



**CATALOGUE // IPCO PLUG**



**IPCO is specialized in the production and supply of the IPCO Plug and leak detection equipment for heat exchangers.**

## About // IPCO

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.

We offer an extensive product range and complete service package to meet our customers' needs. What we offer to our customers:

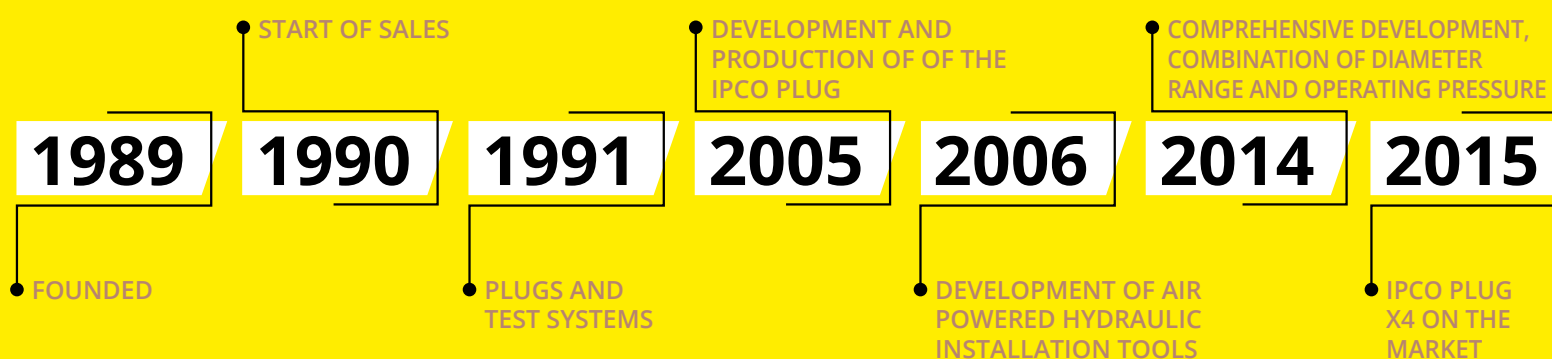
- › Advice on making the appropriate product choice
- › Technical support
- › Guidance with projects and turnarounds
- › Product training
- › Repair and calibration of equipment at IPCO
- › 24/7 availability

### ISO QUALITY SYSTEM

IPCO has a quality system that complies with the international standard ISO 9001. This implies that IPCO's business processes are continuously optimised in order to meet your needs, demands and satisfaction. The emphasis of the ISO standards is to safeguard the quality of IPCO's products and the internal organisation.

### PRODUCT DEVELOPMENT

The market in which IPCO operates is constantly changing. New insights, regulations and specific material requirements lead to new products. During the design phase, IPCO uses the expertise and practical experience of experts. This is done with the common aim: offering safe, innovative and user-friendly products of high quality.

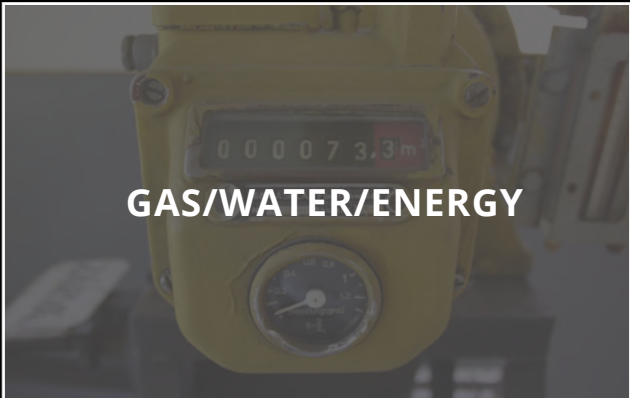




# IPCO // Branches




**INSTALLATION SECTOR**



**GAS/WATER/ENERGY**



**OFFSHORE**



**PETROCHEMICALS**



**CONTRACTING**

IPCO PLUG EXPANDING  
WITH NEW MATERIALS

**2017-2021**

**2022**

**2023**

IPCO TUBE TESTIN  
SYSTEM XL ON  
THE MARKET

IPCO PLUG X4  
UP TO 175 BAR

Visit: [www.ipcoplug.com](http://www.ipcoplug.com)



## Ordering information // IPCO Plug

Please provide the following information when ordering:

- › 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

There are usually sizable quantities in stock of the standard sizes in standard materials, which are ready for immediate shipment. For other sizes and materials, there is no longer delivery time than the actual production time, as production takes place in the Netherlands. For exact delivery times, alternative sizes and/or materials, please contact IPCO or your IPCO Plug Partner.

