

 **IPCO**



**IPCO PLUG**

**CATALOGUE // IPCO PLUG**



**The most service-oriented and specialised manufacturer and supplier of IPCO Plug and leak detection equipment for heat exchangers.**

IPCO has been a leading company for over 30 years, specialising in safe and sustainable products for the maintenance, repair and testing of heat exchangers in various process systems.

In order to meet the expectations and needs of our customers, we offer a comprehensive range and a complete service package.

- › Advice on making the right product choice
- › Provide technical support
- › Guidance on projects and turnarounds
- › Provide product training
- › Repair and calibration of equipment under own management
- › 24/7 availability

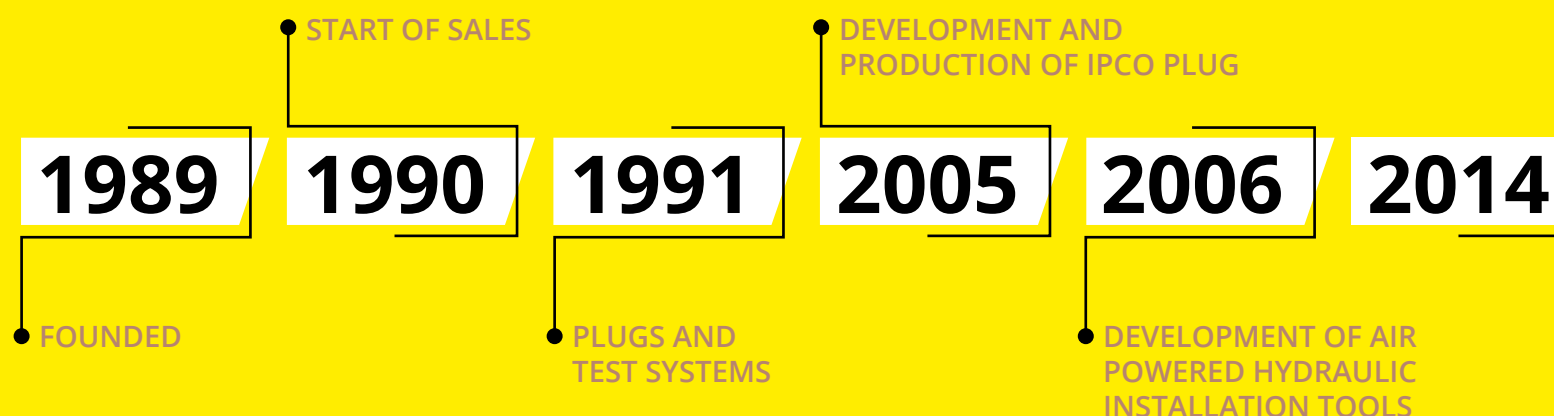
Not surprisingly, IPCO is considered the most service-oriented and specialised supplier in the process industry!

### ISO QUALITY SYSTEM

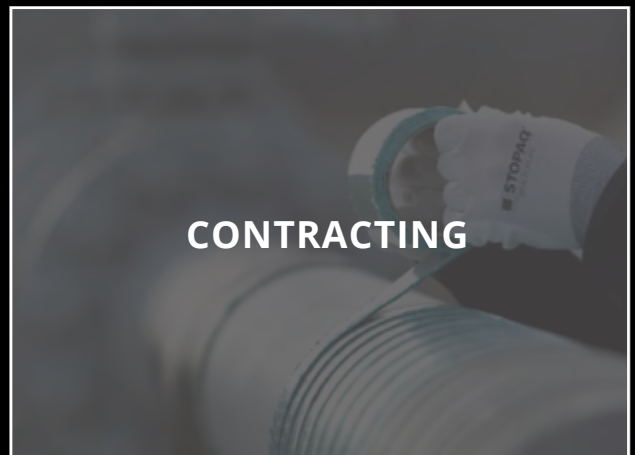
As an organisation, IPCO has a quality system that meets the ISO 9001 international standard. This demonstrates that IPCO continuously develops, implements and improves its operating processes. The focus of the ISO standard is on the quality of the internal organisation which guarantees a constant quality of the products. By achieving this standard, the customer can be assured of complete confidence and satisfaction.

