the calculation is performed according to DIN 2413 - III, but with unit yield strength $K = 235N/mm^2$.
The calculation of pressure with dynamic stresses is performed according to DIN 2413 - III with permanent fatigue resistance
$K=226N/mm^2$.
Safety factor S = 1.5
Reduction coefficient c = 0.8 for 4mm pipe, c = 0.85 for 6 - 8mm pipe, c = 0.9 for > 8mm pipe.
Corrosion: no correction factor is considered for the pressure calculation.

- Insufficient thickness of the wall of the pipe, or absence of longitudinal resistance of the pipes (particularly mild soft steel) may result in problems with clinching of the ring on the pipe leading to loss of water-tightness and a significant decrease in safety. When choosing the pipes to be used, this latter aspect must also be taken into account. A good rule of thumb is to ensure that the yield (constriction on the internal 0 of the pipe) does not exceed 4/10 of a mm up to the external 0 of 16mm and 6/10 of a mm in the larger sizes.

B7

STAINLESS STEEL PIPES TO BE USED FOR ALL SERIES

- For stainless steel pipes we recommend using calibrated pipes that are polished and cold drawn without welding, in material 1.4571 according to UNI EN 10216 - 5 table 6, or ASTM 269, with dimensional tolerances according to EN 10305 - 1.
- The maximum allowable hardness measured on the outer diameter of the pipe is 85 HRB.
- The pressure values indicated in the table below are generally valid with a constant load and with temperatures between - 60°C and + 200°C .

Ø Tube mm	Tolerance EN 10305-1 mm	Thickness mm	Static DIN 2413-I pressure [bar]	Weight Kg/m
4	±0,08	0,5	326	0,048
4		1	544	0,076
6	±0,08	1	406	0,125
6		1,5	572	0,169
6		2	721	0,200
8	±0,08	1	347	0,225
8		1,5	449	0,244
8		2	572	0,301
8		2,5	686	0,344
10	±0,08	1	294	0,225
10		1,5	389	0,319
10		2	498	0,401
10		2,5	601	0,469
10		3	694	0,526
12	±0,08	1 (1)	245	0,275
12		1,5	368	0,394
12		2	426	0,500
12		2,5	516	0,595
12		3	601	0,676
12		3,5	679	0,745
14	±0,08	1,5	315	0,469
14		2	420	0,601
14		2,5	452	0,720
14		3	529	0,826
14		3,5	601	0,920
15	±0,08	1,5	294	0,507
15		2	392	0,651
15		2,5 (3)	426	0,782
15		3	498	0,902
16	±0,08	1 (3)	183	0,373
16		1,5 (2-3)	275	0,544
16		2	368	0,702
16		2,5	402	0,845
16		3	471	0,977
18	±0,08	1 (3)	163	0,423
18		1,5 (1)	245	0,619
18		2	326	0,801
18		2,5	409	0,971
18		3	426	1,128
18		4 (3)	544	1,401

Ø Tube mm	Tolerance EN 10305-1 mm	Thickness mm	Static DIN 2413-I pressure [bar]	Weight Kg/m
20	±0,08	2 (2-3)	294	0,902
20		2,5	368	1,095
20		3	389	1,277
20		3,5	444	1,446
20		4	498	1,602
22	±0,08	1,5 (3)	200	0,764
22		2 (1)	267	1,001
22		2,5	334	1,220
22		3	401	1,427
22		4 (3)	459	1,802
22		5 (3)	555	2,402
25	±0,08	2 (1)	236	1,151
25		2,5	294	1,408
25		3	352	1,653
25		4	411	2,104
25		4,5	456	2,310
25		5 (3)	498	2,490
28	±0,08	2 (1)	210	1,301
28		2,5	263	1,596
28		3	315	1,878
28		4 (3)	420	2,403
28		5 (3)	452	2,878
30	±0,08	2 (2-3)	175	1,402
30		2,5	245	1,721
30		3	294	2,028
30		4	392	2,604
30		5 (3)	426	3,110
32	±0,15	3 (3)	275	2,177
32		4 (3)	368	2,803
32		5 (3)	403	3,378
35	±0,15	2 (1)	168	1,652
35		2,5	210	2,034
35		3	252	2,403
35		4	336	3,104
38	±0,15	3 (2-3)	232	2,628
38		4	310	3,405
38		5	387	4,131
42	±0,2 (4)	3	210	2,929
42		4	280	3,806

(1) Pipes which require the pressure sleeve, only for fittings according to DIN 2353
(2) To be used only for ISO 8432-2/SAE J514 compliant 37° fittings
(3) To be used only for ISO 8432-3 / SAE J1453 compliant ORFS fittings
(4) Cast S.p.A. chose, for technical reasons, to make the pipe seat 042L with tolerance B11

CALCULATION PRESSURES

The calculation of the pressure with static stresses is performed according to DIN 2413 - I with unit yield strength K = 245N/mm^2.
For pipes with an external / internal diameter ratio > 1.35, the calculation is performed according to DIN 2413 - III, but with unit yield strength K = 245N/mm^2.
The pressures with dynamic stresses according to DIN 2413 - III are not indicated since the K value of the permanent fatigue stress is not envisage in UNI EN 10216 - 5. For the calculation according to DIN 2413 - III we recommend a K value = 190N/ mm^2.
Safety factor S = 1.5
Reduction coefficient c = 0.9

Corrosion: no correction factor is considered for the pressure calculation.

- Insufficient thickness of the wall of the pipe, or absence of longitudinal resistance of the pipes (particularly mild soft steel) may result in problems with clinching of the ring on the pipe leading to loss of water-tightness and a significant decrease in safety. When choosing the pipes to be used, this latter aspect must also be taken into account. A good rule of thumb is to ensure that the yield (constriction on the internal 0 of the pipe) does not exceed 4/10 of a mm up to the external 0 of 16mm and 6/10 of a mm in the larger sizes.

B7

SELECTION OF STEEL PIPES

Forty years in the business, tens of thousands of systems built with our fittings all over the world, a billion fittings produced: this allows us to help the users of hydraulic fittings with a careful and objective approach to an issue of particular importance.

Today there is undeniably the need to contain industrial costs. Cast is well aware that this problem is one that affects all companies in the sector, whether manufacturers of components or ones engaged in the construction of complex hydraulic systems.

But there is also a duty beyond any legitimate economic requirement which is called “Safety” and cannot be renounced for any reason. It is therefore necessary to rationalize the costs without decreasing the safety parameters, whether normal and otherwise, which are the only guarantees of correct operation of the systems without exposing people, the environment and property to risks other than those intrinsic to the system.

To carry out the above correctly, it is necessary to have in-depth knowledge of clinching and sealing according to the various standards and types of hydraulic fittings for high pressures.

The DIN 2353 fitting is a mechanical fitting of the cutting ring type that is clinched onto a high quality steel pipe, by means of cold deformation of the cutting ring itself.

In order for the cutting ring to be clinched properly on the carbon steel pipe, the latter should be a calibrated pipe that is cold drawn and seamless, normalized with inert gas, in material E235 according to EN 10305-4 (ST 37.4 according to DIN 1630 - DIN 2391). The maximum allowable hardness measured on the outer diameter of the carbon steel pipe is 75 HRB.

In order for the cutting ring to be clinched properly on a stainless steel pipe, the latter should be a calibrated pipe that is polished, cold drawn and seamless, in material 1.4571 according to EN 10216-5 or ASTM A 269, with dimensional tolerances according to EN 10305-1. The maximum allowable hardness measured on the outside diameter of the stainless steel pipe is 85 HRB.

The use of quality steel pipes is not simply for the purpose of complying with the standard, it is an essential duty determined by the same design of the DIN 2353 fitting, without which the ring-pipe joining system cannot work and will be non-compliant.

If for any reason the pipe is not structured (wall too thin), it must be replaced with a compliant pipe or a pressure sleeve must be inserted at the top of the pipe. There can be no alternatives; the pipe must be able to withstand the “thrust” of the cutting ring during the clinching phase: this is an intrinsic characteristic of DIN 2353 design for which no exceptions can be made.

A second characteristic that the steel pipe must have is absolute compliance with the “maximum allowed hardness” on the external diameter of the pipe itself. If this value is exceeded even minimally, the cutting ring may not clinch on the pipe correctly but slide on it causing incorrect clinching between the pipe and the cutting ring, with the forming of a non-compliant joint that will have to be discarded.

A third characteristic that the steel pipe must have is geometric uniformity: the thickness of the wall must be uniform and there must not be any ovality on the external diameter of the steel pipe.

As indicated above, the functional-technical characteristics of the steel pipes used in hydraulic systems for high pressures with fittings in accordance with DIN 2353, are different and all “imperative” as the absence of even one of them can affect the performance of the joint, making it non-compliant.

These are the objective reasons why it is necessary to use quality pipes. It is not important to know which brand of fitting you intend to use in the construction of the system: if the steel pipe does not meet the required characteristics, the joint will not conform no matter what fitting is used. There can be no doubt about this.

B7

USE OF STEEL PIPES

The assembly of DIN 2353 joints must be carried out in accordance with ISO 8434-1.

It is a very important operation that must be performed in a workmanlike manner by duly trained personnel, in possession of a diploma issued by a company in the sector, an institution or a qualified school in the field of hydraulic systems.

Whoever carries out pre-assembly and assembly of high pressure hydraulic fittings must be aware that failure to scrupulously follow the precise requirements of the standard and those of the manufacturer of the DIN 2353 fitting can lead to serious accidents, physical injury and very serious damage to the environment and to property. It is therefore imperative to carry out a pre-assembly check, in 100% of cases, according to ISO 8434-1, DIN 3859-2 and CAST (see page 23).

The tendency on the part of hydraulic system engineers to increasingly use less structured stainless steel pipes, notwithstanding the values required by the standard, has led us since 2002 to design, test and industrialize a single-edged stainless steel ring called “BP” with operating pressure according to DIN 2353- ISO 8434-1, perfectly interchangeable with all rings (Italian and foreign) produced according to the same standard. In 2016, again with a view to continual improvement, a new design of single-edged ring called “B6” was developed which, with its intrinsic characteristics for use on less structured and electro-joined stainless steel pipes, has completely replaced the “BP” ring, which is no longer used.

In 2021, in the context of continuous improvement, we designed and developed a new highly innovative multi-cutting ring called “B7” which will replace the previous metal-to-metal cutting rings for carbon and stainless steel pipes, making the hydraulic system both safer and more economical.

The ring “B7”, thanks to its particular geometry and heat treatment, can be used on less structured steel pipes; it facilitates the penetration of the cutting edges of the ring on the outer diameter of the steel pipe and limits collapse of the pipe as far as possible, with good clinching between the pipe and the ring, ensuring water-tightness for correct operation of the system.

The main differences between the new multi-cutting ring “B7” and its predecessors are:
- A seal on the front of the fitting body;
- Clinching on the pipe on the rear part of the ring “B7”;
- Protection of the 24° conical seat of the fitting body itself;
- Distribution of the seals over the entire length of the ring

To use non-compliant and less structured pipes on DIN 2353 joints, a “feasibility opinion” is required, issued by the manufacturer of the DIN 2353 fittings used in the system; without this written approval, it is not possible to fit the system with non-compliant or less structured pipes.

To issue a “feasibility opinion”, the manufacturer of the DIN 2353 fittings must perform practical assembly and static seal and dynamic seal tests to check whether, in the case of a pipe that does not comply with the standard, there are sufficiently broad safety parameters to guarantee functioning of the system even in the presence of small anomalies which, almost always, exist at the level of production or industrial performance.

Unfavourable crossovers of tolerances, small differences in materials, superficial assembly, small anomalies in treatments, lack of uniformity in lubrication, etc. are some of the critical factors to be kept under control. Without the “feasibility opinion” from the manufacturer of the DIN 2353 compliant fittings in the system, it is not possible to use steel pipes that do not fully comply with the parameters of the standard and the requirements of the manufacturer of the fittings. The “feasibility opinion” applies only to the single system with its technical and functional characteristics taken into consideration and not to any other application not authorized in writing.

Regarding the general context, we would like to make it perfectly clear that, while we are happy to find technical solutions for users and the market, the position of Cast S.p.A. on the use of fittings in accordance with DIN 2353 has always been the following: anyone who uses this type of product, whatever the installation and the relative operating performance required, must comply with the requirements of the standard and those of the manufacturer of the fittings.

Without the “feasibility opinion” issued by the manufacturer of the fittings, products that do not comply with the requirements of the standard cannot be used on the system. Anyone who consciously decides not to comply with this “obligation” assumes responsibility for voiding all warranties on the product and, in the event of an accident or damage, will be jointly and severally liable for all possible consequences.

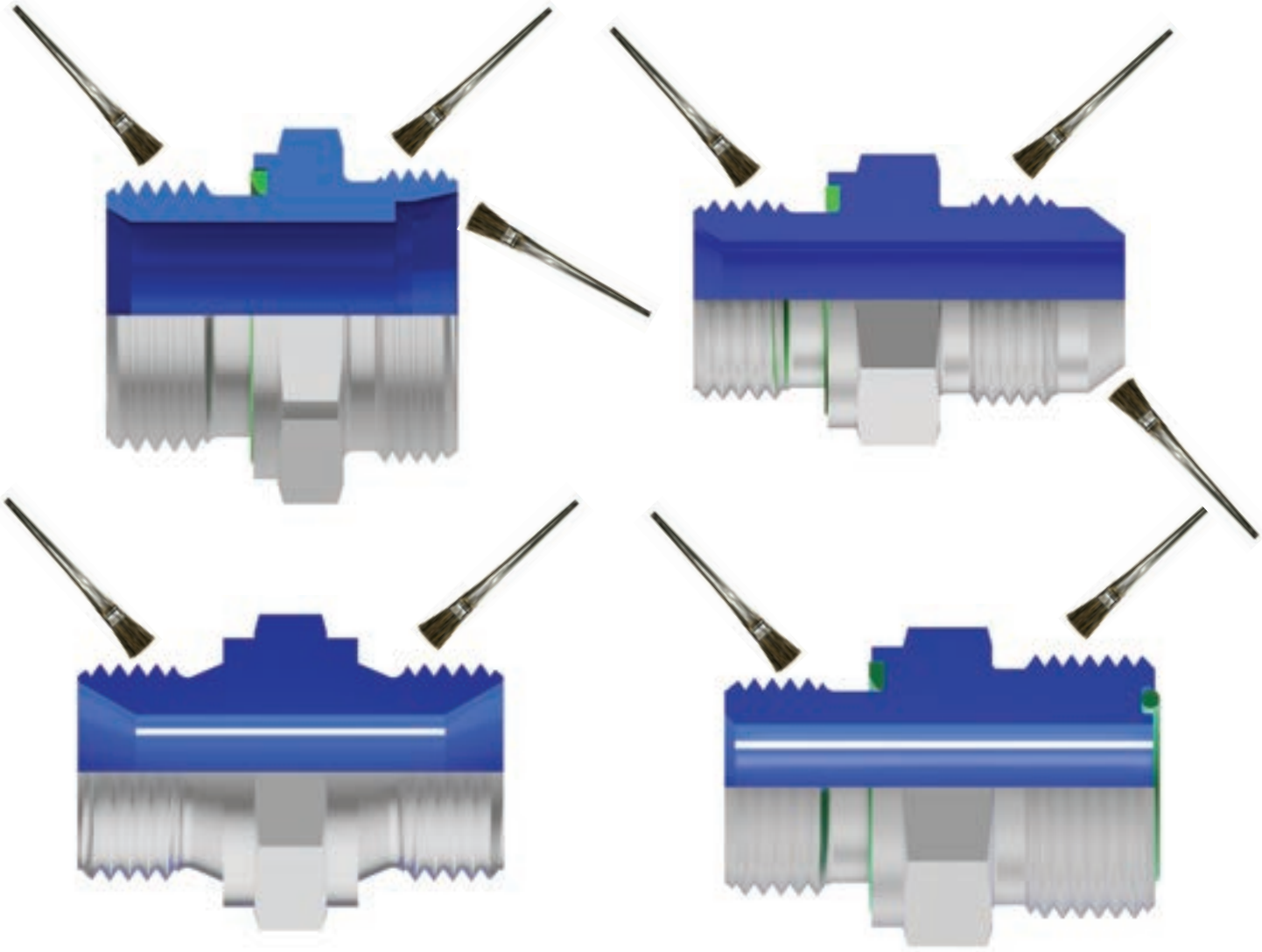
LUBRICATION

The threads are lubricated to separate or protect the surfaces in contact during the tightening phase in order to limit the effects of friction. Lubricants offer better wear resistance, allowing surfaces to slide smoothly over each other, which is especially important for some materials such as stainless steel, which tend to weld together when cold, causing scraping and sticking. Lubricants make disassembly much easier and prevent rust and corrosion, which can cause surfaces to weld permanently.