# Table of contents // IPCO Plug

<b>ABOUT IPCO</b>	<b>2</b>
<b>IPCO BRANCHES</b>	<b>3</b>
<b>ORDERING INFORMATION</b>	<b>4</b>
<b>THE IPCO PLUG DESCRIPTION</b>	<b>6</b>
Pressure Equipment Directive (PED)	7
<b>IPCO PLUG X1</b>	<b>8</b>
IPCO Plug X1 sizes	9
<b>IPCO PLUG X4</b>	<b>10</b>
IPCO Plug X4 sizes	11
<b>IPCO PLUG ACCESSORIES</b>	<b>12</b>
IPCO Plug installation set	12
Pull rod and positioners	12
Pull rod extension	12
Caliber set	13
Brush set	13
IPCO Plug removal tool	13
<b>IPCO PLUG PRODUCTION</b>	<b>14</b>
The design	14
The production	15
The assembly	15
Completion	15
<b>TUBE TESTING SYSTEM</b>	<b>16</b>
Tube Testing System TP0631	16
Tube Testing System TP2750XL	17
<b>TUBE TESTING SYSTEM</b>	<b>18</b>
Seal sets TPAN	18
Seal holders TP	18
Specials: Oval seal sets	18
Pressure regulator	18
TP extension	18
<b>IPCO TRAINING</b>	<b>19</b>



## The IPCO Plug // Description

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

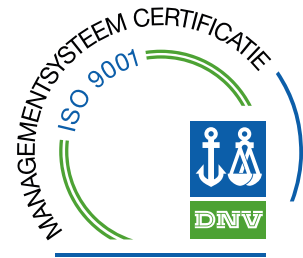
The design, production and installation of the IPCO Plug meets the essential and strict safety requirements of the Pressure Equipment Directive (PED). This is verified and validated by DNV as Notified Body through a declaration of conformity. This offers the customer additional certainty.

- › 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 tube, thanks to the supplied size 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 installed in pressure equipment (heat exchangers), which involves risks. IPCO Plugs comply with the ASME PCC-2-2022 article 312 and the essential safety requirements in accordance with the PED directive. IPCO has procedures in place to ensure that design, calculations, safety regulations, material selections and production always takes place in accordance with the regulations. The PED label is required for products of high quality.



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 exposed to various tests throughout the entire process.
- › IPCO is ISO-9001 certified and thus guarantees constant quality of the IPCO Plug.

In order to ensure these statements, the IPCO Plugs have been inspected by notified body DNV according to PED modules B and D. This is documented in a declaration of conformity. These modules are linked to the ISO certification. They state all relevant matters, such as the applicability of pressure and temperature in accordance with EU standards, harmonized materials, calculations and drawings. IPCO is dedicated to put in any effort to supply safe and sustainable products. IPCO also sets high demands on suppliers, raw materials, storage, product packaging and internal and external quality controls. This to relieve the customer of any worries.



ISO 9001 certificate



Module B certificate IPX1



Module B certificate IPX4



Module D certificate Plugs



## IPCO Plug X1 // (IPX1) Kit

An IPX1 kit consists of 10 plugs, a brush and a size caliber.

X1 Plugs are available in the following materials:

- › 'A' for 16Mo3
- › 'B' for Brass
- › 'C' for Carbon steel
- › 'D' for Duplex
- › 'E' for 304L
- › 'M' for Monel
- › 'S' for Stainless Steel 316L
- › 'ST' for 321
- › 'SV' for 904L
- › 'T' for Titanium

Other materials are available upon request.

Always make sure to choose a material similar to the tube or tube sheet of the heat exchanger! This can 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 through the toughest conditions. The maximum working pressure and temperature of the IPX1 depends on the size and material of the plug. If the application puts even higher requirements for the plug than what is already possible by default, IPCO can, on request, carry out additional investigations and tests to meet your specifications.





## IPCO PLUG X1 SIZES

Other sizes available on request.