### PRODUCT DEVELOPMENT

The market in which IPCO operates is constantly changing. New insights into regulations and specific material requirements lead to new products. During the design phase, IPCO draws on the professional knowledge and practical experience of experts. This is done with one common goal: a safe, innovative and user-friendly product of high quality.



## Other // branches



COMPREHENSIVE DEVELOPMENT,  
COMBINATION OF DIAMETER RANGE AND  
OPERATING PRESSURE

**2015**

IPCO PLUG X4 ON  
THE MARKET

For more information please  
visit: [www.ipcoplug.com](http://www.ipcoplug.com)



## Order information // IPCO Plug

When ordering, you should have the following information at hand:

- › Size and wall thickness of the tube.
- › Thickness of the tube sheet, diameter and pitch of the holes.
- › Material of the tube and the tube sheet.
- › Maximum operating pressure and temperature.
- › Are the pipes rolled (expanded) and/or welded?
- › Dimensions of any water box / channel head or baffles present.
- › Condition of the pipes and the age of the heat exchanger.

### DELIVERY TERM FOR IPCO PLUGS

Significant quantities of the standard sizes in standard materials are usually available in stock for immediate supply. For the other sizes, the lead time is no longer than the actual production time, because the production takes place in the Netherlands. For exact delivery times, larger sizes or alternative materials, please contact IPCO BV or your local IPCO Plug partner.

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## The IPCO Plug //

IPCO Plugs (IPX1 and IPX4) can seal heat exchangers tubes safer and faster than traditional systems. This saves you a lot of time and money. In short: **Maintenance without delay!**

IPCO Plugs are also certified according to the Pressure Equipment Directive (PED). This means that: the design and manufacture of IPCO Plugs meet strict, essential safety requirements. This offers the asset owner peace of mind.

- › Provides a safe and reliable seal.
- › Does not cause damage to adjacent tubes and the tube sheet, thanks to the controlled installation force.
- › Is reliable during the life of the heat exchanger under the most severe conditions.
- › Has a correct, simple and clear check of the sizing of the pipe, thanks to the supplied sizing caliber.
- › Has dimensions and codes based on the metric system.
- › Has lower installation costs compared to welded, explosive or other mechanical plugs.
- › Is systematically subjected to leak, blow out, deformation and break tests.



# Pressure Equipment Directive // (PED)

IPCO Plugs are placed in pressure equipment (heat exchangers). There are risks associated with pressure equipment. IPCO Plugs meet the essential safety requirements laid down in the PED Directive. IPCO has procedures in place that guarantee that production always complies with the guidelines. The PED label is a requirement for high quality products.



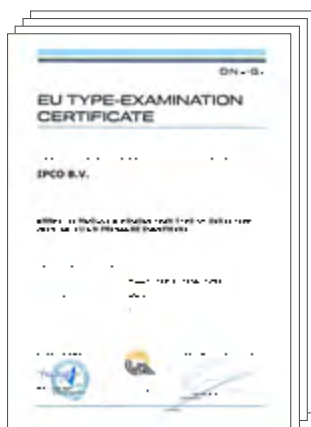
IPCO Plugs are manufactured under strict supervision:

- › The production line of the plugs is fully traceable and identifiable.
- › All materials used have a valid material certificate.
- › The plugs are subjected to various tests throughout the entire process.
- › IPCO is ISO-9001 certified and thus guarantees constant quality of the IPCO Plug.

To ensure all of this, IPCO Plugs are certified according to PED modules D and B. These modules are linked to the ISO certification. This documents all relevant matters, such as the applicability of pressure and temperature (these apply according to EU standards) and harmonised materials, calculations and drawings. IPCO does everything possible to deliver safe and sustainable products. IPCO also sets high requirements for suppliers, raw materials, storage, product packaging and internal and external quality controls. All of this to completely take care of the customer.