For the tightening of carbon steel fittings, it is recommended to use a mineral oil compatible with any elastomeric seals present on the fitting.
For the tightening of stainless steel fittings it is recommended to use a specific anti-seize lubricant paste resistant to high temperatures as mentioned on page 24 of the “Technical Commercial Catalogue”.

Carbon steel

Stainless steel



B7

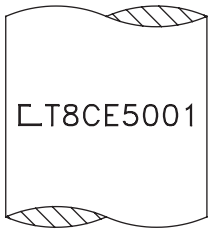
TRACEABILITY MARKS

The Cast product has traceability marks that allow you to find all useful information on: the manufacturer, the production plant, the year of manufacture, the production area, the type of material used and the casting number of the steel.

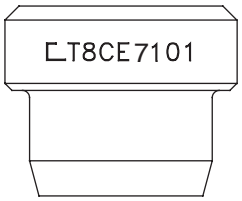
EXAMPLES OF TRACEABILITY MARKS

Details obteined from round bars:

Standard marking:

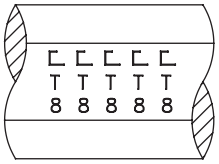


DIN 2353 ring:

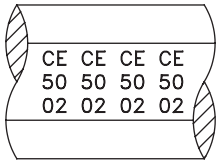


Details obtained from hexagonals bars:

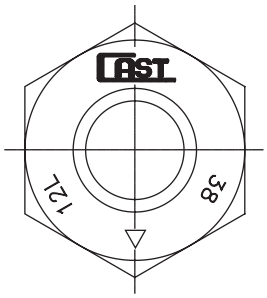
Side 1:



Side 2:

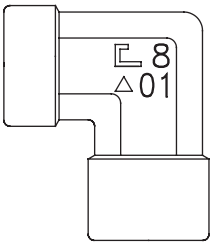


Nuts obtained from moulding:

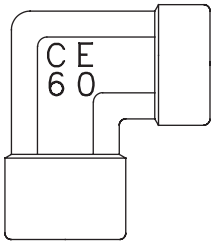


Details obtained from forgings:

Side 1:



Side 2:



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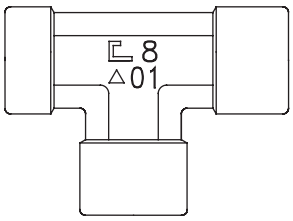
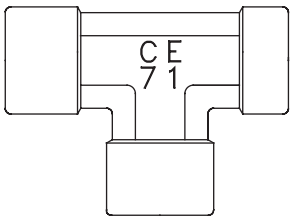
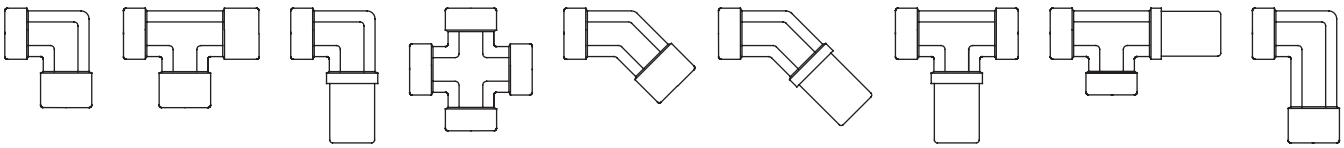


Side 2:



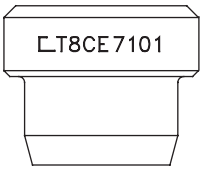
Type of forgings:



B7

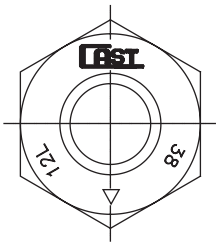
DECODING OF TRACEABILITY MARKS

DIN 2353 ring



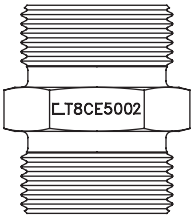
- = Manufacturer
- T = Production plant
- 8 = Year of manufacture
- CE = Production area
- 71 =Type of steel used
- 01 = No. of steel casting

DIN 2353 nut



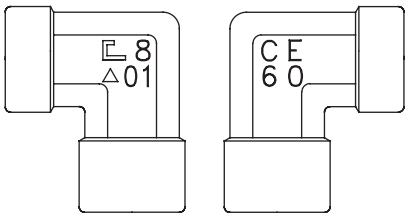
- = Manufacturer
- ▽ = Supplier symbol
- 12L = Pipe size
- 38 =Type of steel used

DIN 2353 fitting



- = Manufacturer
- T = Production plant
- 8 = Year of manufacture
- CE = Production area
- 50 = Type of steel used
- 02 = No. of steel casting

DIN 2353 moulded piece



- = Manufacturer
- 8 =Year of manufacture
- △ = Supplier symbol
- 01 = No. of steel casting
- CE = Production area
- 60 = Type of steel used

NB.: Any other alphanumeric references engraved on the artefact do not relate to traceability.

Mark code of the year of manufacture

MARK	1	2	3	4	5	6	7	8	9	0
YEAR OF MAN.	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

MARK	Y	I	J	L	N	S	U	V	X	Z
YEAR OF MAN.	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

Every ten years the identification number of the year of manufacture becomes a letter or vice versa.

Mark code of the steel used

MARK	DESIGNATION
15	1.0401 (C15) - 1.1140 (C15R) - 1.1141 (C15E)
35	1.0501 (C35) - 1.1180 (C35R)
38	1.0303 (C4C) - 1.0214 (C10C) - 1.0501 (C35) - 1.0503 (C45) – C43
45	1.0038 (S235JR) - 1.0114 (S235J0) - 1.0117 (S235J2)
50	11SMnPb37/30 - 11SMn37/30
60	28SMnPb28 (PR60)
80	36SMnPb14 (PR80)
01	X5CrNiMo17-12-2 - 1.4401 (AISI 316)
04	X2CrNiMo17-12-2 - 1.4404 (AISI 316L)
05	X8CrNiS18-9 - 1.4305 (AISI 303)
07	X2CrNi18-9 - 1.4307 (AISI 304L) ; X5CrNi18-10 - 1.4301 (AISI 304)
71	X6CrNiMoTi17-12-2 - 1.4571 (AISI 316Ti)

B7

PRELIMINARY PRE-ASSEMBLY OPERATIONS ACCORDING TO ISO 8434 - 1 VALID FOR "B7" CUTTING RINGS

1. CHECK OF TOOLS TO BE USED

- Before starting assembly of the Cast "B7" cutting rings, it is essential to make sure that the necessary instruments and components (equipment, fittings, pipes, etc.) are in perfect working order, compliant and free from defects. Replace anything that does not comply with the manufacturer's standards and instructions.
- Check the taper of the 24° seat of the pre-assembly tool and of the hardened pre-assembly mandrel with the relative 24° buffer as indicated in the figures below, after every 45-50 pre-assemblies performed.
- The foregoing is imperative and must always be applied for safety reasons.

Fig. 1

SEAT AT 24° COMPLIANT

Keeping the tool aligned with the hardened pre-assembly tool/ mandrel, insert the "P" side into the seat at 24°.

The conical end on the "P" side must be entirely within the seat.

Control buffer

Pre-assembly tool/mandrel

Keeping the buffer aligned with the hardened pre-assembly tool/ mandrel, insert the "NP" side into the 24° seat.

The conical end on the "NP" side must not exceed the thread of the seat.

Fig. 2

SEAT AT 24° NOT COMPLIANT

In this case the seat at 24° is too small. The "P" side does not enter flush with the pre-assembly tool/mandrel.

Control buffer

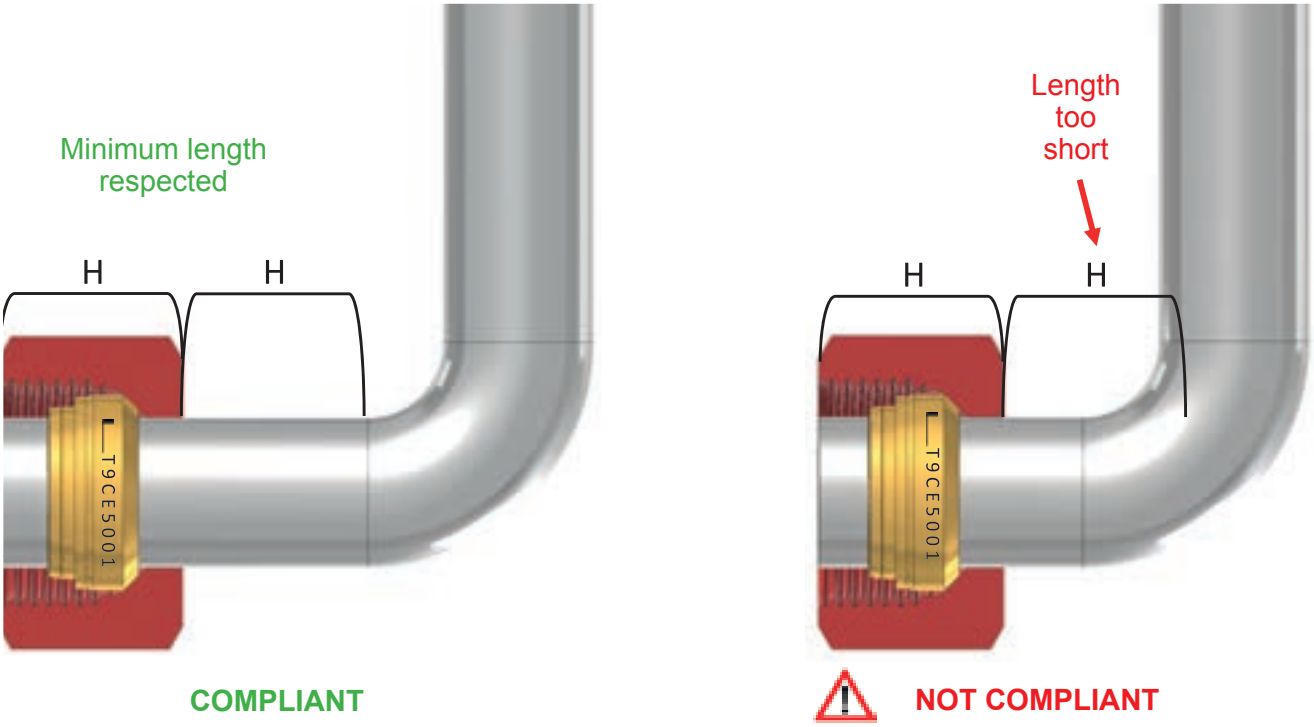
Pre-assembly tool/mandrel

In this case the seat at 24° is too large. The "NP" side goes beyond the pre-assembly tool/mandrel.

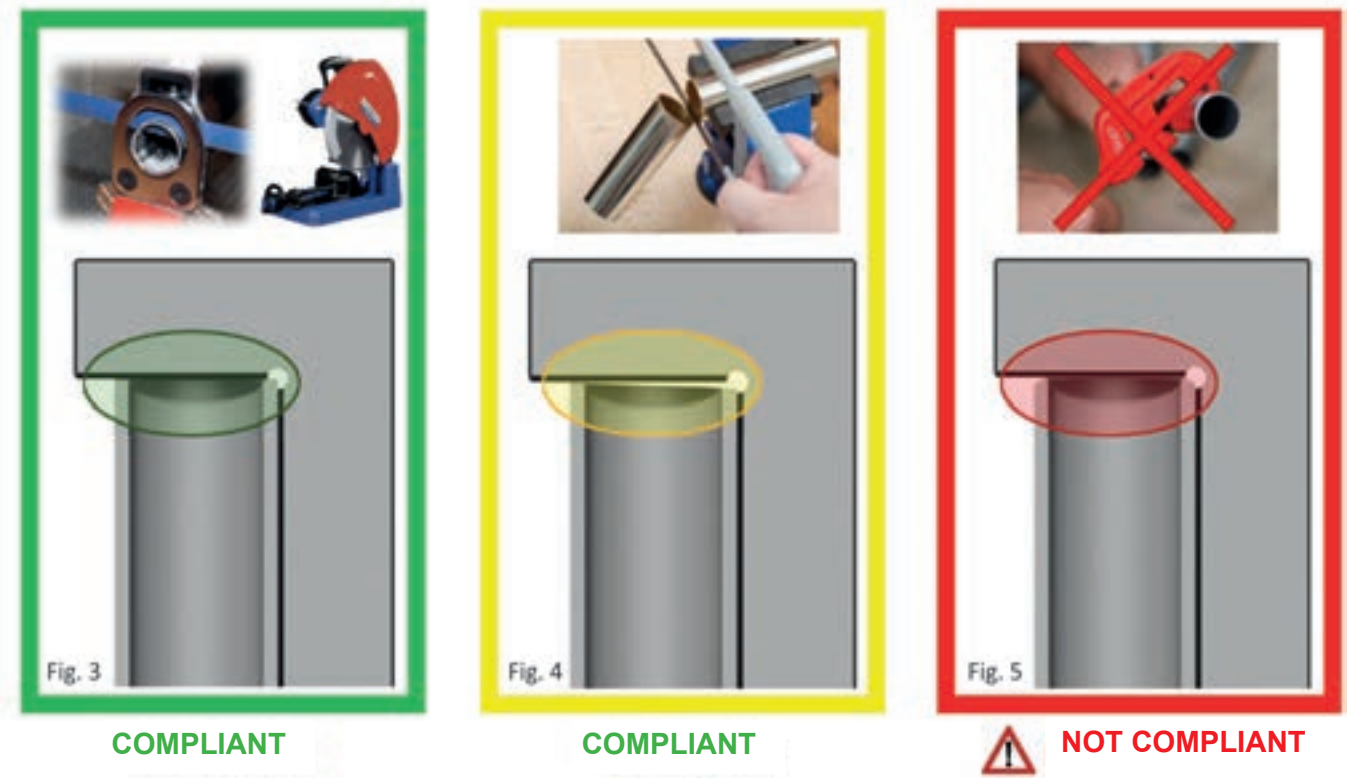
NB: Check of the seat at 24° must always be performed with both sides (P-NP) of the buffer.