IPCO PLUG KIT X1	RANGE IN MM	POSITIONER	PULL ROD	PULL ROD EXTENSION	REMOVAL TOOL
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			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	IPST-M06	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			
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			IPVG220-265
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				
IPK-220-X	22,0 - 22,5	IPPP220-240			
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				
IPK-245-X	24,5 - 25,0	IPPP245-265			
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 size caliber. The X4 plugs have an operating pressure up to 175 bar and a much larger diameter 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:

- › 'A' for 16Mo3
- › 'B' for Brass
- › 'C' for Carbon steel
- › 'D' for Duplex
- › 'E' for 304L
- › 'M' for Monel
- › 'S' for Stainless Steel 316L
- › 'ST' for 321
- › 'SV' for 904L
- › 'T' for Titanium

Other materials are available upon request.

Always make sure to choose a material similar to the tube or tube sheet of the heat exchanger! This can prevent chemical and/or thermal reactions between materials.



### OPERATING PRESSURE AND TEMPERATURE IPX4

While the working pressure of the X4 can be up to 175 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.





**Wide range for  
easy 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
IPX4-135-X	13,5 - 14,5	IPX4-PPB135-145	IPST-M06	IPSTV-M06	IPVGX4135-175
IPX4-145-X	14,5 - 16,0	IPX4-PPB145-160			
IPX4-155-X	15,5 – 17,0	IPX4-PPB155-170			
IPX4-170-X	17,0 - 19,5	IPX4-PPB170-195	IPST-M08	IPSTV-M08	IPVGX4170-195
IPX4-195-X	19,5 - 22,0	IPX4-PPB195-220			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			IPVGX4290-315
IPX4-315-X	31,5 - 34,0	IPX4-PPB315-340			IPVGX4315-340
IPX4-340-X	34,0 - 36,5	IPX4-PPB340-365			IPVGX4340-365
IPX4-365-X	36,5 - 39,0	IPX4-PPB365-390			IPVGX4365-390
IPX4-390-X	39,0 - 41,5	IPX4-PPB390-415			IPVGX4390-415



## Accessories // IPCO Plug

### IPCO PLUG INSTALLATION SET

The installation set consists of a hydraulic ram, hose and an air-driven hydraulic foot pump; supplied in a robust trolley case c/w insert. The IPCO Plug ram is specially designed to install the IPCO Plug and a high level of safety was taken into account in its design. The ram is fitted standard with a robust break-out protection. In the most extreme case, this prevents the pull rod from slipping out of the ram. It is possible to remove this protection when working in confined spaces. Furthermore, 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.



### IPCO PLUG HAND INSTALLATION TOOL

In addition to the IPCO Plug installation set mentioned above, we offer also an alternative: the IPCO Plug Hand Installation Tool, HIT. The HIT can be used when only a few IPCO Plug products have to be installed, and/or there is a hard-to-reach location and/or no air connection is available. The HIT can be used manually or with a battery powered impact drill. These possibilities can be determined according to environmental requirements and user preferences.



### PULL ROD AND PLUG POSITIONER

In order to install the IPCO Plug, it is necessary to use the correct pull rod. Both types IPCO Plug X1 and X4 use the same four pull rods. For each size group, this consists of a pull rod, knurled nut and a spacer ring. The X1 and X4 do each have their own series of plug positioners, which are listed in the tables on pages 9 and 11.



### PULL ROD EXTENSION

To install a plug, a complete IPCO Plug pull rod is required. If necessary, a pull rod extension may be needed. 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 extend the complete IPCO Plug pull rod in steps to reach the desired length.



## CALIBER SET

To check the correct plug size, a size caliber is used. Each IPCO Plug kit contains a size caliber. 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 before installation which brush is needed to insert the IPX4-plug. This prevents unnecessary stock or having to return products afterwards. The engraved size number of the caliber corresponds with the size of the IPX1-plug or IPX4 brush.



## BRUSH SET

Before securely sealing the tube or tube sheet, 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 types of brushes are available: a brush for hard materials and one for soft materials. The brushes are available in three different ways: separately, as a set to match the IPX4 or a case with all IPCO's brushes. The last options means that you always have the right brush size on-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 piece. This makes it simple, 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 and international regulations, standards and norms, like the ASME. IPCO utilizes as many raw materials as possible from the EU which fit within the harmonized standards.

### THE DESIGN

The IPCO Plug is designed to not only meet the applicable standards. Moreover, the IPCO Plug fits perfectly into existing dimensions of heat exchanger tubes of BWG, SWG (in inches) and DIN (in millimetres). If an installation uses one of those heat exchanger tubes, at least one IPX4-plug usually fits within the design. Only a few IPX4 sizes are needed for a complete site.