ISO 9001 certificate



Module B certificate IPCX1



Module B certificate IPCX4



Module D certificate Plugs

## IPCO Plug X1 // (IPX1) Kit

An IPX1 kit consists of 10 plugs, a brush and a sizing calibre. X1 Plugs are available in the following materials: Carbon steel (C), Brass (B), Duplex (D) and Stainless Steel 316L (S), 304L (E), 321 (ST), 904L (SV), Monel (M), 16Mo3 (A) and Titanium (T). Other materials are available upon request. Always choose a material similar to the pipe or the pipe plate of the heat exchanger! This will prevent chemical and/or thermal reactions between materials.



### OPERATING PRESSURE AND TEMPERATURE IPX1

The IPX1 can withstand extremely high working pressures and therefore works in all heat exchangers under the toughest conditions. The maximum working pressure and temperature of the IPX1 depend on the size and material of the plug. If the application sets even higher requirements for the plug than what is already possible by default, IPCO can carry out additional examinations and tests on request to meet your specifications.





**IPCO PLUG X1 SIZES***Other sizes available on request.*

<b>IPCO PLUG KIT X1</b>	<b>RANGE IN MM</b>	<b>POSITIONER</b>	<b>PULL ROD</b>	<b>PULL ROD EXTENSION</b>	<b>REMOVAL TOOL</b>		
IPK-100-X	10,0 - 10,5	IPPP100	IPST-M05	IPSTV-M05	IPVG100-110		
IPK-105-X	10,5 - 11,0	IPPP105-110					
IPK-110-X	11,0 - 11,5						
IPK-115-X	11,5 - 12,0	IPPP115-125	IPST-M06	IPSTV-M06	IPVG115-125		
IPK-120-X	12,0 - 12,5						
IPK-125-X	12,5 - 13,0						
IPK-130-X	13,0 - 13,5	IPPP130-145			IPSTV-M06	IPVG130-165	
IPK-135-X	13,5 - 14,0						
IPK-140-X	14,0 - 14,5						
IPK-145-X	14,5 - 15,0						
IPK-150-X	15,0 - 15,5	IPPP150-165	IPSTV-M06	IPVG130-165			
IPK-155-X	15,5 - 16,0						
IPK-160-X	16,0 - 16,5						
IPK-165-X	16,5 - 17,0						
IPK-170-X	17,0 - 17,5	IPPP170-190			IPST-M08	IPSTV-M08	IPVG170-215
IPK-175-X	17,5 - 18,0						
IPK-180-X	18,0 - 18,5						
IPK-185-X	18,5 - 19,0						
IPK-190-X	19,0 - 19,5						
IPK-195-X	19,5 - 20,0	IPPP195-215	IPSTV-M08	IPVG170-215			
IPK-200-X	20,0 - 20,5						
IPK-205-X	20,5 - 21,0						
IPK-210-X	21,0 - 21,5						
IPK-215-X	21,5 - 22,0	IPPP220-240					IPSTV-M08
IPK-220-X	22,0 - 22,5						
IPK-225-X	22,5 - 23,0						
IPK-230-X	23,0 - 23,5						
IPK-235-X	23,5 - 24,0						
IPK-240-X	24,0 - 24,5	IPPP245-265			IPSTV-M08	IPVG220-265	
IPK-245-X	24,5 - 25,0						
IPK-250-X	25,0 - 25,5						
IPK-255-X	25,5 - 26,0						
IPK-260-X	26,0 - 26,5						
IPK-265-X	26,5 - 27,0						

## IPCO Plug X4 // (IPX4) Kit

An IPX4 kit consists of 10 plugs and a sizing calibre. The X4 plugs have a standard operating pressure (Ps) of 100 bar and a much larger range than the X1. The advantage of the larger range is that less stock is needed and that ordering the correct size is easier.

X4 Plugs are available in the following materials: Carbon steel (C), Brass (B), Monel (M), and Stainless Steel 316L (S) 304L (E), 321 (ST), 904L (SV). Other materials are available upon request. Always use a material similar to the material of the pipe and pipe plate to prevent thermal and/or chemical reactions between different materials.

### OPERATING PRESSURE AND TEMPERATURE IPX4

While the working pressure of the X4 is 100 bar, the temperature of the IPX4 remains dependent on the material of the plug. If the application sets even higher requirements for the plug than what is already possible by default, IPCO can carry out additional examinations and tests on request to meet your specifications.





