

IPCO PLUGS

Maintenance of plants often result in delay with increasing costs. By using the IPCO PLUGS (IPX1 and IPX4), leaking tubes in heat exchangers can be sealed safer and quicker in comparison with traditional systems. The heat exchangers can be back into operation quicker, which saves the plant a lot of time and money.

IPCO PLUGS are fully certified and approved according to the Pressure Equipment Directive (PED), which means that the design and manufacture of the IPCO PLUGS comply with the strictest safety requirements of the PED directive to provide total peace of mind.

Features:

- Fool proof design ensures safe, quick and reliable installation.
- The design ensures no damage to adjacent tubes or tube shaped sheet, because of the unique, individually controlled installation force.
- Complete reliability over the total lifetime of the heat exchanger under the most severe operational conditions.
- Simple and fool proof sizing and installation to each tube is ensured by the sizing gauge supplied in each kit.
- Sizes and codes are based on the metric system, which ensures clear recognition and a better fit to the pipe sizes.
- Exceptionally low installation cost when compared to welded, explosive or other mechanical plugs.
- Plug material matches the tube material to prevent thermal expansion and any potential galvanic reaction is eliminated.
- No welding/hot work required to install the tube plugs ensuring minimum production downtime.
- The unique design ensures total compliance and is fully submitted to leak-, blow out-, and deformation tests and the breakaway force.



IPCO PLUG X1 (IPX1) KIT

The IPX1 kit contains 10 plugs, a brush and a gauge. The X1 plugs are generally available from stock in Carbon Steel (C), Brass (B), Stainless steel 316L (S) and Monel (M). Alternative exotic materials, such as RVS 304 (E), 321 (ST), 904L (SV), 16Mo3 (A) and Titanium (T) available on request. Always remember to ensure that you use a compatible plug for each type of tube and tube sheet material to prevent thermal and/or chemical reaction occurring!

OPERATING PRESSURE AND TEMPERATURE IPX1

The maximum operating pressure and temperature are dependent on size and material of the IPX1 in correlation with the heat exchanger construction. The IPCO plug X1 can withstand high working pressures, which means it can be used in all heat exchangers in most situations and under the most severe conditions, as long as it is correctly specified and installed. In the event of even higher demands on the IPCO Plug, IPCO can complete proof testing trials or project specific research and development in order to comply with client specifications.

IPCO PLUG X1 RANGES

IPCO PLUG KIT X1	TUBE ID (MM)	COMPLETE PULL ROD	COMPLETE PULL ROD EXTENSION	IPCO PLUG REMOVAL TOOL
IPK-100-X	10,0 – 10,5	IPST-100-110	IPSTV-100-125-300	IPVG100-110
IPK-105-X	10,5 – 11,0			
IPK-110-X	11,0 – 11,5			
IPK-115-X	11,5 – 12,0	IPST-115-125	IPSTV-100-125-300	IPVG115-125
IPK-120-X	12,0 – 12,5			
IPK-125-X	12,5 – 13,0			
IPK-130-X	13,0 – 13,5	IPST-130-145	IPSTV-130-165-300	IPVG130-165
IPK-135-X	13,5 – 14,0			
IPK-140-X	14,0 – 14,5			
IPK-145-X	14,5 – 15,0	IPST-150-165	IPSTV-130-165-300	IPVG130-165
IPK-150-X	15,0 – 15,5			
IPK-155-X	15,5 – 16,0			
IPK-160-X	16,0 – 16,5	IPST-170-190	IPSTV-170-300-300	IPVG170-215
IPK-165-X	16,5 – 17,0			
IPK-170-X	17,0 – 17,5			
IPK-175-X	17,5 – 18,0	IPST-195-215	IPSTV-170-300-300	IPVG170-215
IPK-180-X	18,0 – 18,5			
IPK-185-X	18,5 – 19,0			
IPK-190-X	19,0 – 19,5	IPST-220-240	IPSTV-170-300-300	IPVG220-265
IPK-195-X	19,5 – 20,0			
IPK-200-X	20,0 – 20,5			
IPK-205-X	20,5 – 21,0	IPST-245-265	IPSTV-170-300-300	IPVG220-265
IPK-210-X	21,0 – 21,5			
IPK-215-X	21,5 – 22,0			
IPK-220-X	22,0 – 22,5	IPST-270-290	IPSTV-170-300-300	IPVG270-320
IPK-225-X	22,5 – 23,0			
IPK-230-X	23,0 – 23,5			
IPK-235-X	23,5 – 24,0	IPST-245-265	IPSTV-170-300-300	IPVG220-265
IPK-240-X	24,0 – 24,5			
IPK-245-X	24,5 – 25,0			
IPK-250-X	25,0 – 25,5	IPST-270-290	IPSTV-170-300-300	IPVG270-320
IPK-255-X	25,5 – 26,0			
IPK-260-X	26,0 – 26,5			
IPK-265-X	26,5 – 27,0	IPST-270-290	IPSTV-170-300-300	IPVG270-320
IPK-270-X	27,0 – 27,5			
IPK-275-X	27,5 – 28,0			
IPK-280-X	28,0 – 28,5	IPST-270-290	IPSTV-170-300-300	IPVG270-320
IPK-285-X	28,5 – 29,0			
IPK-290-X	29,0 – 29,5			