2. PREPARATION OF THE PIPE FOR CUTTING RINGS “B7”

• The straight section of the pipe where pre-assembly is to be carried out must be at least twice the length of the nut (length H). The roundness of the pipe must comply with the EN 10305 standard.



• Cut the pipe with the appropriate hacksaw (fig. 3 and 4) and do not use roller pipe cutters (fig. 5). Check that the cut is made correctly at 90°. Gently remove internal and external burrs with the special deburring tool and eliminate internal and external processing residues.



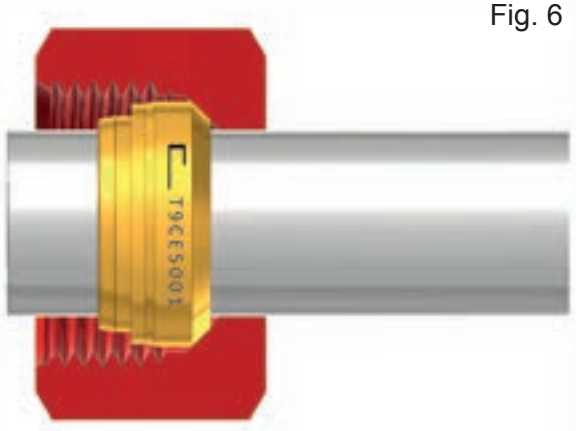
3. LUBRICATION OF THE COMPONENTS

- Before starting pre-assembly, use products suitable for carbon steel and stainless steel to lubricate the 24° conical seat and the thread of the pre-assembly tool, the cutting ring, the thread and the contact surface of the thrust nut with the cutting ring.

4. PREPARATION OF THE COMPONENTS

Fit the nut and the ring on the pipe only with the head of the ring facing the inside of the thrust nut (see fig. 6). DO NOT fit the cutting ring on the pipe with the head of the ring (larger diameter) facing the outside of the thrust nut as it is absolutely non-compliant (see fig. 7).

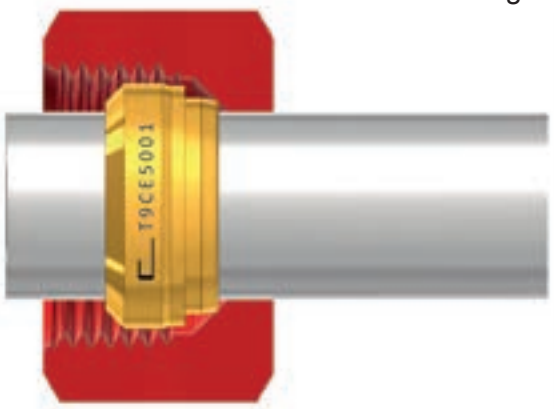
Fig. 6



A compliant assembly carried out as shown in figure 6 ensures high performance and safety of the DIN system at 24°.

COMPLIANT

Fig. 7



Incorrect assembly, carried out as shown in figure 7, makes the DIN system at 24° completely inefficient.

NOT COMPLIANT

To identify with certainty the largest diameter of the cutting ring, which must absolutely face (enter) the inside of the thrust (tightening) nut, simply locate the traceability codes engraved on the largest diameter of the cutting ring.
In other words: “traceability marks = largest diameter of the cutting ring”, which must always be facing the inside of the thrust nut.

3. PRE-ASSEMBLY

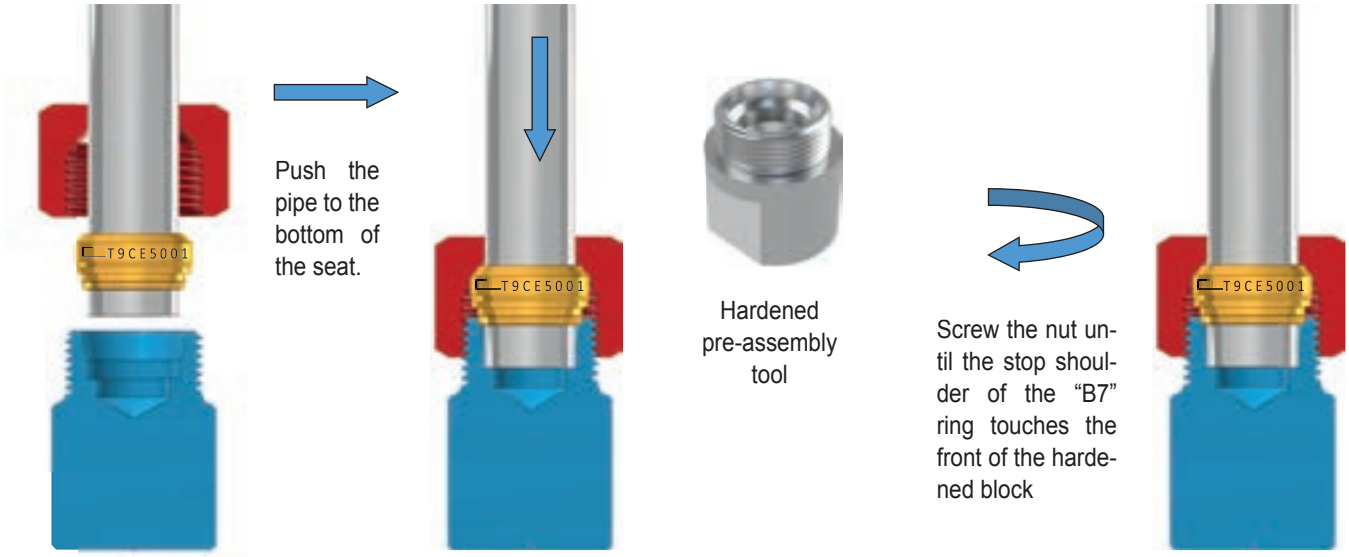
After carrying out the preliminary operations correctly (points 1 to 4), continue with pre-assembly of the cutting ring “B7” according to one of the following methods of pre-assembly:

- MANUAL PRE-ASSEMBLY ON HARDENED PRE-ASSEMBLY TOOL WITH WRENCH(see page 18);
- MANUAL PRE-ASSEMBLY ON HARDENED PRE-ASSEMBLY TOOL WITH TIGHTENING TORQUES (see page 20);
- PRE-ASSEMBLY WITH AUTOMATIC MACHINE (see page 21).

MANUAL PRE-ASSEMBLY ON HARDENED PRE-ASSEMBLY TOOL WITH WRENCH

• Insert the pipe into the 24° cone of the pre-assembly tool until it makes contact with the stop.

• Screw the nut using an operating wrench until the “B7” ring, compressed in the 24° cone seat, brings the stop shoulder in contact with the front of the hardened block.
This condition is signaled by a sudden increase in the tightening torque. During this operation it is important to keep the pipe in full abutment on the bottom of the block and to prevent any axial rotation of the pipe.



• The end of the preassembly occurs when the stop shoulder of the “B7” ring abuts against the front of the hardened preassembly block. This condition is signaled by a sudden increase in the tightening torque.

NOTES:

• The ISO 8434-1 standard also provides for direct pre-assembly on a carbon steel fitting. In this case, the fitting must be replaced each time it is tightened. The 24° seat of the fitting used must be checked in advance following the instructions in point 1 on page 15. The above also applies to stainless steel fittings for diameters 6-8-10-12 mm only.

• Stainless steel fittings with a diameter greater than 12 mm must be pre-assembled with hardened pre-assembly tools.

• The values shown in the tightening tables on page 19 are indicative ones obtained from practical tests carried out in the Cast laboratory, which may vary according to the materials and tolerances of the components used. The contact with the stop shoulder surface of the ring determines the pre-assembly, while the values expressed in Nm or portions of the nut turn represent the tightening torques or the rotation to be applied to correctly carry out the final assembly.

B7

TABLE VALUES OF FINAL ASSEMBLY ON THE MACHINE/SYSTEM

Without prejudice to the mandatory compliance checks of components and equipment, after having correctly carried out the pre-assembly by sending the stop shoulder of the “B7” ring against the front of the fitting or tightening block depending on what is used, it is possible to proceed with the final assembly on the machine, in complete safety, using the table values in Nm or portion of the nut turn indicated below.

Tightening torques for carbon steel:

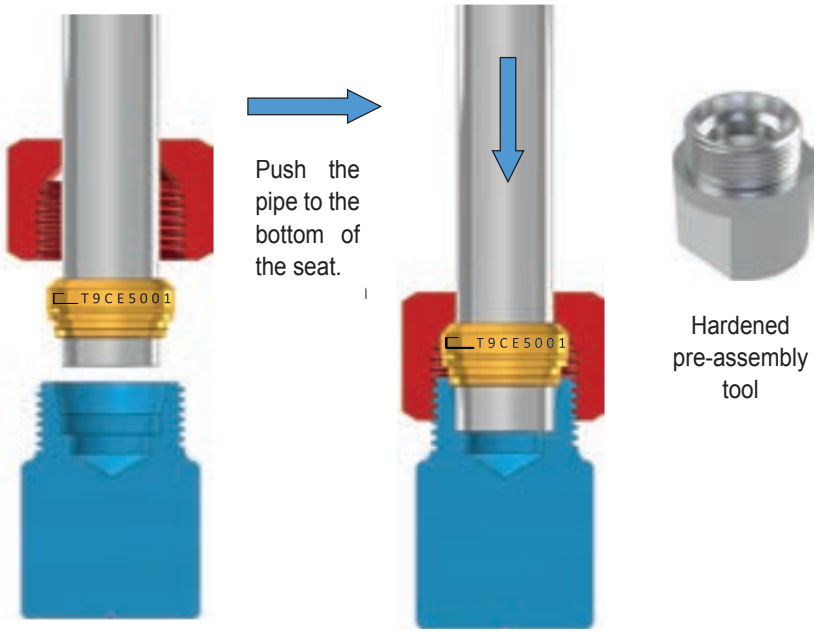
Series	PN [Bar]		Metric Thread	Ø Pipe	L1	D1	Pre-assembly	Final assembly	
	Standard ISO 8434-1	Above Standard					Stop shoulder contact	Nm	Turns of nut
L	250	500	M12x1.5	6	9,5	10	End of operation	32	1/4
			M14x1.5	8	9,5	12	End of operation	45	1/4
			M16x1.5	10	10	14	End of operation	45	1/4
		400	M18x1.5	12	10	16	End of operation	85	1/4
			M22x1.5	15	10	19	End of operation	105	1/4
	160		M26x1.5	18	10	23	End of operation	170	1/4
		250	M30x2	22	10,5	27	End of operation	250	1/4
	100		M36x2	28	11	33	End of operation	370	1/4
			M45x2	35	13	41	End of operation	590	1/4
			M52x2	42	13	48	End of operation	660	1/4
S	630	800	M14x1.5	6	9,5	10	End of operation	35	1/4
			M16x1.5	8	9,5	12	End of operation	55	1/4
			M18x1.5	10	10	14	End of operation	55	1/4
		630	M20x1.5	12	10	16	End of operation	90	1/4
			M22x1.5	14	10	19	End of operation	140	1/4
	400		M24x1.5	16	10,5	21	End of operation	170	1/4
		420	M30x2	20	12	26	End of operation	280	1/4
			M36x2	25	12	32	End of operation	500	1/4
	250		M42x2	30	13	36	End of operation	620	1/4
			M52x2	38	13	44	End of operation	780	1/4

Tightening torques for stainless steel:

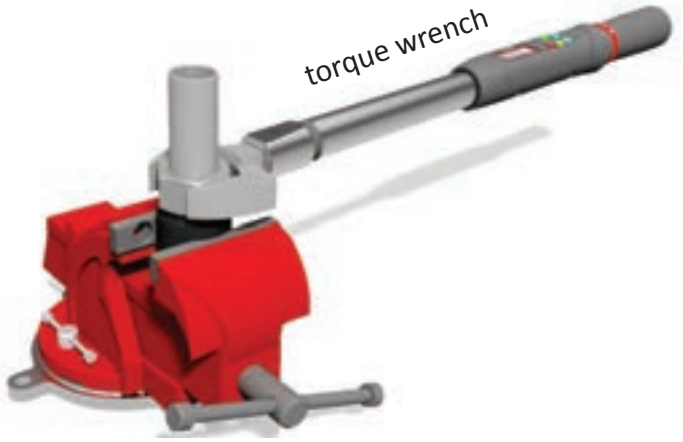
Series	PN [Bar]		Metric Thread	Ø Pipe	L1	D1	Pre-assembly	Final assembly	
	Standard ISO 8434-1	Above Standard					Stop shoulder contact	Nm	Turns of nut
L	250	315	M12x1.5	6	9,5	10	End of operation	50	1/4
			M14x1.5	8	9,5	12	End of operation	85	1/4
			M16x1.5	10	10	14	End of operation	115	1/4
			M18x1.5	12	10	16	End of operation	160	1/4
			M22x1.5	15	10	19	End of operation	210	1/4
	160		M26x1.5	18	10	23	End of operation	350	1/4
		160	M30x2	22	10,5	27	End of operation	520	1/4
	100		M36x2	28	11	33	End of operation	550	1/4
			M45x2	35	13	41	End of operation	1100	1/4
			M52x2	42	13	48	End of operation	1500	1/4
S	630	630	M14x1.5	6	9,5	10	End of operation	85	1/4
			M16x1.5	8	9,5	12	End of operation	130	1/4
			M18x1.5	10	10	14	End of operation	140	1/4
			M20x1.5	12	10	16	End of operation	200	1/4
			M22x1.5	14	10	19	End of operation	310	1/4
	400	400	M24x1.5	16	10,5	21	End of operation	350	1/4
			M30x2	20	12	26	End of operation	560	1/4
			M36x2	25	12	32	End of operation	700	1/4
	250		M42x2	30	13	36	End of operation	1100	1/4
		315	M52x2	38	13	44	End of operation	1600	1/4

MANUAL PRE-ASSEMBLY ON HARDENED PRE-ASSEMBLY TOOL WITH TORQUE WRENCH

Insert the pipe into the 24° cone of the tightening block until it rests on its stop. Then screw the nut using the torque wrench until the “B7”ring, compressed in the 24° cone seat, brings the stop shoulder in contact with the front of the hardened block.
This condition is signaled by a sudden increase in the tightening torque. During this operation it is important to keep the pipe in full abutment on the bottom of the block and to prevent any axial rotation of the pipe.



- The end of the preassembly occurs when the stop shoulder of the “B7” ring abuts against the front of the hardened preassembly block. This condition is signaled by a sudden increase in the tightening torque.



NOTES:

- The ISO 8434-1 standard also provides for direct pre-assembly on a carbon steel fitting. In this case, the fitting must be replaced each time it is tightened. The 24° seat of the fitting used must be checked in advance following the instructions in point 1 on page 15. The above also applies to stainless steel fittings for diameters 6-8-10-12 mm only.
- Stainless steel fittings with a diameter greater than 12 mm must be pre-assembled with hardened pre-assembly tools.
- Direct pre-assembly on the fitting’s body does not change the procedure used for this operation, the ring stop shoulder must always be in contact with the front of the fitting used.

B7

INSTRUCTIONS ON PRE-ASSEMBLY WITH AUTOMATIC MACHINE

SETTING OF THE PRE-ASSEMBLY MACHINE

Without prejudice to the mandatory compliance checks of the equipment, before proceeding with automatic assembly in series, make sure to calibrate the machine as follows:

Pre-assembly machine

Mandrel

Support plate

• To calibrate the automatic machine, use the indicated below table values, varying the operating pressure (bar) until the “B7” ring, compressed in the 24° cone seat, brings the stop shoulder of the “B7” ring in abutment with the front of the mandrel, making a correct pre-assembly.