**Broad range for  
simple selection and  
stock management.**

## IPCO PLUG X4 SIZES

*Other sizes available on request.*

IPCO PLUG KIT X4	RANGE IN MM	POSITIONER	PULL ROD	PULL ROD EXTENSION	REMOVAL TOOL
IPX4-153-X	15,3 - 17,5	IPX4-PPB153-175	IPST-M06	IPSTV-M06	IPVGX4150-175
IPX4-170-X	17,0 - 19,5	IPX4-PPB170-195			IPVGX4170-195
IPX4-195-X	19,5 - 22,0	IPX4-PPB195-220	IPST-M08	IPSTV-M08	IPVGX4195-220
IPX4-215-X	21,5 - 24,0	IPX4-PPB215-240			IPVGX4215-240
IPX4-240-X	24,0 - 26,5	IPX4-PPB240-265	IPST-M10	IPSTV-M10	IPVGX4240-265
IPX4-265-X	26,5 - 29,0	IPX4-PPB265-290			IPVGX4265-290
IPX4-290-X	29,0 - 31,5	IPX4-PPB290-315	IPST-M10	IPSTV-M10	IPVGX4290-315
IPX4-315-X	31,5 - 34,0	IPX4-PPB315-340			IPVGX4315-340
IPX4-340-X	34,0 - 36,5	IPX4-PPB340-365	IPST-M10	IPSTV-M10	IPVGX4340-365
IPX4-365-X	36,5 - 39,0	IPX4-PPB365-390			IPVGX4365-390
IPX4-390-X	39,0 - 41,5	IPX4-PPB390-415	IPST-M10	IPSTV-M10	IPVGX4390-415

## Accessories // IPCO PLUG

### IPCO PLUG INSTALLATION SET

The installation set consists of a hydraulic ram and hose with an air-driven hydraulic foot pump. The set is supplied in a robust plastic trolley case. The IPCO Plug ram is specially designed to install the IPCO Plug and a high level of safety was taken into account in this design. The ram has a robust breakout protection as standard. In the most extreme case, this prevents the pull rod from coming out of the ram. It is possible to remove this breakout protection when working in very small or limited spaces. In addition, the IPCO Plug ram always installs the plug in one go. This saves time, prevents human error, improves the performance of the IPCO Plug and prevents damage to the tools.



### PULL ROD AND PLUG POSITIONER

It is necessary to use the correct pull rod to install the IPCO Plug. Both IPCO Plugs X1 and X4 use the same four pull rods. Per size range, it consists of a pull rod, a knurled nut and a spacer ring. The X1 and X4 do have each their own series of positioners, all of which are listed in the tables on pages 9 and 11.



### PULL ROD EXTENSION

To install a plug, the complete IPCO Plug pull rod is required. If necessary, a pull rod extension can be added. The pull rod extension is used if water boxes, channel heads and/ or baffles are present or with Air Fin Coolers. The extension is connected to the (standard) complete IPCO Plug pull rod. The IPCO Plug pull rod extension is available as standard in lengths of 300mm. This allows the user to build up the complete IPCO Plug pull rod in steps to the desired length.



## CALIBER SET

For checking the correct plug size, a sizing caliber is used. Each IPCO Plug kit contains a caliber as standard. With a complete caliber set (supplied in a case), you have all the IPX1 plug sizes at your fingertips. With this caliber set, you can also determine which brush is required for the installation to install the IPX4 plug. This prevents unnecessary stock or products to be returned afterwards. The engraved size number of the caliber corresponds with the size of the IPX1 plug or IPX4 brush.



## BRUSH SET

Before the tube or tube sheet is safely sealed, the inside must be brushed. The IPCO Plug brush has been developed for 3 applications:

- › Cleaning, removal of deposits, pitting and oxidation / corrosion
- › Re-rounding the tube or tube sheet hole
- › Roughening the material surface so that the plug gets a good grip.

Two versions of brushes are available: a HT brush for hard materials and a brush for soft materials. The brushes are available in three ways: separately or as a kit within the IPX4 size range. In addition, IPCO supplies the brushes as a complete set in a case. Enabling you to always have the correct brush size at hand.