Other sizes available on request

IPCO PLUG X4 (IPX4) KIT

The IPX4 kit contains 10 plugs, an internal diameter gauge and an IPX4 positioner (instead of a brush). The IPX4 has an operating pressure of 100 bar and a bigger range than the IPX1. The advantage of a bigger range is that potentially less stock is required and it makes it easier to order the correct plug size.

X4 Plugs are generally available from stock in Carbon Steel (C) and Stainless steel 316L (S). Alternative materials, such as Brass (B), Monel (M), Stainless steel 304 (E), 321 (ST), 904L (SV), 16Mo3 (A) and Titanium (T) available on request. It is always important to ensure that you use a compatible plug for each type of tube and tube sheet material to prevent thermal and/or chemical reaction occurring!

IPCO PLUG X4 RANGES

IPCO PLUG KIT X4	TUBE ID (MM)	COMPLETE PULL ROD EXCL. POSITIONER	POSITIONER IPX4	COMPLETE PULL ROD EXTENSION	IPX4 REMOVAL TOOL
IPX4-150-X	15,0-17,0*	IPSTX4-130-165	IPX4-PPB150	IPSTV130-165-300	IPVG130-165 + IPVG-170-215
IPX4-170-X	17,0-19,5	IPSTX4-130-165	IPX4-PPB170	IPSTV130-165-300	IPVG130-165 + IPVG170-215
IPX4-195-X	19,5-22,0	IPSTX4-170-300	IPX4-PPB195	IPSTV170-300-300	IPVG170-215 + IPVG220-265
IPX4-215-X	21,5-24,0	IPSTX4-170-300	IPX4-PPB215	IPSTV170-300-300	IPVG170-215+ IPVG220-265 + IPVG270-320
IPX4-240-X	24,0-26,5	IPSTX4-170-300	IPX4-PPB240	IPSTV170-300-300	IPVG220-265 + IPVG270-320

*Size range is different per material

Other sizes available on request



IPCO PLUG INSTALLATION SET

The installation set consists of a hydraulic ram, a hose and a hydraulic pump which are supplied in a robust, lightweight composite handling trolley. The hydraulic ram is designed with a robust safety guard as standard. This is to protect the operator from possible harm in the unlikely event of the pull rod breaking out of the ram. The design also ensures that it is possible to remove the safety guard in case of very small or limited spaces to ensure that the plug is installed in one stroke. This improves the performance of the plugs, saves time and money and causes no damage to the installation tools.



PULL ROD

To install an IPCO PLUG, it is necessary to use the correct complete pull rod assembly. The pull rod assembly for the IPX1 consists of a standard pull rod, a knurled nut and a rod/tube positioner. The pull rod assembly of the IPX4 consists of the same standard pull rod, knurled nut and tube positioner, but has an additional plug positioner which is generally supplied within the IPX4 kits. No extra tools are required.