Setting table:

Series	Ø Pipe	Nut thread	Machine pressure for carbon steel [bar]	Machine pressure for stainless steel [bar]
L	6	M12x1,5	30	40
	8	M14x1,5	35	45
	10	M16x1,5	40	50
	12	M18x1,5	45	55
	15	M22x1,5	55	65
	18	M26x1,5	60	70
	22	M30x2	65	80
	28	M36x2	75	100
	35	M45x2	125	155
	42	M52x2	155	200
S	6	M14x1,5	30	40
	8	M16x1,5	35	45
	10	M18x1,5	40	50
	12	M20x1,5	45	55
	14	M22x1,5	55	65
	16	M24x1,5	65	75
	20	M30x2	75	95
	25	M36x2	100	120
	30	M42x2	125	155
	38	M52x2	155	200

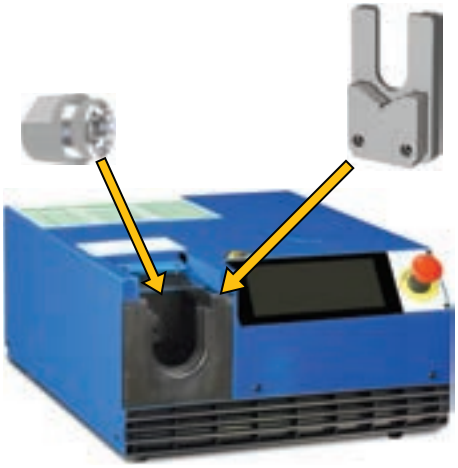
Note:

The values shown in the setting tables are indicative ones obtained from practical tests carried out in the Cast laboratory, which may vary according to the materials, tolerances of the components and pre-assembly machine used.

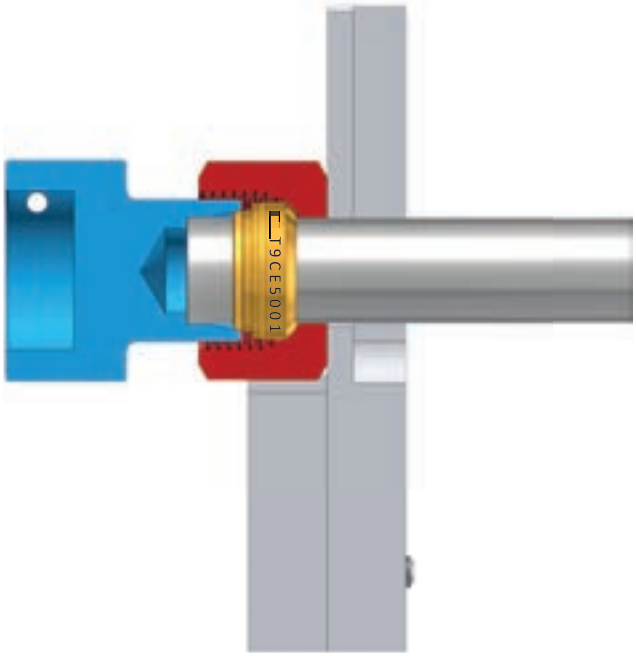
The values expressed in bars represent the pressures necessary to correctly perform the preassembly to push the stop shoulder of the “B7” ring on the mandrel front stop.

PRE-ASSEMBLY WITH MACHINE

- Check the conformity of the equipment with the appropriate buffers (see page 15). Install the mandrel and the support plate suited to the diameter and series for the pre-assembly to be carried out. It is imperative to repeat the check every 45-50 pre-assemblies for reasons of safety.



- Set the calibration pressure on the display or with the analogue selector in accordance with the values validated previously (with calibration of the actual operating pressure).
- Insert the pipe, complete with nut and ring as prepared previously in point 4 on page 17 fig. 6, inside the 24° cone of the mandrel bringing the nut in contact with the support plate.
- Hold the pipe firmly and against the bottom of the cone of the mandrel and press the start command to operate the machine.



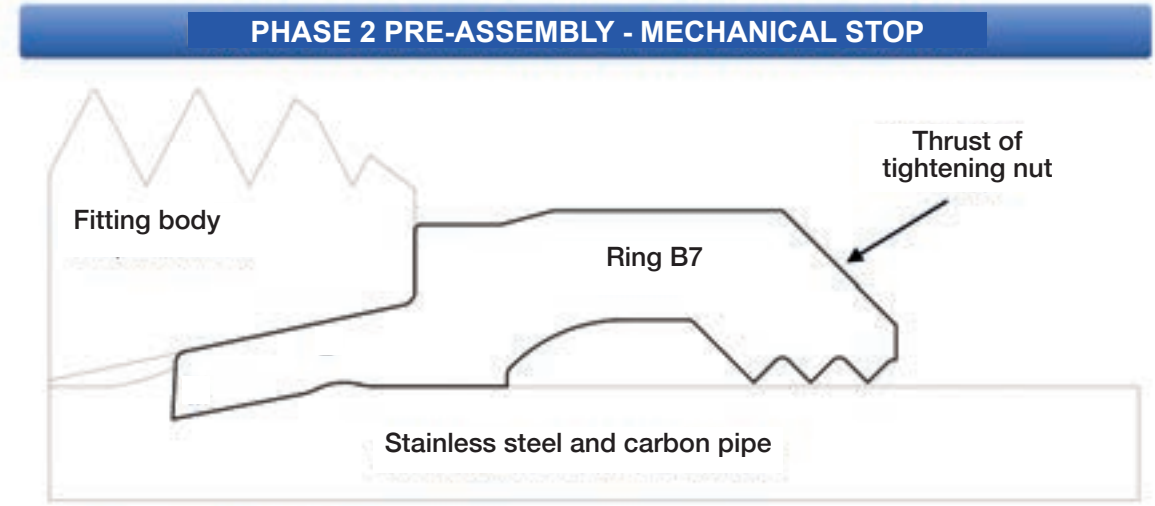
- Continue to hold the pipe firmly and in abutment during the full pre-assembly operation. This way the stop shoulder of the “B7” ring comes in contact with the front of the hardened mandrel.
- Pre-assembly is completed when the thrust cylinder has returned to its initial starting position.

NOTES:
Some operations may be slightly different depending on the type of machine used. However, the calibration carried out for initial setting certifies its suitability for use.

B7

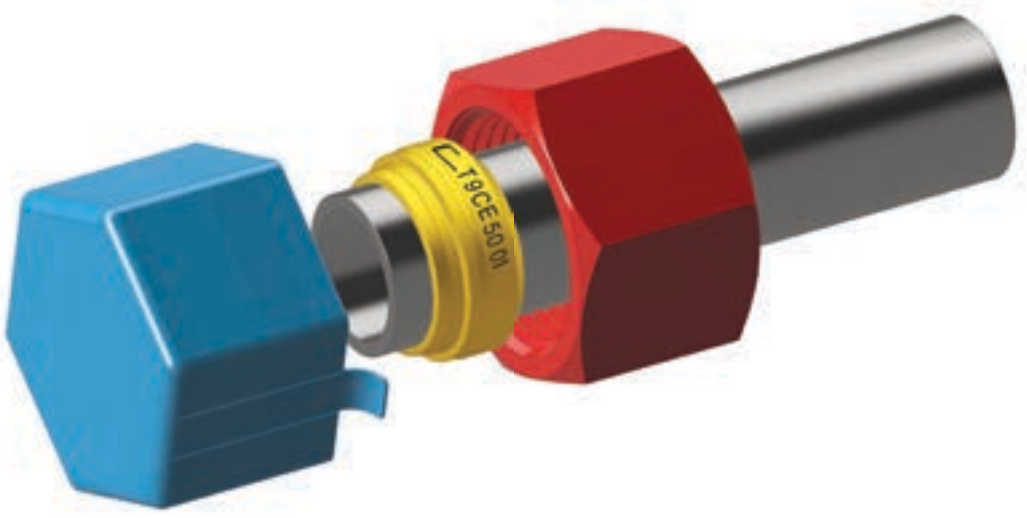
PRE-ASSEMBLY CHECK IS TO BE PERFORMED AT 100% OF THE TIGHTENINGS ACCORDING TO ISO 8434-1, DIN 3859-2 AND CAST S.p.A.

- Unscrew the nut, visually make sure that the stop shoulder of the cutting ring is in contact with the front of the product used (fitting, block or mandrel), remove the pipe and check that the “B7” cutting ring is blocked on the steel pipe. If the ring moves longitudinally, the pre-assembly is not compliant, it cannot be used and must be redone. It is a simple, objective check, without complications. The rotation of the ring on itself is normal and does not create any functional problems.



FINAL PRE-ASSEMBLY CHECK

- The last check to be carried out before final tightening on the machine is no less important, is of yield of the pipe.
- Insufficient thickness of the wall of the pipe, absence of longitudinal resistance of the pipes, the incorrect type of pipe and incorrect pre-assembly may result in problems with clinching of the ring on the pipe leading to loss of water-tightness and a significant decrease in safety.
- A good rule of thumb is to ensure that the yield (constriction on the internal 0 of the pipe) does not exceed 0.4 mm up to the external 0 of 16mm and 0.6 mm in the larger sizes.
- If the pipe is not immediately used for final assembly on the machine, protect the ends with plastic caps



INSTRUCTIONS ON FINAL ASSEMBLY ON THE MACHINE/SYSTEM

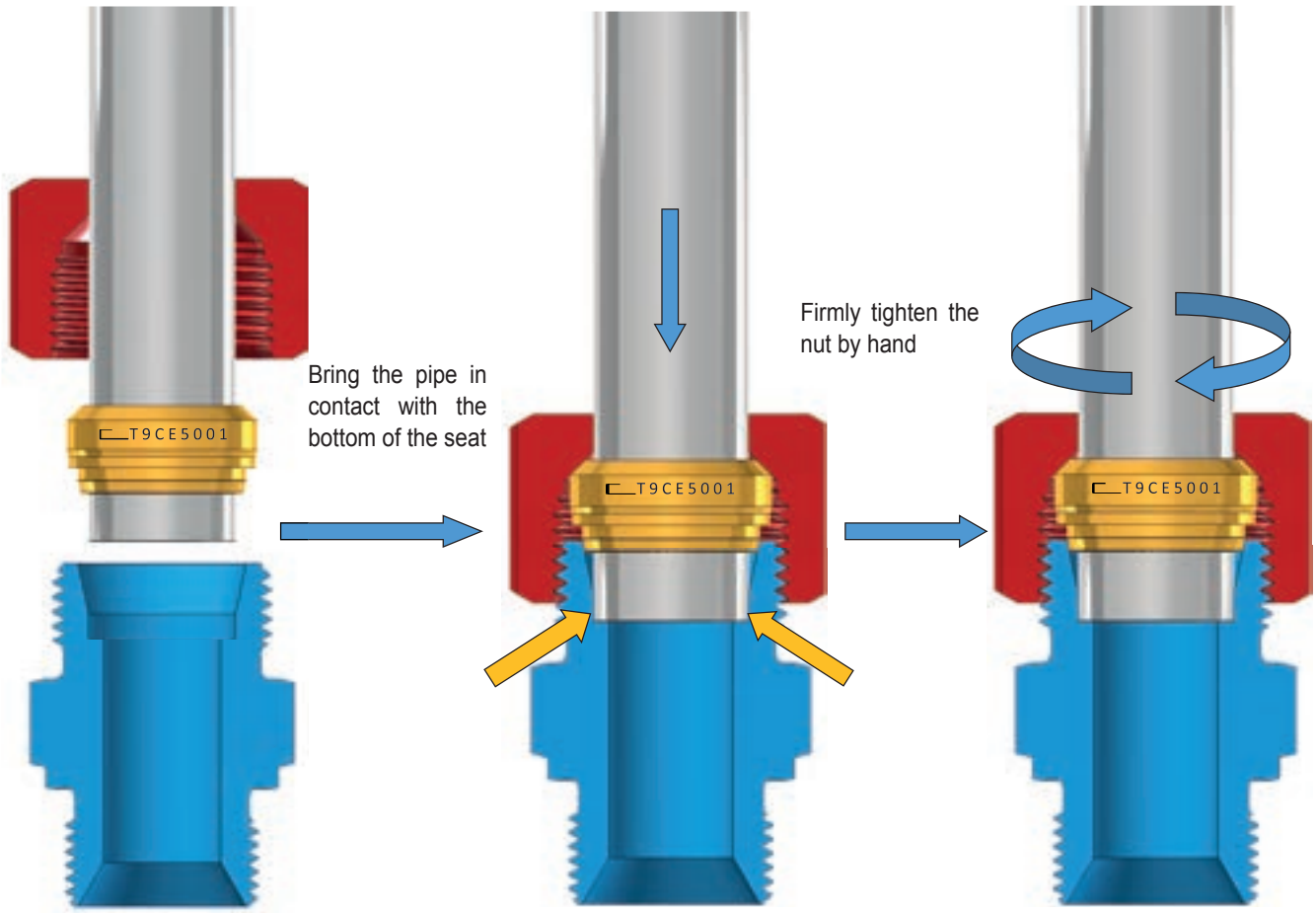
PERFORMANCE CHECK

- Before final tightening on the machine of the pipe previously pre-assembled with nut and ring, it is essential to make sure that the various components (nuts, rings, fittings, pipe, etc.) are in perfect working order, compliant and free from defects. Replace any that are non-compliant. Make sure the pipe is correctly aligned with the axis of the fitting. If it is not, fitting will be non-compliant; in which case alignment must be redone.
- Remove any plastic caps from the end of the pipes.
- Check that the pipes to be assembled are free of occlusions, bottlenecks or damage caused during the various processes of preparation. Replace non-compliant pipes.
- The above is imperative for correct functioning of the system.
- It is not allowed to mount components or items that do not comply with the reference standards.

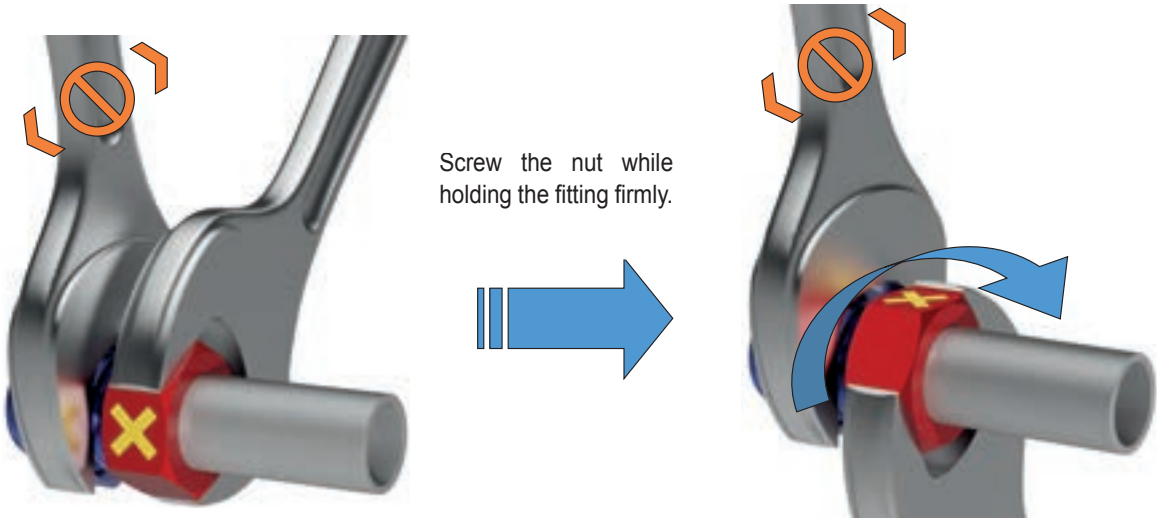
.