## IPCO PLUG REMOVAL TOOL

In rare cases, it may be necessary to remove plugs. For example, if the pipe is insufficiently pre-processed or is cracked/ torn during excessive (post-) rolling. With the IPCO Plug removal tool, plugs can be removed evenly, quickly and easily. This manual tool consists of one whole piece that makes it strong, robust and durable.



## IPCO PLUG // Production

The production of each IPCO Plug is an extremely careful and extensive process. The IPCO Plug is a unique product, which takes into account European laws, rules, standards and norms. IPCO uses as many raw materials as possible from the EU and that fit within the harmonised standards.

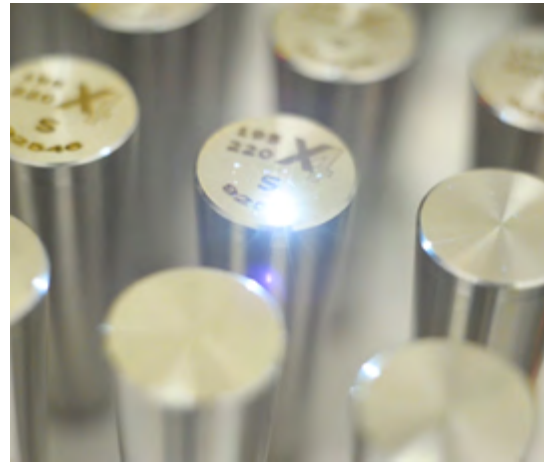
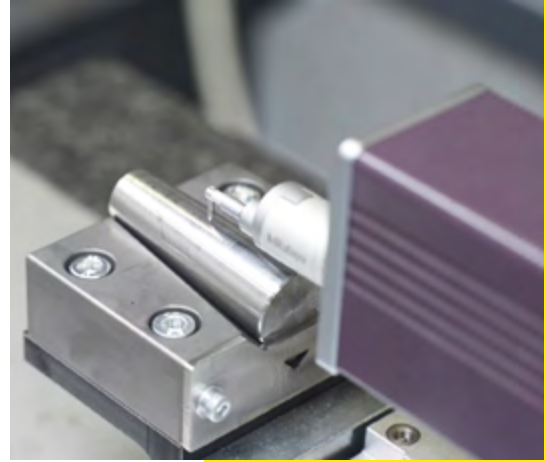
### THE DESIGN

The IPCO Plug is designed to not only meet the applicable standards. In addition, the IPCO Plug fits perfectly with existing dimensions of heat exchanger tubes of both BWG, SWG (in inches) and DIN in millimetres. If an installation uses both standards, usually one IPX4 plug fits within the design. For a complete site, usually only a few IPX4 sizes are required.

Furthermore, the IPCO Plug is safe, sustainable and stable. The IPCO Plug X4 has 5 sealing rings, and the IPCO Plug X1 even has 6 sealing rings. Each IPCO Plug ring creates a multiple barrier between plug and tube wall or tube sheet, for optimal and durable operation.

The plug pin pushes the plug ring apart. This compresses the ring, causing it to seal. The plug pin and plug ring are therefore balanced in design and completely aligned with each other.

Finally, the key to a perfect result is the breaking pin. This breaking pin is initially the coupling with the tool. It then ensures the correct breaking force for the correct installation.



**Top quality, traceability and certification are the core of the IPCO Plug production.**





**Extremely high  
work pressure for  
ultimate safety.**

## THE PRODUCTION

A careful selection of raw materials takes place per IPCO Plug. This is done in accordance with the existing laws and regulations. After this selection, production can begin. IPCO only uses state-of-the-art CNC equipment and the programs that perfectly follow the IPCO Plug design are loaded here.

Every product part that has already been made is fully checked at first. After all parameters are 100% confirmed, the desired production series will start. If at one point something is not fully in line with the design, it will be corrected first.

Various instruments are used for this monitoring process, aimed at the operation of the IPCO Plug. The breaking pin of the IPCO Plug receives special attention. Due to the extremely important value, it is not only checked on all points. The breaking pin is also physically loaded to guarantee that the breaking moment fully meets the design requirements.