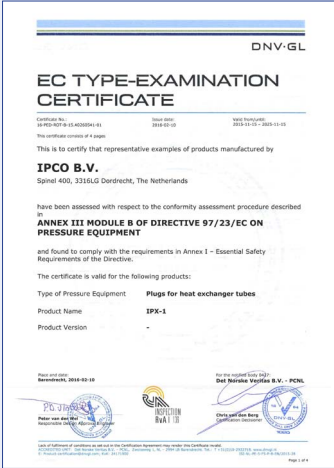


PULL ROD EXTENSION

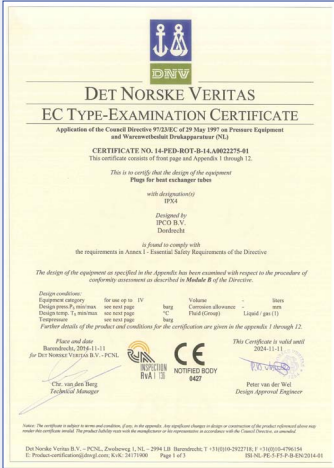
For complete flexibility, IPCO has developed a plug pull rod extension kit. The extended length of the pull rod assembly allows the installer to properly position the plug without having to reach or lean into the heat exchangers with channel heads, divider plates of Air-fin (fin-fan) coolers. It is easily connected to the (standard) complete tube plug pull rod assembly. The extended length of the pull rod assembly is standard available in 300mm lengths, this way the installer has the opportunity to extend the complete tube plug pull rod assembly in steps to the size required.



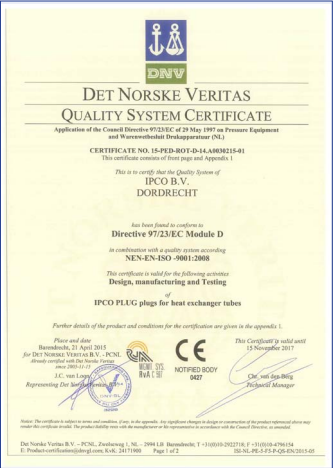
ISO 9001 certificate



Module B certificate IPX1



Module B certificate IPX4



Module D certificate Plugs

GAUGE SET

A gauge is used to determine the correct size plug. Every IPCO plug kit is supplied with a gauge. With a complete gauge set (supplied in a convenient suitcase) you have most common gauges for different IPX1 plug sizes within reach, but with the complete gauge set you can also determine which brushes for the IPX4 plugs are necessary prior to the installation process. This avoids the need to return products and unnecessary stock. The gauge size which corresponds to the IPX1 plug size or brush for the IPX4 plug is stamped on the end of each gauge.



BRUSH SET

The interior of the tube must be properly brushed before it can be sealed. Each IPX1 kit includes a single brush which has been designed to remove debris, pitting and oxidation from the inner tube whilst ensuring the inner tube surface is prepared enough to provide the plug with sufficient grip for correct installation. The IPCO plug offers the choice of two brushes: a brush for hard materials and a brush for softer materials. Brushes can be ordered separately, or as a complete brush-set (supplied in a convenient case), always providing you with the correct brush for the job.

Please note that the IPX4 kit does not contain a brush as the X4 plugs have a greater expansion range. Multiple brushes should be purchased to cover the range required.



PLUG REMOVAL TOOL

In some cases it may be necessary to remove plugs, for example when the pipe is not sufficiently prepared or burst/cracked after over-expanding (excessive rolling). With the IPCO Plug removal tool, plugs can be removed safely, evenly, quickly and easily. The tool body is manufactured in one piece, making it strong and durable.



PRESSURE EQUIPMENT DIRECTIVE (PED)

Understanding that IPCO Plugs are used in pressure equipment (heat exchangers), IPCO Plugs are designed and produced to conform and adhere to the Pressure Equipment Directive (PED).

In order to ensure that IPCO Plugs satisfy PED requirements, IPCO has an integrated control system that ensures that each link in the production line is traceable and identifiable. All materials used are certified and the Plugs are subjected to multiple tests.





Tube testing system

With the Tube Testing Gun Set, clients can pneumatically test from 3 to 10 tubes per minute. The set, consists of an Air Injection gun, plugging gun and three seal holder sets, which makes finding leaking heat exchangers tubes safe and quick.

Operation

Connect the Tube Testing Guns to plant air or an inert gas. Insert the Air Injection gun into one end of the tube, the Plugging gun into the other and press the air control valve. Air expands the seals on both guns and pressurises the tube. When the pressure in the tube stabilises, release the air control valve. Any reduction of pressure will be indicated on the integral pressure gauge to reveal even the smallest tube leak. Press the relief control valve to release the pressure out of the tube and the seals on both guns release again.