FINAL ASSEMBLY ON THE MACHINE/SYSTEM

- Insert the pre-assembled pipe into the 24° cone of the fitting bringing it in contact with the stop at the bottom. Holding the pipe against the stop and keeping it aligned with the fitting, tighten the nut firmly against the joint.



• Tighten the nut by wrench until the connection is compacted, from this point tighten with a further 1/4 turn. Alternatively, use the tightening torques shown in the following tables.



Tightening torques for final fitting on board the machine with torque wrench in Nm or fraction of a turn of the nut:

Series	ØPipe	Metric thread	Carbon steel Final assembly		Stainless steel Final assembly	
			Nm	Turn of nut	Nm	Turn of nut
L	6	M12x1,5	32	1/4	50	1/4
	8	M14x1,5	45	1/4	85	1/4
	10	M16x1,5	45	1/4	115	1/4
	12	M18x1,5	85	1/4	160	1/4
	15	M22x1,5	105	1/4	210	1/4
	18	M26x1,5	170	1/4	350	1/4
	22	M30x2	250	1/4	520	1/4
	28	M36x2	370	1/4	550	1/4
	35	M45x2	590	1/4	1100	1/4
	42	M52x2	660	1/4	1500	1/4
S	6	M14x1,5	35	1/4	85	1/4
	8	M16x1,5	55	1/4	130	1/4
	10	M18x1,5	55	1/4	140	1/4
	12	M20x1,5	90	1/4	200	1/4
	14	M22x1,5	140	1/4	310	1/4
	16	M24x1,5	170	1/4	350	1/4
	20	M30x2	280	1/4	560	1/4
	25	M36x2	500	1/4	700	1/4
	30	M42x2	620	1/4	1100	1/4
	38	M52x2	780	1/4	1600	1/4

Notes:
The values shown in the tightening tables are indicative ones obtained from practical tests carried out in the Cast laboratory, which may vary according to the materials and tolerances of the components used.

B7

EXPERIENCE AT THE SERVICE OF USERS

All the hydraulic components require particular attention to safety. Our company, which operates in the production of high pressure hydraulic fittings, intends to make its knowledge available while limiting, as far as possible, all errors, design oversights and superficiality. We must never forget that the product is intrinsically dangerous due to the high pressure involved. One of the most delicate phases which, when done correctly, can guarantee safe seal and performance, is that of assembly - when the operator acts directly on the components. The content of this document is based on our many years of experience in the field. We cover the most common errors involved in the assembly of fittings and the possible consequences of these, and instructions on how to correct these errors. This information is for the benefit of installers and end users, to help them improve quality and simplify their work and avoid the minor and major issues typical of large-scale industrial fitting. In the cases considered, we also wanted to provide a useful comparison between products based on standards, and those products specifically designed by CAST S.p.A. that exceed and, in our opinion, improve on the standard itself. 100% of all pre-assemblies carried out are in any case still given a check.

Ring B3
Made in carbon and stainless steel

STANDARD DIN 2353
Interchangeable
ISO 8434-1

Ring B4
Made in carbon and stainless steel

Cast design
Interchangeable
ISO 8434-1

Ring B6
Made in stainless steel

Cast design
Interchangeable
ISO 8434-1

HEAT TREATMENTS FOR STAINLESS STEEL RINGS

The surface hardening treatment of the stainless steel rings partially reduces the non-magnetic characteristic typical of this steel. A slight magnetism is therefore taken for granted and does not constitute a defect.

B7

RING “B7” PRODUCED IN CARBON AND STAINLESS STEEL

Multi-cutting ring with sequential variable geometry, Cast product interchangeable with all ISO 8434 - 1 compliant fittings. It guarantees maximum safety and simple and objective control for cost-effective and optimal fitting of the system.

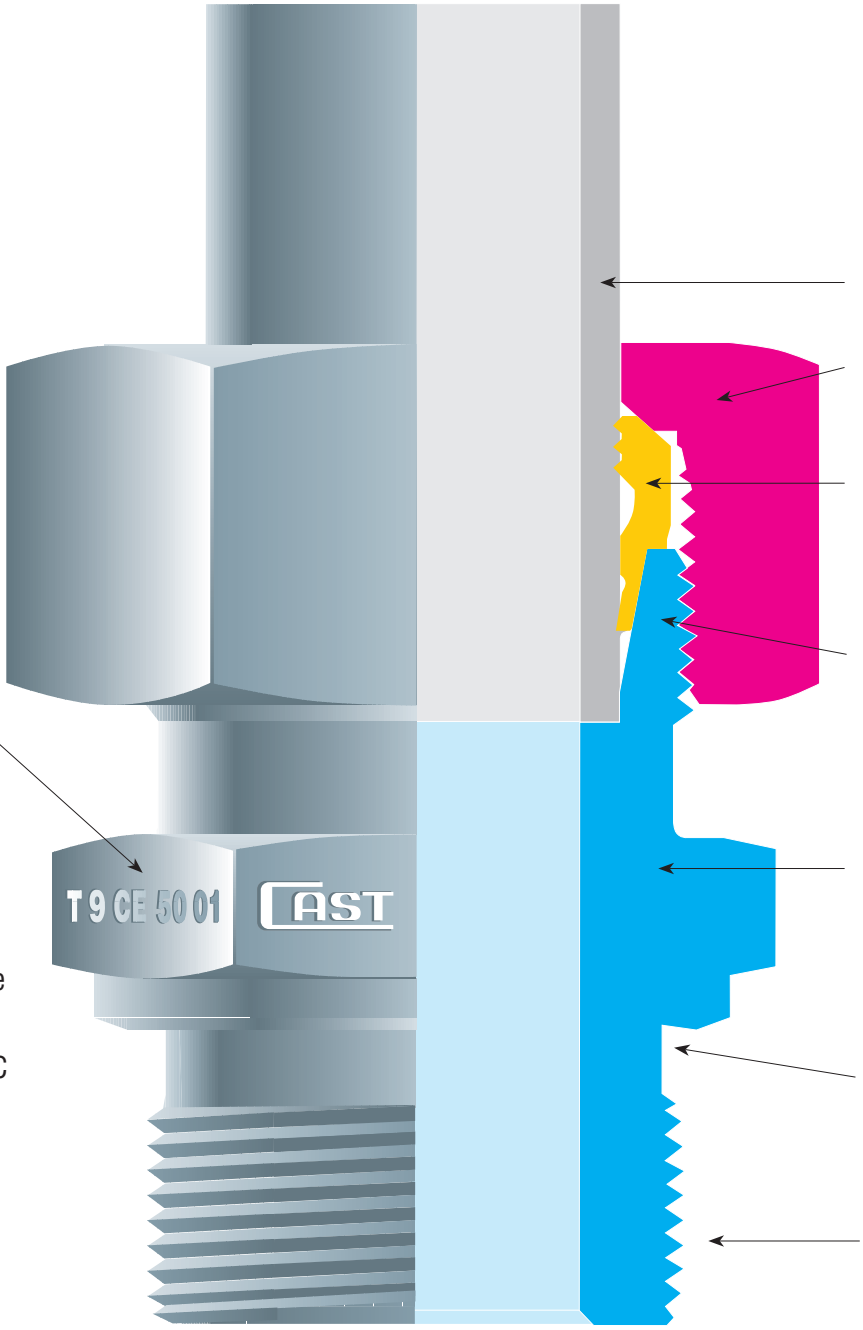
Industrial patent pending at the deliberating bodies

SAFETY IS ESSENTIAL

1. Before starting work, always check that the tools to be used are in perfect working order and comply with the requirements, the standard and the technical instructions.
2. Before starting work, always check that the products to be used comply with the standard: exceptions to this basic requirement are never allowed.
3. To correctly comply with points 1 and 2, it is essential that the operators have received correct and in-depth technical-cultural training on the work to be performed.
4. Technical training is essential to be able to carry out, correctly and consciously, the necessary checks on the tools and components/parts to be used, and to be able to set up the systems in a workmanlike manner.
5. Cultural training is essential. Operators must be aware that their work and their decisions to operate in one way rather than another, affect in a normal and natural way the outcome of the functionality and safety of any structure/system. They must be aware that their actions could potentially cause serious economic damage, major accidents and tragedies involving innocent victims responsible only for having trusted in the professionalism and expertise of the operators.
6. It goes without saying that since safety is at stake, not all responsibility can be assigned to the installation operators who, even if duly trained, need “Managers” to monitor their work and proper compliance with the standards and instructions for use provided by the manufacturer.
7. As already strongly emphasized, “Safety is essential” and does not allow exceptions of any kind. It must be ensured and maintained according to all the tolerance margins required by current legislation and by the mandatory instructions for use provided by the manufacturer.
8. In the following pages are some of the most common errors and faults, with an explanation of the causes and the solutions to be taken.

OUTLINE DIAGRAM OF JOINT SYSTEM ISO 8434 - 1, DIN 2353 WITH "B7" MULTI-CUTTING RING WITH SEQUENTIAL VARIABLE GEOMETRY

DIN 2353 JOINT SYSTEM



Reference requirements:

Pipe E 235
EN 10305-4

Nut
DIN 3870

Cutting Ring "B7"
Interchangeable
DIN 3861- B

Form of the seat
DIN 3861

Fitting body
ISO 8434-1

Seat of
metal-to-metal seal
ISO 1179-4

Threaded end
ISO 1179-4

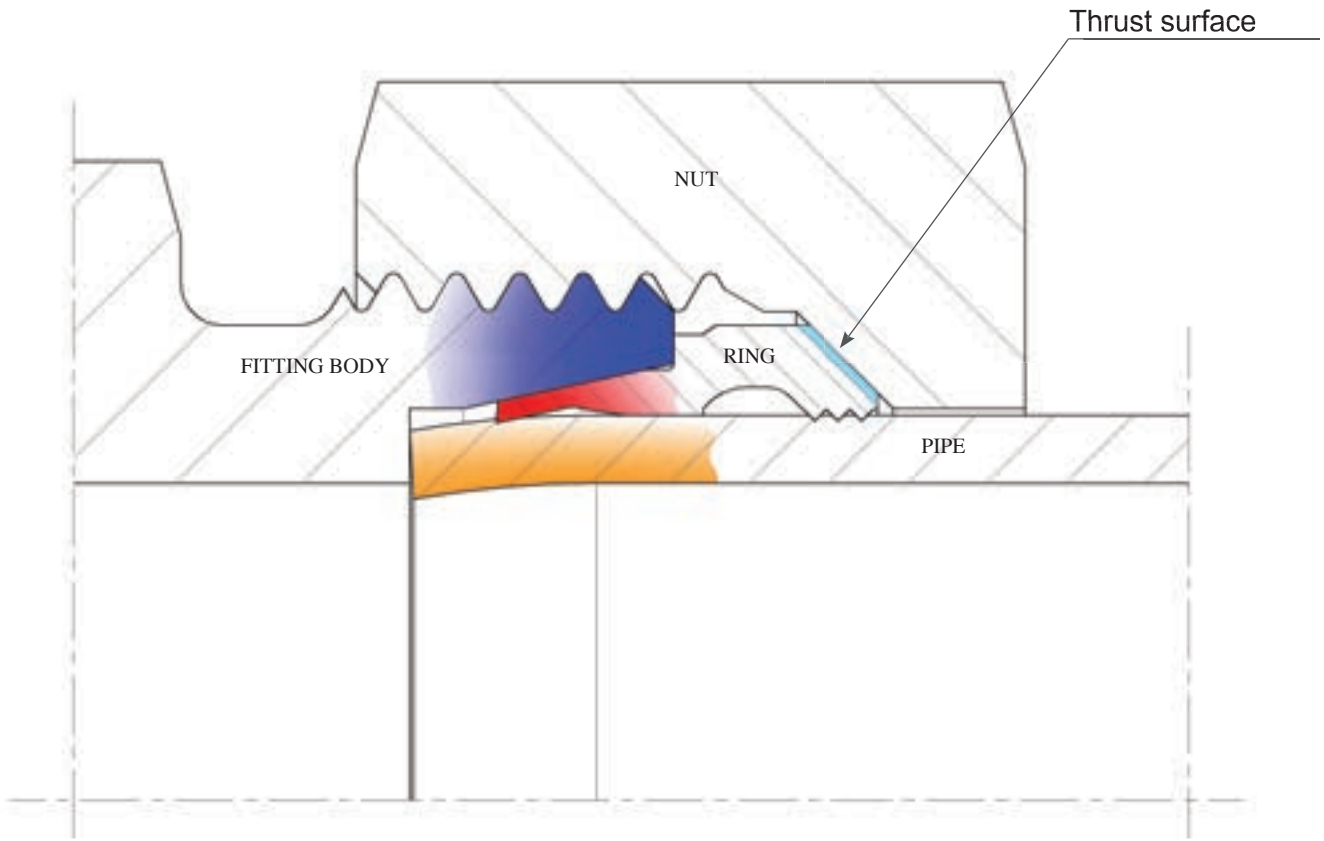
Decoding of traceability:

CAST = producer

- T = Production site
- 9 = Year of manufacture
- CE = Produced in the EEC
- 50 = Type of steel used
- 01 = Casting no of the steel used

"B7" CUTTING RING FITTINGS

ASSEMBLY ON A 24° OVERSIZE SEAT (NOT COMPLIANT)



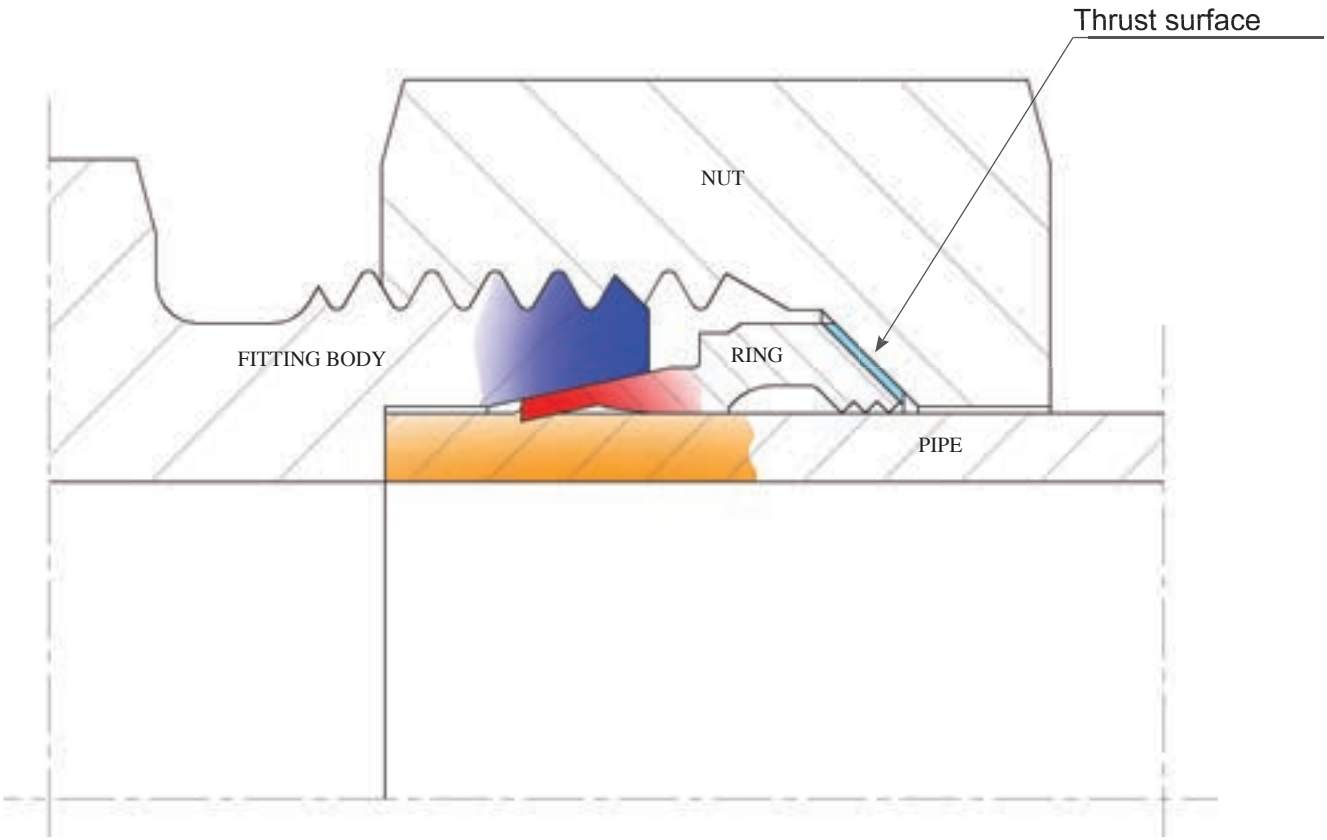
BEHAVIOUR OF ASSEMBLY:
An oversized (non-compliant) 24° cone seat causes insufficient clamping of the first cutting edge of the ring to the steel tube..