## THE ASSEMBLY

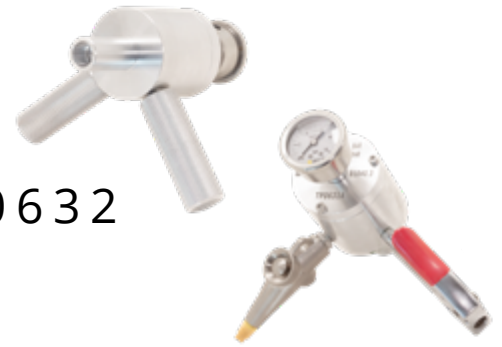
Each IPCO Plug consists of three parts, and for a batch all three parts must come from one production batch. Although all parts have been checked in advance in the production, this is largely repeated during the assembly. As soon as everything is correct, some IPCO Plug products are assembled, placed in a test set-up

and tested. During this part, the different values are measured and logged, after which a blow out test is done. In the rare case that the IPCO Plug does not meet the set values, the process is run through again. IPCO make adjustments where necessary, until it has been demonstrated that the values of the design have been achieved. After the batch has been assembled, each plug pin is provided with all relevant data by means of laser engraving. Examples are the size range, the material code and the batch number. After this, the process is completed.

## COMPLETION

Now that all steps have been completed, the different types, sizes and materials can be packed separately. This is done in kits of 10 pieces, together with the corresponding size caliber and instructions for use. IPCO Plug X1 also includes the tube preparation brush.

Each IPCO Plug kit is then sealed to ensure traceability. All relevant data is stated on this 4-language seal in Dutch, German, English and French. This information includes the IPCO Plug material, dimensions, working pressure and temperature and the contents of this kit. The unique batch number that is on each plug is also present on this seal. This ensures full traceability. This guarantees that the safety of your installation is safeguarded to the fullest possible extent.



## Tube Testing System // TP0632

With the Tube Testing System, you can test pneumatically for leaks safe, reliable and fast.

The whole set works completely pneumatically and only the air inlet tool needs to be connected to the pressure supply. The air inlet tool and sealing tool must be each fitted with the correct seal holders and rubber seal and washer sets. After this, you can insert at both ends of the tube. With the air inlet tool, the air or an inert gas, is inserted into the tube and has two functions:

1. It initially expands the rubber seals so that they close the tube ends.
2. It builds up pressure in the tube to check for leaks.

After the correct test pressure has been reached, the air supply of the air inlet tool is stopped. The pressure gauges on both tools indicate whether the air pressure remains stable or decreases and determine if this tube is leaking or not.

The leaking tubes that have been found can be closed safe and reliable with an IPCO Plug. The complete TP0632 set consists of an air inlet tool, a sealing tool and complete set of seal holders for both tools. The rubber seal and washer sets (seal sets) have a range of 1.3 mm and can be ordered per size application.

### ADVANTAGES OF TUBE TESTING SYSTEM

- › Safe, easy and quick to use thanks to the use of pneumatics and the unique seal.
- › Lightweight, ergonomic aluminium housing.
- › Seal holders and support rings of stainless steel.
- › System range from 7 to 32 mm.
- › Low maintenance costs.
- › Perfect addition to the IPCO Plug.

### SEAL HOLDER TP2031

SEALSET	RANGE ID (MM)
TPAN5107	7,2 - 8,5
TPAN5108	8,2 - 9,5
TPAN5109	9,2 - 10,5
TPAN5110	10,2 - 11,5
TPAN5111	11,2 - 12,5
TPAN5112	12,2 - 13,5

### SEAL HOLDER TP2081

SEAL SET	RANGE ID (MM)
TPAN5212	12,2 - 13,5
TPAN5213	13,2 - 14,5
TPAN5214	14,2 - 15,5
TPAN5215	15,2 - 16,5
TPAN5216	16,2 - 17,5
TPAN5217	17,2 - 18,5
TPAN5218	18,2 - 19,5
TPAN5219	19,2 - 20,5
TPAN5220	20,2 - 21,5
TPAN5221	21,2 - 22,5
TPAN5222	22,2 - 23,5
TPAN5223	23,2 - 24,5
TPAN5224	24,2 - 25,5
TPAN5225	25,2 - 26,5
TPAN5226	26,2 - 27,5