Furthermore, the IPCO Plug is safe, durable and stable. The IPCO Plug X4 has 5 sealing rings, and the IPCO Plug X1 even has 6 sealing rings, creating a multi-barrier between the plug and tube wall or tube sheet, for optimum performance.

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 for a perfect result is the breaking pin. This breaking pin is primarily the link to the tool. It then ensures the appropriate breaking force for correct installation.



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





**The extremely high operating pressure of the IPCO Plug X1 and X4 provides 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 the latest CNC equipment. The programmes follow the IPCO Plug design perfectly.

When the IPCO Plug is produced, it will be first fully inspected. 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, focusing on the operation of the IPCO Plug. The breaking pin of the IPCO Plug receives exceptional attention. This is due to its extremely important value, it is also physically tested to ensure that the breaking point fully meets the design requirements.

## THE ASSEMBLY

Each IPCO Plug consists of 3 parts and for a batch, all 3 parts must come from one production batch. Although all parts are fully checked before the start of production, this is repeated during the assembly. Once everything is correct, some IPCO Plugs are assembled, placed in a test set-up and tested. During this part, various values are measured and logged, after which

a blow-out test is performed. In the rare case that the IPCO Plug does not meet the established values, the process is run through again. IPCO makes adjustments where required, until it is demonstrated that the values of the design have been achieved. After the batch has been assembled, each plug pin is provided with relevant data through a laser engraving. This includes the size range, material code and the batch number. This is followed by the completion of the production process.

## 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 a seal in the languages: Dutch, German, English, and French. For instance, the IPCO Plug material, dimensions, working pressure and temperature, and further contents of the specific kit.

Additionally, the batch number printed on each plug is also mentioned on the seal. This ensures the traceability and the safety of your installation of the plug.

## Tube Testing System // TP0631

With the tube testing system, one 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 equipped with the correct seal holders, rubber seal, and washer sets. After the assembly the components have to be inserted at both ends of the tube. With the air inlet tool, the air or an inert gas, is inserted into the tube. This has two functions:

1. First, it initially expands the rubber seals causing them to close the tube ends.
2. It builds up pressure in the tube to check for leaks.

After reaching the correct test pressure, the air supply is stopped. The pressure gauges on both tools to indicate whether the air pressure remains stable or decreases. This allows you to determine whether the tube is leaking.

The leaking tubes that have been discovered can be sealed safely and reliably with an IPCO Plug. The TP0631 set consists of an air inlet tool, a sealing tool and a complete set of seal holders for both tools. The rubber seal and washer 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 due to pneumatics and the unique seal.
- › Lightweight and 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

SEAL SET	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.*



## Tube Testing System // TP2750XL

For testing tubes with internal diameters up to 53 mm, IPCO offers the TP2750XL set of tools. It has double the air supply, with separate and adjustable test pressures through a pressure regulator. An additional advantage of this set is that the special oval seal set (sizing on page 18) works excellent with this tool.



### SEAL HOLDER TP2181XL

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
TPAN5332	32,2 - 35
TPAN5334	34,5 - 37
TPAN5336	36,5 - 39

### SEAL HOLDER TP2182XL

SEAL SET	RANGE ID (MM)
TPAN5338	38,5 - 41
TPAN5340	40,5 - 43
TPAN5342	42,5 - 45
TPAN5344	44,5 - 47
TPAN5346	46,5 - 49
TPAN5348	48,5 - 51
TPAN5350	50,5 - 53



## Tube Testing System // Attachments

### SEAL SETS TPAN

Sealing rubbers complete with stainless steel support rings to prevent corrosion.



### SEAL HOLDERS TP

With the IPCO Tube Testing System TP0631, 2x 3 seal holders are provided. Each seal holder has its size range and with the 3 the whole range from 7.2 to 32.55 mm 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 in combination with the TP2750XL. 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 delivered 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 cooled heat exchanger (ACHE) 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 standard seal holder is placed.



## 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.



**IPCO B.V.**

PO Box 1163  
3300 BD Dordrecht  
The Netherlands

**T.** +31 78 652 18 88  
**E.** [info@ipco.nl](mailto:info@ipco.nl)  
**W.** [www.ipcoplug.com](http://www.ipcoplug.com)

**Visiting address**

Spinel 400  
3316 LG Dordrecht  
The Netherlands