CONSEQUENCES:
Reduction of safety with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
Replace the defective item with one with a compliant 24° cone seat and repeat the assembly.

"B7" CUTTING RING FITTINGS

ASSEMBLY ON A 24° UNDERSIZE SEAT (NOT COMPLIANT)



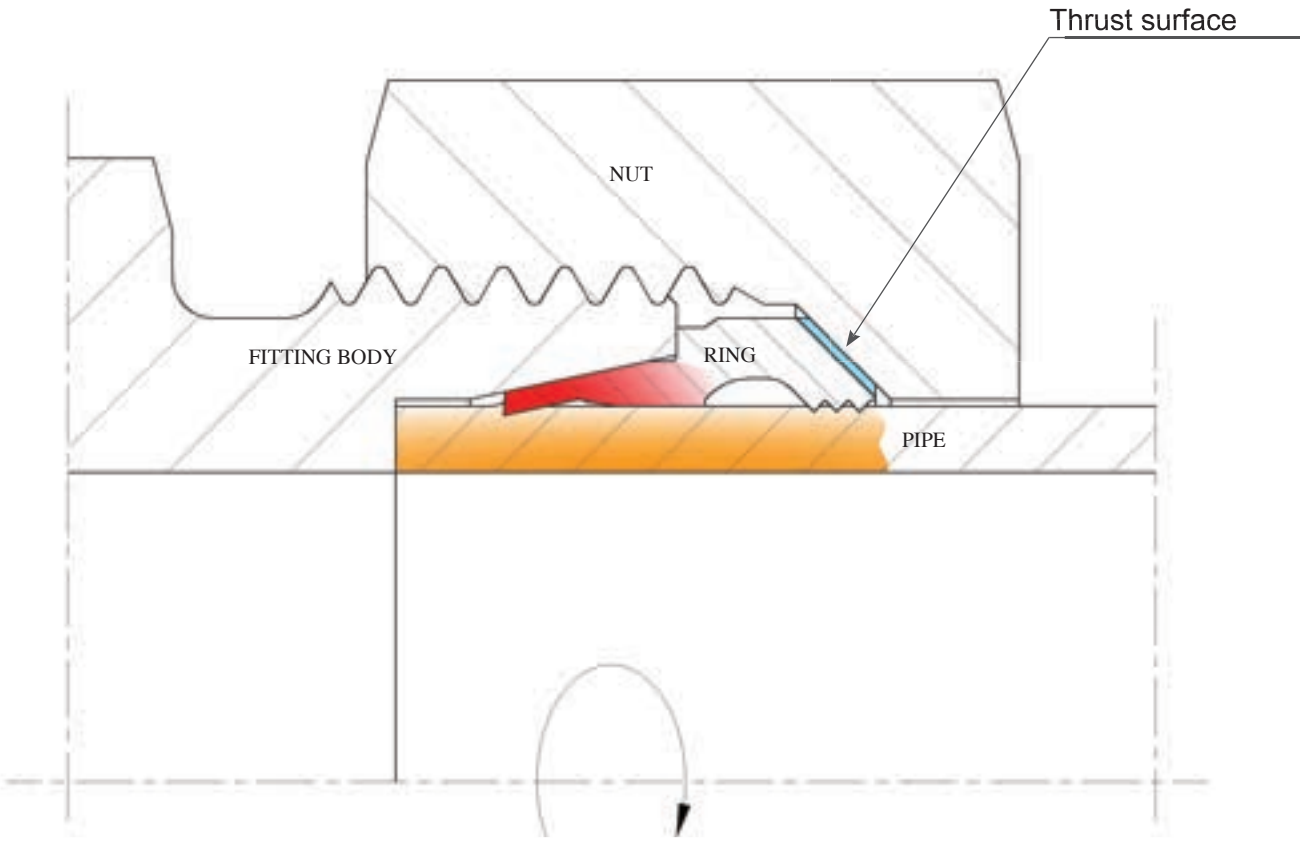
BEHAVIOUR OF ASSEMBLY:
A smaller (non-compliant) 24° cone seat causes the wrong positioning of the cutting ring being too far back from the pipe front, impairing the correct system sealing.

CONSEQUENCES:
Sliding of the steel pipe with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
Replace the defective item with one with a compliant 24° cone seat and repeat the assembly.

"B7" CUTTING RING FITTINGS

PIPE THAT ROTATES DURING THE TIGHTENING PHASE



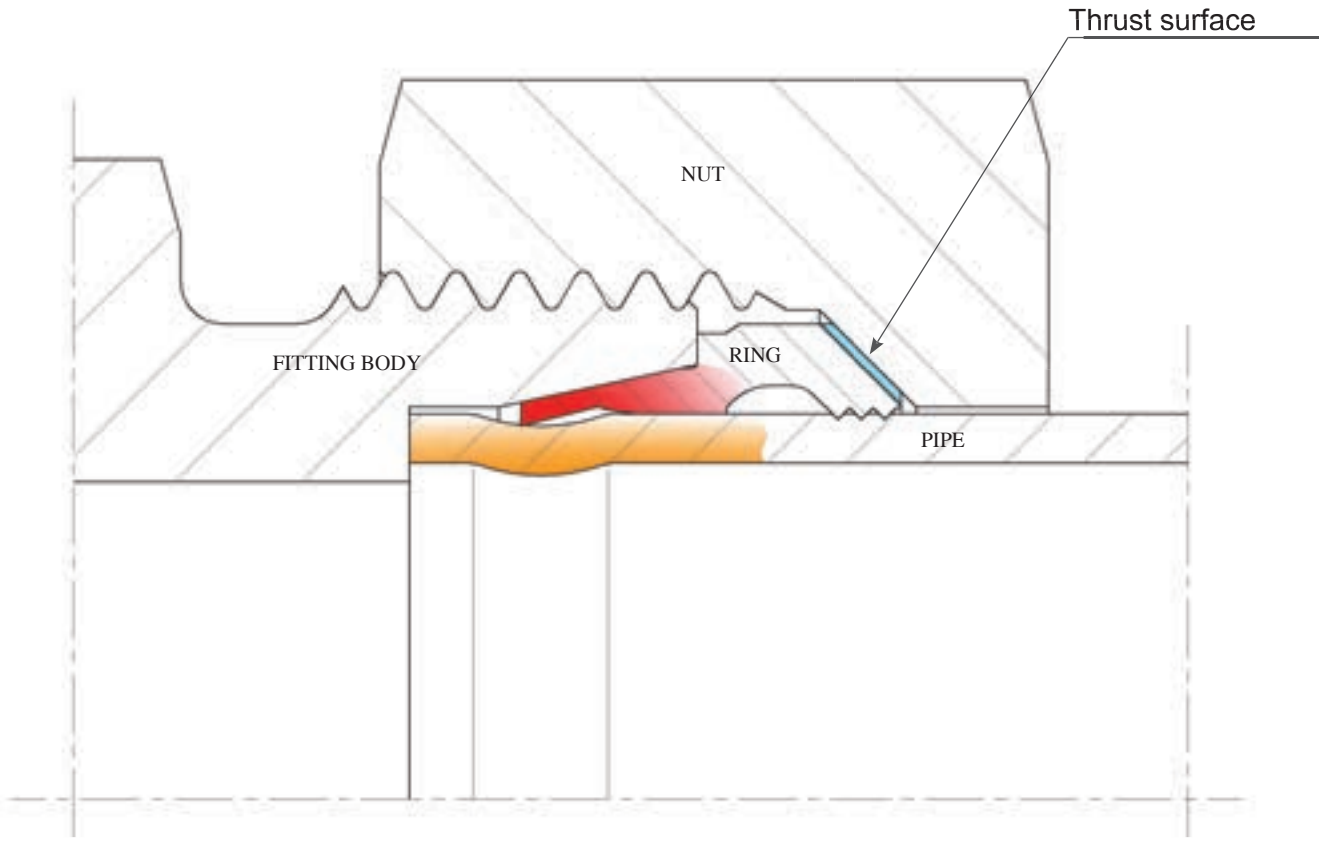
BEHAVIOUR OF ASSEMBLY:
Rotation of the pipe does not allow the cutting ring to properly clinch on the steel pipe.

CONSEQUENCES:
Loss of fluid from the fitting with the possibility of causing damage to people and property.

MEASURES TO BE APPLIED:
Repeat assembly, preventing rotation of the steel pipe.

"B7" CUTTING RING FITTINGS

THIN WALL PIPE (NON-COMPLIANT)



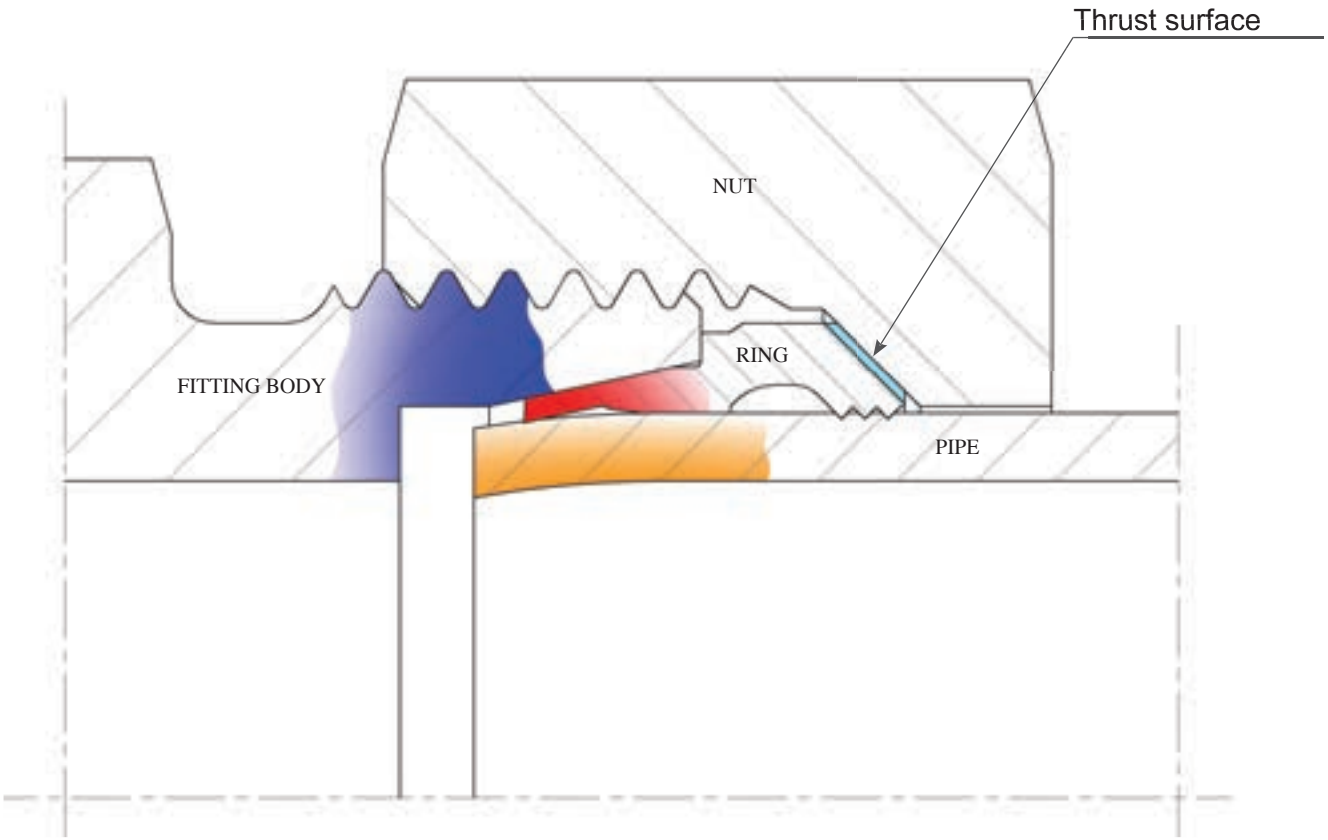
BEHAVIOUR OF ASSEMBLY:
A thin-walled pipe does not offer the necessary resistance to the pressure exerted by the cutting ring during the tightening phase. The pipe yields and does not allow correct clinching of the cutting ring on the steel pipe.

CONSEQUENCES:
Sliding of the steel pipe with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
Repeat assembly using an appropriate pressure sleeve or replacing the pipe with a compliant one (see pages 8-9).