### SEAL HOLDER TP2101

SEAL SET	RANGE ID (MM)
TPAN5327	27,2 - 28,5
TPAN5328	28,2 - 29,5
TPAN5329	29,2 - 30,5
TPAN5330	30,2 - 31,5
TPAN5331	31,2 - 32,5

*Other sizes available on request.*





### SEAL SETS TPAN

One set of 2 rubber seals complete with 4 stainless steel support washers to prevent corrosion, to suit one size range



### SEAL HOLDERS TP

In a standard supply of the IPCO Tube Testing System TP0632, 3 pairs of 2 seal holders are supplied. Each seal holder has its size range and with the 3 the whole range from 7.2 to 32.5mm internal diameter can be covered. The seal holders are made of stainless steel to prevent corrosion



### SPECIALS: OVAL SEAL SETS

Oval seal sets especially for air-fin coolers. Available in four different sizes: 55x18/S1.9, 44x16/S1.9-2.3, 44x16/S3.75 and 36x14/S1.5



### PRESSURE REGULATOR

A pressure regulator ensures that inert gas or compressed air, supplied from a source with higher pressure, can be supplied at a lower pressure. For sealing rubbers smaller than 12mm, the working pressure must be reduced to 2.8-4 bar.



### TUBE TESTING SYSTEM EXTENSION

For air coolers (air-finn / finn-fan coolers) and if tubes are close to baffles or water boxes / channel heads, it is necessary to be able to operate the seal set of the Tube Testing System remotely. The Tube Testing System extension (TP2201) is used for this and is standard available in a length of 300mm. The extensions can be easily connected to each other to a lengths of 600mm, 900mm or 1200mm. At the end of the extension, the required seal holder is placed





## Tube Testing System //

In addition to the standard set of TP0632 tube testing system, IPCO offers several additional options in the range that, depending on the application, can perfectly meet your test requirements.

### **IPCO TP 0632 DLT**

When testing long tubes and/or large diameters, it is safer and faster to work with a double air supply DLT. As a result, the TPAN seal sets close the tube immediately and the pressure is quickly increased. This saves you valuable time and makes the work process go faster and easier.

### **IPCO TP 2750 XL**

For testing pipes with internal diameters up to 50 mm, IPCO supplies the XL set of test guns. These have a double air supply as standard, with separate and adjustable test pressure by means of a pressure regulator. An additional advantage of this set is that the special oval seal sets work excellent with this kit.

### **IPCO TP XXXX MH**

All IPCO TP sets can be supplied with the IPCO Pressure gauges perpendicular to the normal position. This is advantageous in situations where the pressure gauges are not visible in the usual way. This means that the pressure gauges are also visible in a 90 degrees angle.

Would you like more information about these test possibilities or the IPCO Plugs? Then contact us by phone, e-mail or via [www.ipcoplug.com](http://www.ipcoplug.com) or contact your local IPCO Plug representative.

## IPCO // Training

IPCO provides technical training for the safe installation of IPCO Plugs and the use of the Tube Testing Systems at the IPCO T-DEC (Training, Demonstration and Education Centre). Training can also take place on location. Skilled and certified professionals provide this training. In addition to the technical skills, the participants are also trained in identifying, assessing and preventing any risks associated with working with heat exchangers.

This IPCO Plug training consists of 3 parts:

### 1. Theory

- › Basic concepts of the IPCO Plug.
- › Sizing and recognition of information from the heat exchanger.
- › Construction and operation of the tools.

### 2. Practical

- › Assembly of tools.
- › Handling the various components and the safety of work.
- › Basic steps of the preparations and the IPCO Plug installation.
- › Hands on and demonstrating practical knowledge.

### 3. Exam

- › A multiple choice questionnaire to demonstrate acquired knowledge.
- › Discussion of exam and completion of training.

After a successful completion of the training, the participants receive an official IPCO Plug certificate that declares that they can work in a safe and proper way. IPCO recommends that this training is repeated annually.



Despite our efforts to ensure that the information provided is correct, IPCO accepts no responsibility for the recommended uses, results, injuries and damages that may result from the use of its products. IPCO advises users to make sure that the products are suitable for the purpose for which they are used.



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