SEALSET	ID RANGE	SEAL HOLDER
TPAN5107	7,2 – 8,5mm	TP2031
TPAN5108	8,2 – 9,5mm	TP2031
TPAN5109	9,2 – 10,5mm	TP2031
TPAN5110	10,2 – 11,5mm	TP2031
TPAN5111	11,2 – 12,5mm	TP2031
TPAN5112	12,2 – 13,5mm	TP2031
TPAN5212	12,2 – 13,5mm	TP2081
TPAN5213	13,2 – 14,5mm	TP2081
TPAN5214	14,2 – 15,5mm	TP2081
TPAN5215	15,2 – 16,5mm	TP2081
TPAN5216	16,2 – 17,5mm	TP2081
TPAN5217	17,2 – 18,5mm	TP2081
TPAN5218	18,2 – 19,5mm	TP2081
TPAN5219	19,2 – 20,5mm	TP2081
TPAN5220	20,2 – 21,5mm	TP2081
TPAN5221	21,2 – 22,5mm	TP2081
TPAN5222	22,2 – 23,5mm	TP2081
TPAN5223	23,2 – 24,5mm	TP2081
TPAN5224	24,2 – 25,5mm	TP2081
TPAN5225	25,2 – 26,5mm	TP2081
TPAN5226	26,2 – 27,5mm	TP2081
TPAN5327	27,2 – 28,5mm	TP2101
TPAN5328	28,2 – 29,5mm	TP2101
TPAN5329	29,2 – 30,5mm	TP2101
TPAN5330	30,2 – 31,5mm	TP2101
TPAN5331	31,2 – 32,5mm	TP2101

Other sizes available on request



SEAL SETS TPAN

Neoprene seal (other materials on request) complete with stainless steel washer sets to prevent corrosion.



SEAL HOLDERS TP

Including three seal holder sets to test tubes from 7,2 tot 32,5mm ID. The seal holders are made of stainless steel to prevent corrosion.



SPECIALS: OVAL SEAL SETS

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



REGULATOR

A regulator is a device that reduces the pressure to a fixed value after the release of the inert gas or air. When you use seals smaller than 12mm the operating pressure has to be reduced to 2.8-4 bar.



TUBE TESTING GUN EXTENSION

An extension device (TP2201) has been developed for air-fin/fin-fan coolers and channel heads. The extended length prevents the installer leaning into the heat exchangers with channel heads or divider plates. The TP2201 extension device has a standard length of 300mm. Multiple extension devices can be conveniently connected to one another for greater distances. The required seal container is then placed at the end of the extension piece.



Features of the Tube testing system

- Compact and lightweight: each gun weighs less than 1kg.
- Uses standard plant air (or inert gas) supplies from 2,7 to 8,5 bar.
- Unique sealing element of the seal holders prevents leakage after changing the seal and washer sets
- All thread connections are metric or BSP, through which debris and other impurities can be removed easily.

ORDERING INFORMATION IPCO PLUGS

When ordering IPCO plugs, please provide the following information:

1. Tube OD and wall thickness and/or measured tube ID.
2. Thickness of tube sheet, diameter and pitch of the tubes.
3. Tube and tube sheet material.
4. Maximum pressure and temperature.
5. Type of tube to tube sheet joint (rolled and/or welded).
6. Is there a water head/divider plate, and if yes, also all the dimensions.
7. Condition of tubes and age of heat exchanger.

DELIVERY

Substantial quantities of the "standard" sizes in the materials listed above are normally in stock for immediate shipment. For "other" sizes a slightly longer delivery time may be required.

SERVICE

Leaking heat exchanger tubes must be sealed off immediately. Call IPCO at any time: 24 hours a day, 7 days a week. Outside office hours an automated answering system will provide you with a representative's contact telephone number.

TRAINING

IPCO provides excellent quality training courses in our T-DEC (Training, Demonstration and Education Centre). Alternatively the training can be performed at end user's location and/or at the authorised IPCO Plug reseller location.

Training is given by a certified person and focusses on the technical skills required to install IPCO Plugs as well as risk assessment and prevention of hazardous operation when working with heat exchange units.

Upon successful completion of the course, the trainee will be issued with an IPCOSAFE certificate. Please note refresher courses are required annually to ensure operators of IPCO equipment are fully compliant.