"B7" CUTTING RING FITTINGS

PIPE NOT INSERTED AT THE BOTTOM OF THE 24° SEAT



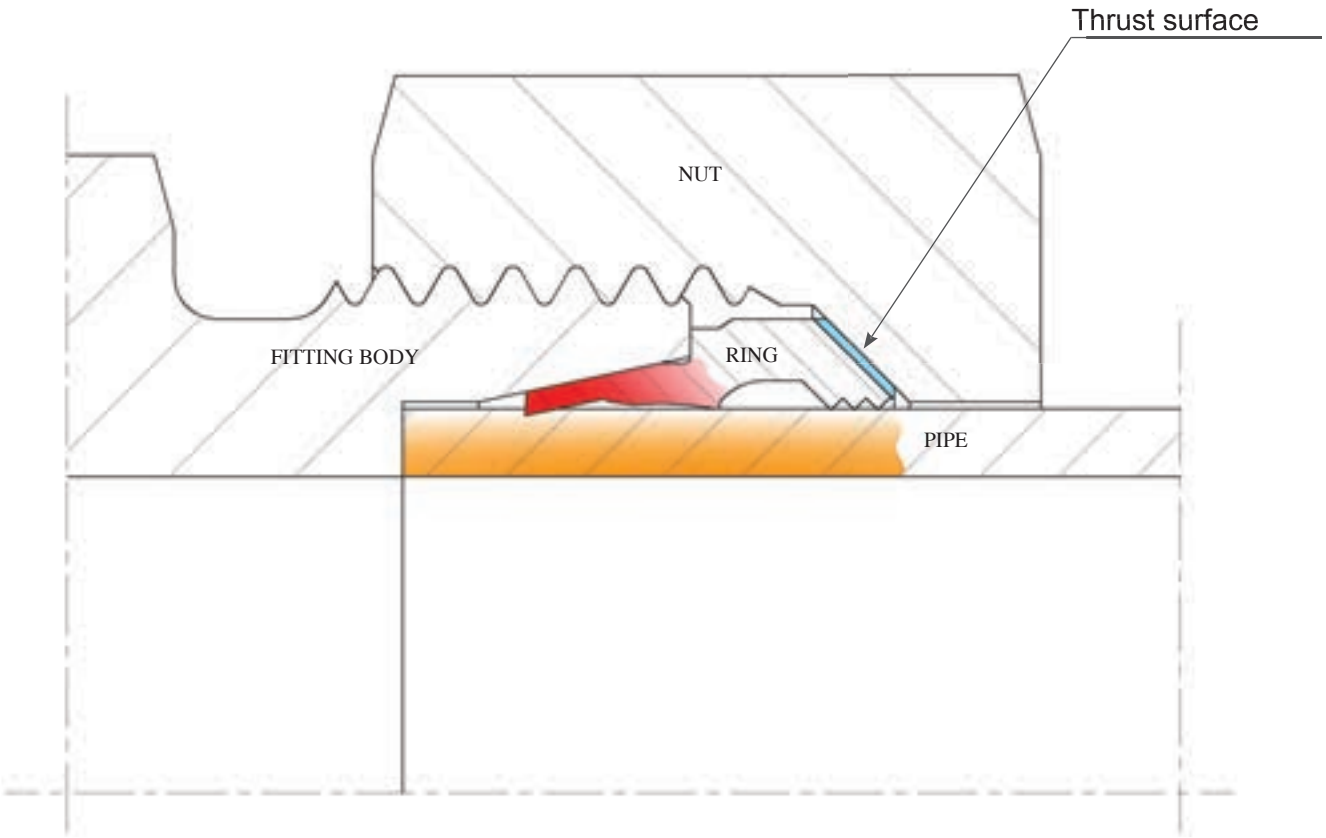
BEHAVIOUR OF ASSEMBLY:
A pipe not in contact with the stop leads to failure of the end of the pipe and incorrect clinching of the cutting ring on the steel pipe.

CONSEQUENCES:
Fluid leakage from the fitting with the chance of causing serious damage to people and properties.

MEASURES TO BE APPLIED:
Repeat assembly making sure that the pipe is in contact with the stop.

"B7" CUTTING RING FITTINGS

EXCESSIVE HARDNESS OF THE PIPE (NON-COMPLIANT)



BEHAVIOUR OF ASSEMBLY:
A pipe with excessive hardness on the external diameter does not allow correct clinching of the cutting ring on the steel pipe.

CONSEQUENCES:
Sliding of the steel pipe with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
Repeat assembly using a pipe with a suitable hardness (see pages 8-9).
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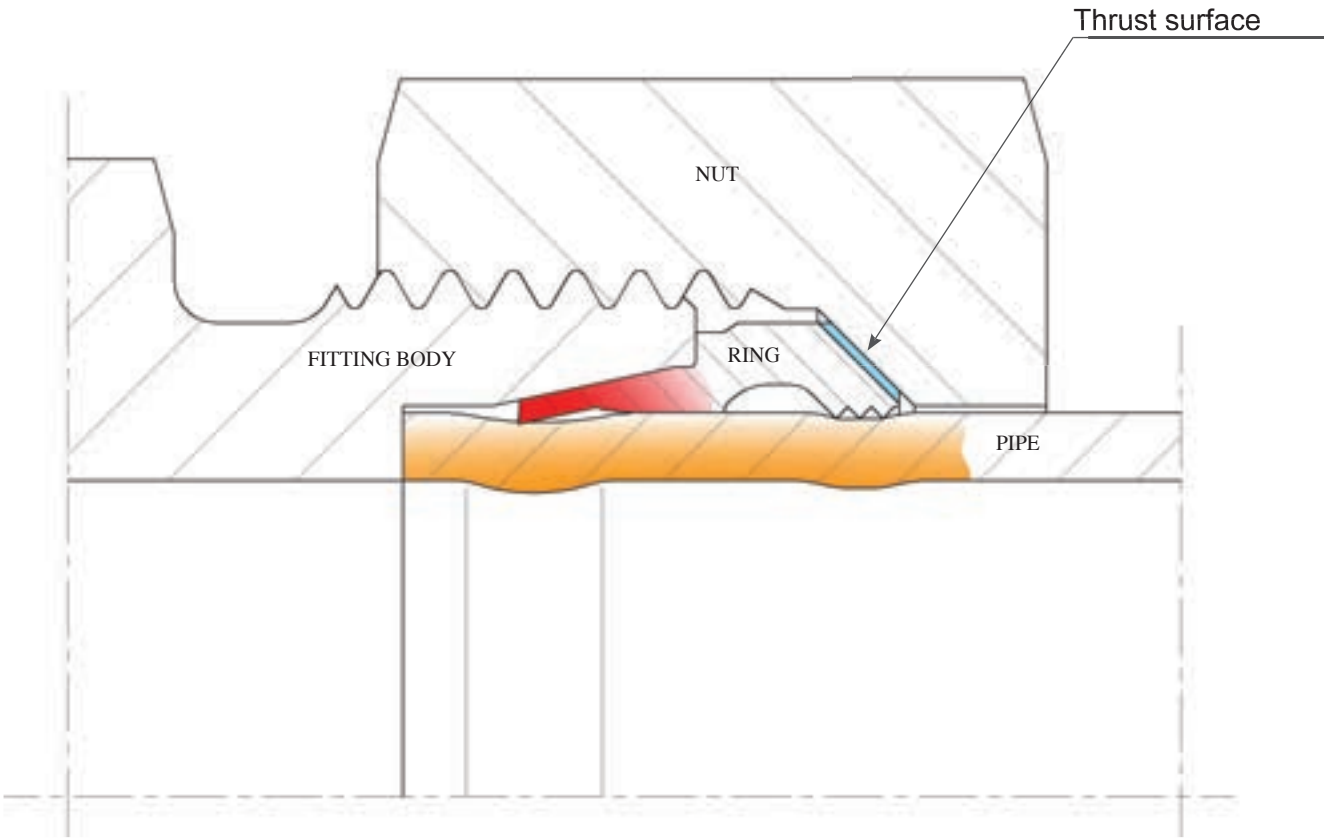
"B7" CUTTING RING FITTINGS

PIPE WITH A LOWER THAN PERMITTED HARDNESS (NON-COMPLIANT)



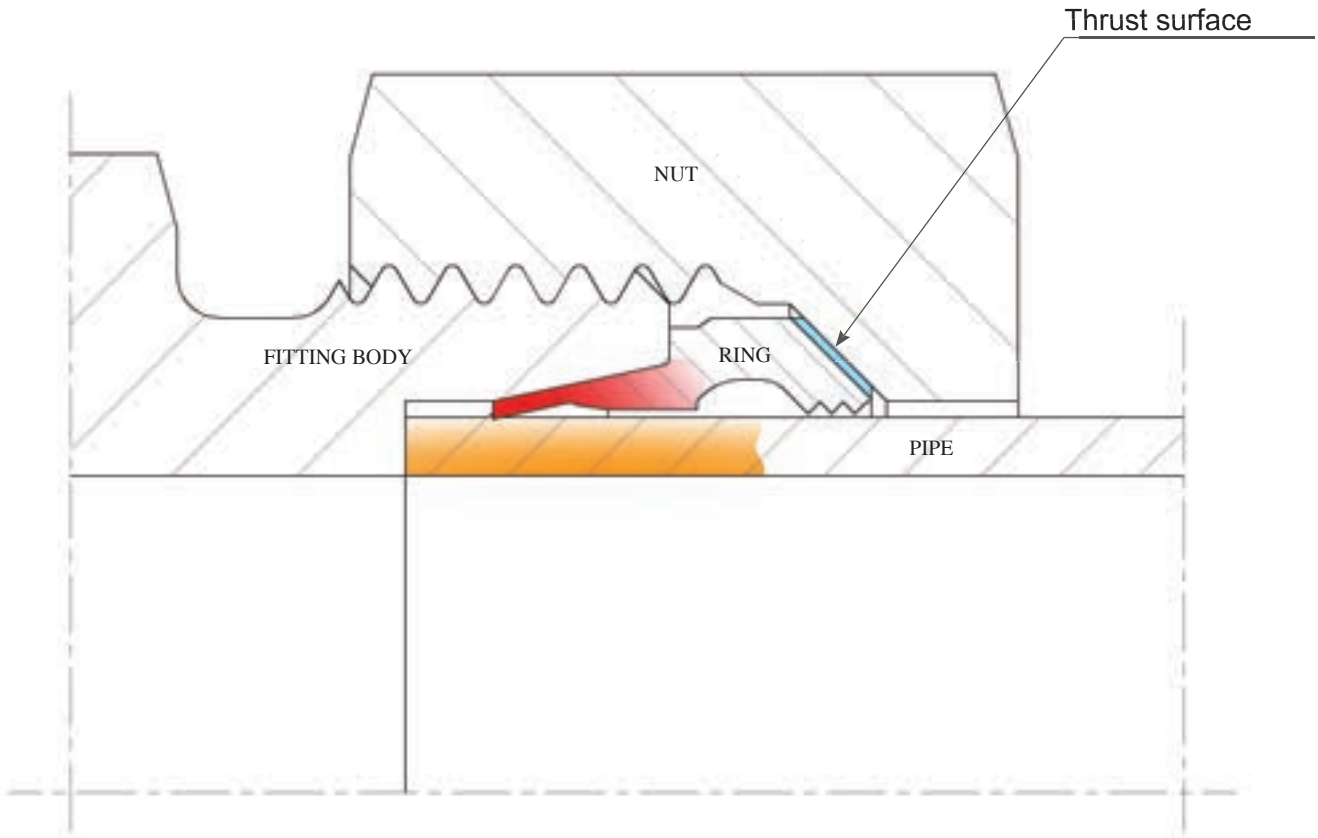
BEHAVIOUR OF ASSEMBLY:
A pipe with a reduced hardness on the external diameter is also normally less structured and does not offer the necessary resistance to the pressure exerted by the cutting ring during the tightening phase. The pipe yields and does not allow correct clinching of the cutting ring on the steel pipe.

CONSEQUENCES:
Fluid leakage from the fitting with the chance of causing serious damage to people and properties.

MEASURES TO BE APPLIED:
Repeat assembly using a pipe with a suitable hardness (see pages 8-9).

"B7" CUTTING RING FITTINGS

OUTER DIAMETER OF THE PIPE OF LESS THAN NOMINAL SIZE (NON-COMPLIANT)



BEHAVIOUR OF ASSEMBLY:
A pipe with a smaller outer diameter does not allow proper clinching of the cutting ring on the steel pipe.

CONSEQUENCES:
Sliding of the steel pipe with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
Repeat assembly using a pipe with conforming dimensions (see pages 8-9).
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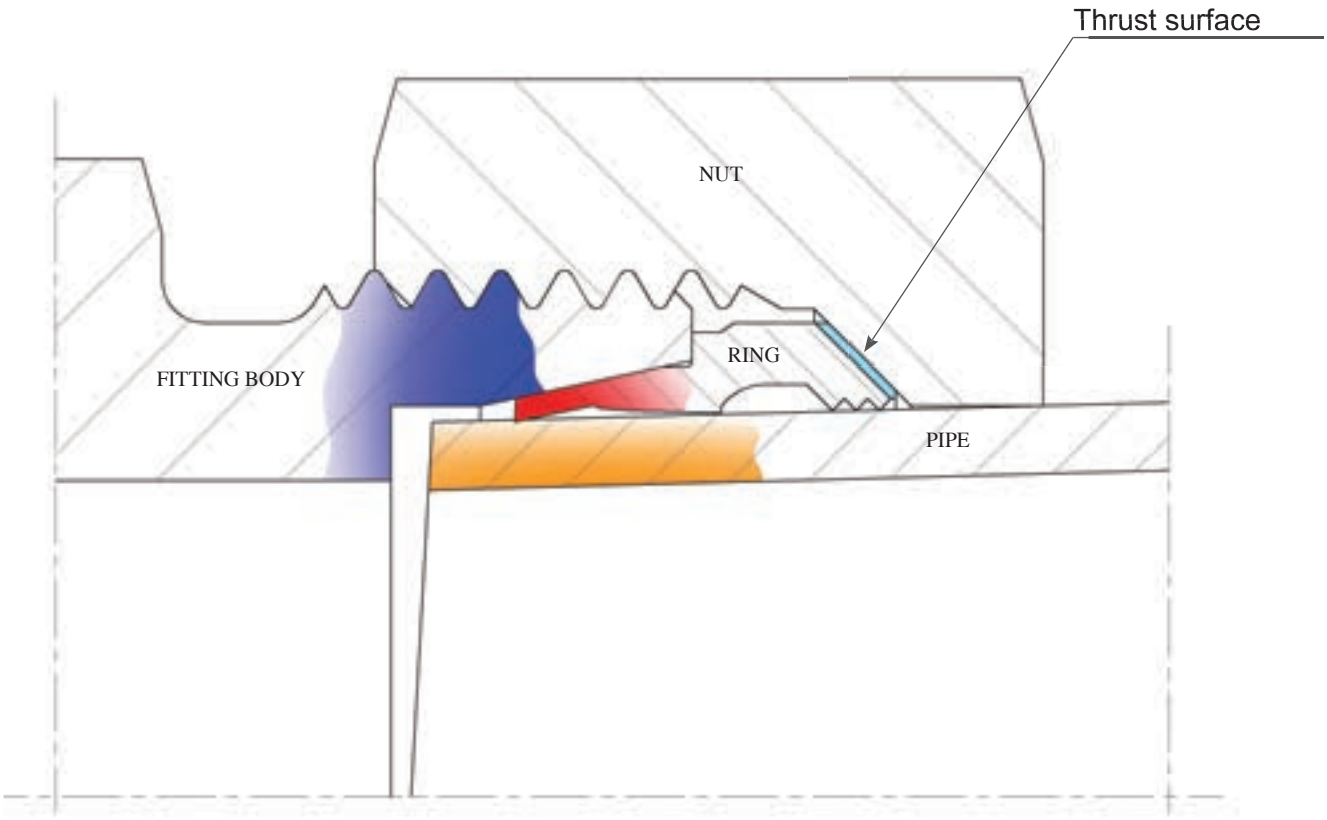
"B7" CUTTING RING FITTINGS

INCORRECTLY CUT PIPE (NON-COMPLIANT)



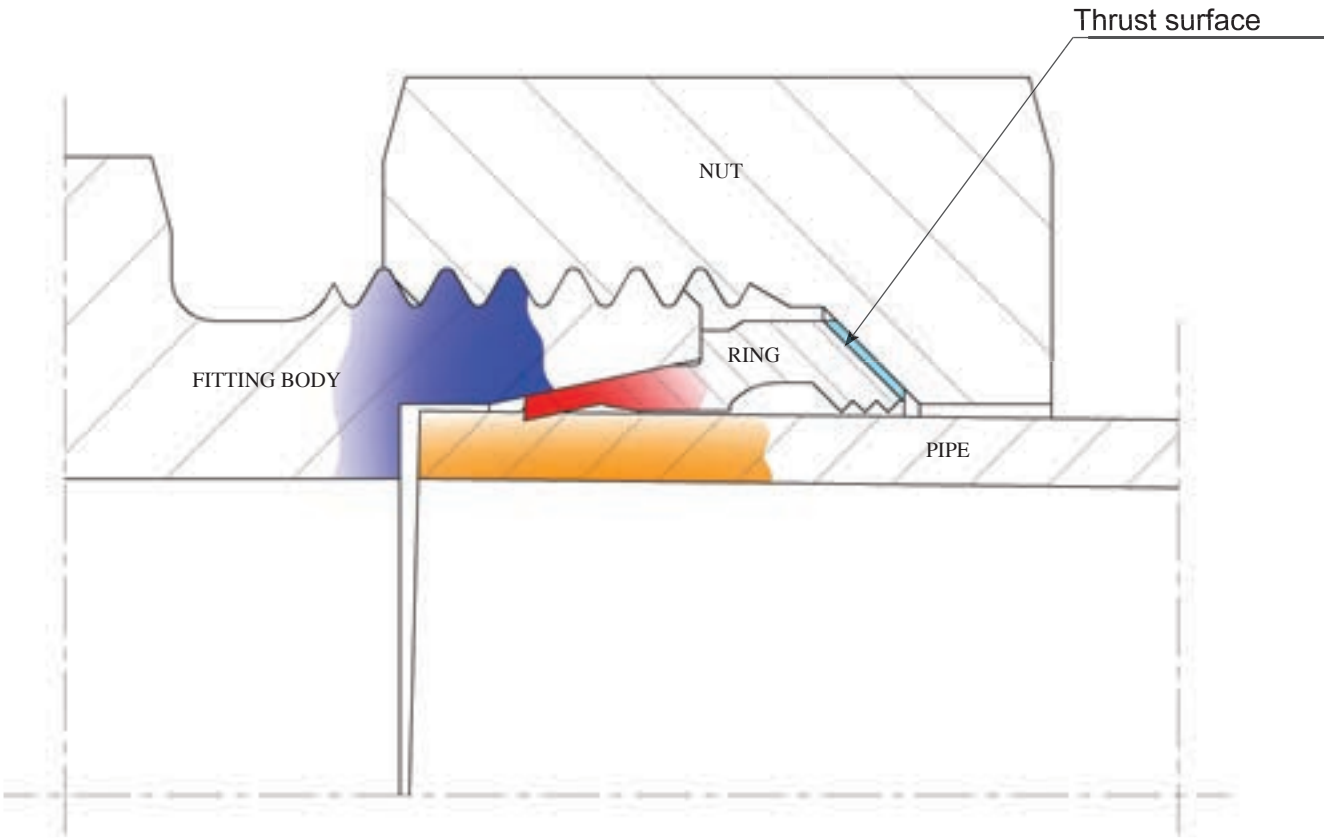
BEHAVIOUR OF ASSEMBLY:
An incorrectly cut pipe does not allow correct clinching of the cutting ring on the steel pipe.

CONSEQUENCES:
Sliding of the steel pipe with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
Repeat assembly making sure that the steel pipe is cut perpendicular to its axis.

"B7" CUTTING RING FITTINGS

PIPE NOT ALIGNED WITH THE AXIS OF THE FITTING AND NOT BRACKETED



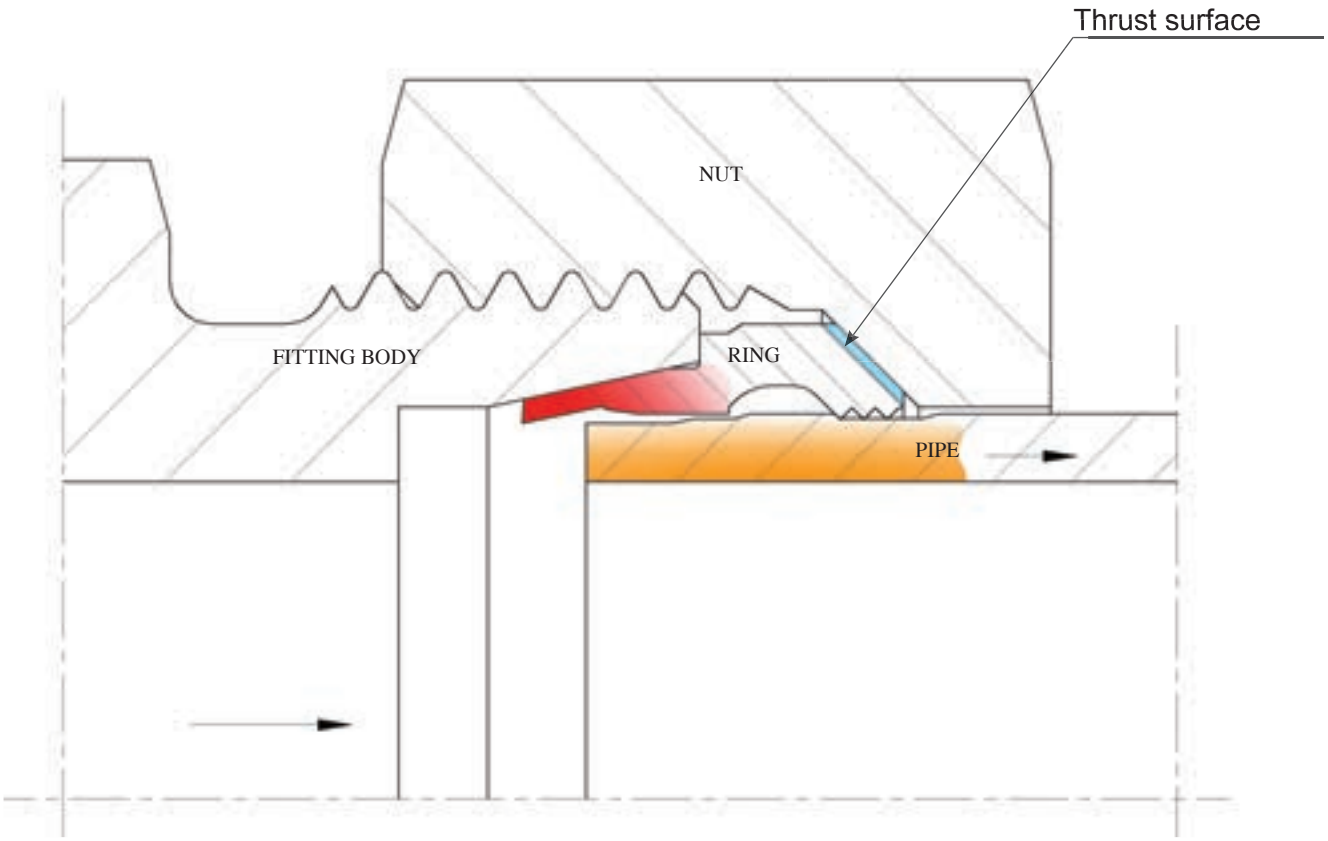
BEHAVIOUR OF ASSEMBLY:
A pipe not aligned with the axis of the fitting does not guarantee a correct seal of the joint between the cutting ring clinched on the steel pipe and the 24° seat of the fitting.

CONSEQUENCES:
Leaking of fluid from the fitting and possible extraction of the steel pipe with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
The pipe must be aligned with the axis of the fitting and fixed with the appropriate brackets.

"B7" CUTTING RING FITTINGS

SYSTEM WITH PRESSURE PEAKS HIGHER THAN PERMITTED



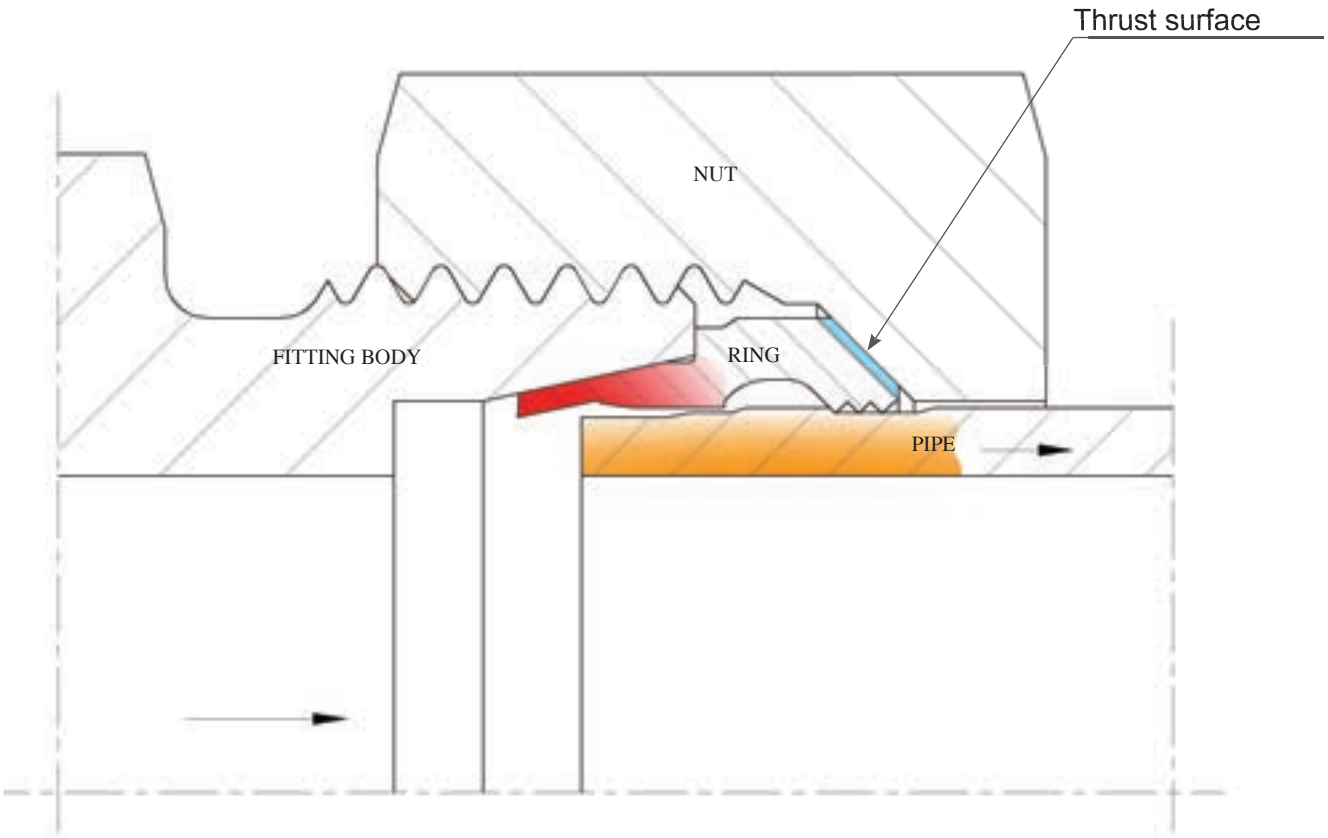
BEHAVIOUR OF ASSEMBLY:
During use (under pressure) it is possible the duly clinched steel pipe will slide after the cutting ring pierces the previously clinched part of the pipe.

CONSEQUENCES:
Sliding of the steel pipe with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
Design the system in such a way as to avoid pressure peaks that are higher than permitted.

"B7" CUTTING RING FITTINGS

SYSTEM WITH PRESSURES HIGHER THAN PERMITTED



BEHAVIOUR OF ASSEMBLY:
During use (under pressure) it is possible the duly clinched steel pipe will slide after the cutting ring pierces the previously clinched part of the pipe.

CONSEQUENCES:
Sliding of the steel pipe with the possibility of causing serious damage to people and property.

MEASURES TO BE APPLIED:
Design the system in such a way as to avoid pressures that are higher than permitted.

B7

REQUIREMENTS FOR THE CUTTING RING "B7"

The ring "B7" permits assembly directly on the machine with carbon steel fittings, while the pre-assembly of the stainless steel fittings must be carried out with hardened pre-assembly tools, starting from diameter 15 mm and up, following the instructions on pages 18 - 19 - 20 of this catalogue and on pages 15 - 16 - 17 - 18 - 23 - 24 - 25 of this technical newsletter.

- *Use only CAST products and components to make the desired connection during a fitting process, in order to avoid litigation and damage to property and people.*
- *Fully apply the general instructions, standards of use, safety factors, assembly instructions and operating pressures of the fitting to be used in the installation.*
- *Strictly observe the indicated temperature range, the specified pressure variations and the required pressure values in bar.*
- *Observe the specified tightening values and the essential and detailed assembly instructions.*
- *Lubricate all the components with the products indicated in the assembly instructions.*
- *Use only the carbon and stainless steel pipes referred to on pages 8-9 of this catalogue.*
- *Use pressure sleeves on all the thin-walled steel pipes.*
- *The coupling of carbon components with stainless steel ones is not recommended.*
- *Always check that the components to be used are free from defects.*
- *Always check the correct alignment of the system, pipes, connections and actuators.*
- *It is not allowed to use pipes or fittings or make connections that are non-compliant.*
- *It is not allowed to alter CAST products in any way.*
- *Strictly observe all the instructions in this Catalogue - Technical Newsletter 2020.*

Failure to comply with any of the above requirements can alter the functional safety of the products and render the warranty null and void. In case of doubt always err on the side of caution.

It is not allowed to use and combine components of different manufacturers of hydraulic fittings. The company and traceability marks on the product are used.

The user is not allowed to carry out modifications or repairs on the hydraulic fittings produced by our company. The user will otherwise assume all responsibility for his work and any damage caused to the environment, to people and to property.

Pressurized fluids can cause serious damage to people and property. It is therefore necessary to always pay the utmost attention, observe all the requirements and take all precautions to ensure the safety of oneself and of others, in order to avoid any accident.

It is forbidden to use components (pipes, fittings, etc ...) that are non-compliant.

PRODUCT LIABILITY - VALID FOR ALL SERIES

Presidential Decree 224 - EEC 85/347 states: "... liability will be attributed to the party found to have been negligent." Specifically, the Producer will be held legally liable only if the product is actually defective in design or in execution/production, due to negligence or wilful misconduct.

On the other hand, the Distributor who made the sale must have made sure that his customer is effectively aware of all the technical issues inherent in the product itself, such as the assembly instructions, and that he is using it for the correct applications.

Likewise, the End User will be held liable if, due to negligence, superficiality or wilful misconduct, he has not scrupulously followed the written instructions of the Manufacturer (Technical Commercial Catalogue) which must be provided to him as a technical aid by the Distributor who sold the product. If the End User does not have these instructions, he may request them directly from our offices, who will send them accordingly.

By virtue of this law, CAST S.p.A. declines all responsibility if the user does not strictly and fully apply the GENERAL INSTRUCTIONS, RULES OF USE, SAFETY FACTORS, ASSEMBLY INSTRUCTIONS and WORKING PRESSURES as well as any other technical information clearly indicated in our Technical Commercial Catalogue and/or the product has been modified or altered not by CAST S.p.A., as failure to comply with these mandatory requirements or any changes made may alter the functional safety of the products and render the warranty null and void. As per the aforementioned legislation, there is a deductible of 500.00 Euros.

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INDEX FOR THE CUTTING RING “B7”

TECHNICAL NEWS INDEX

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