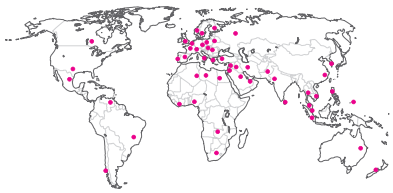
KRAIS®
Tube & Pipe Tools

www.krais.com



PED certified 2014/68/EU

TÜVRheinland® CERTIFIED

Tested to 10000 PSI (540 BAR)

T_APPL

High-Pressure Tube Plugs

Reliable sealing solutions for heat exchangers and fin-fan air coolers. T_APPL plugs ensure precise torque-controlled installation, durable sealing performance, and easy removal without tube wall damage.

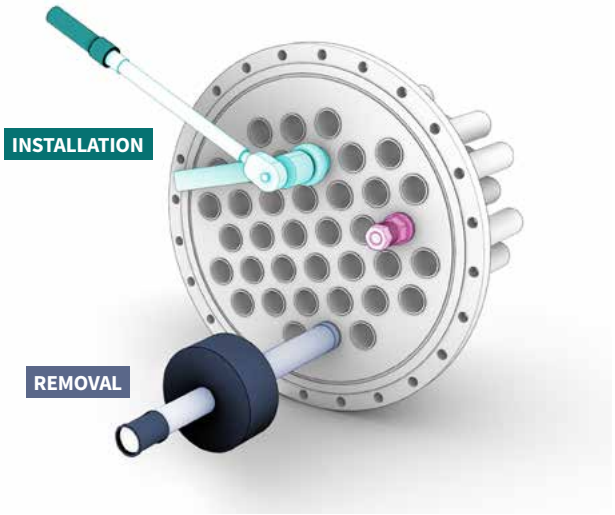
T_APPL HEP Series (for general applications)

High pressure plugs for general heat exchangers applications

The KRAIS T_APPL HEP series tube plugs is a specialized, mechanical plug engineered for use inwide range of heat exchangers. Designed for high-pressure environments, it offers secure sealing without damaging the tube wall, even under severe thermal stress or vibration.

KEY ADVANTAGES

- Torque-controlled installation - ensures repeatable, consistent radial expansion with no tube deformation.
- Installation requires only a manual torque wrench. No high pressure pumps, no hydraulic breakers.
- Engineered expansion delivers a reliable mechanical seal, even under high thermal cycling and vibration.



PROPER TORQUE

A torque wrench should be used to ensure correct plug installation.

EASY PLUG REMOVAL

A dedicated slide hammer, connected to the threaded part of the plug, allows safe extraction of the plug for tube inspection or replacement

TOOL SELECTION TABLE

Please measure your tube IDand select a proper material (XX): CS for Carbon Steel, BR for Admirality Brass, SS for Stainless Stel, CN for Cu Nicel

TUBE OD		WALL	TUBE ID		TOOL NR
[INCH]	[MM]	[BWG]	[INCH]	[MM]	
5/8"	15,88	18	0,527	13,39	HEP-1351-XX
		19	0,541	13,74	HEP-1422-XX
		20	0,555	14,10	
		21	0,561	14,25	HEP-1483-XX
		22	0,569	14,45	
3/4"	19,05	12	0,532	13,51	HEP-1351-XX
		13	0,560	14,22	HEP-1422-XX
		14	0,584	14,83	HEP-1483-XX
		15	0,606	15,39	HEP-1539-XX
		16	0,620	15,75	
		17	0,634	16,10	HEP-1610-XX
		18	0,652	16,56	HEP-1656-XX
		19	0,666	16,92	HEP-1691-XX
		20	0,680	17,27	
		21	0,686	17,42	HEP-1762-XX
		22	0,694	17,63	
7/8"	22,22	12	0,657	16,69	HEP-1656-XX
		13	0,685	17,40	HEP-1762-XX
		14	0,709	18,01	HEP-1803-XX

TUBE OD		WALL	TUBE ID		TOOL NR
[INCH]	[MM]	[BWG]	[INCH]	[MM]	
7/8"	22,22	15	0,731	18,57	HEP-1853-XX
		16	0,745	18,92	HEP-1892-XX
		17	0,759	19,28	
		18	0,777	19,74	HEP-1973-XX
		19	0,791	20,09	
		20	0,805	20,45	HEP-2044-XX
		21	0,811	20,60	HEP-2080-XX
		22	0,819	20,80	
1"	25,4	12	0,782	19,86	HEP-1973-XX
		13	0,810	20,57	HEP-2044-XX
		14	0,834	21,18	HEP-2184-XX
		15	0,856	21,74	HEP-2174-XX
		16	0,870	22,10	
		17	0,884	22,45	HEP-2245-XX
		18	0,902	22,91	HEP-2236-XX
		19	0,916	23,27	HEP-2326-XX
		20	0,930	23,62	
		21	0,963	24,46	HEP-2397-XX
		22	0,944	23,98	

TOOL EXPANSION RANGE TABLE

Please check before order if your measeured tube ID fits in tool range.

TOOL NR	[INCH]		[MM]	
	MIN	MAX	MIN	MAX
HEP-1351-XX	0,530	0,550	13,46	13,97
HEP-1422-XX	0,550	0,570	13,97	14,48
HEP-1483-XX	0,570	0,590	14,48	14,99
HEP-1539-XX	0,610	0,630	15,49	16,00
HEP-1610-XX	0,630	0,650	16,00	16,51
HEP-1656-XX	0,650	0,670	16,51	17,02
HEP-1691-XX	0,670	0,690	17,02	17,53
HEP-1762-XX	0,690	0,710	17,53	18,03
HEP-1803-XX	0,710	0,730	18,03	18,54
HEP-1853-XX	0,730	0,750	18,54	19,05
HEP-1892-XX	0,750	0,770	19,05	19,56
HEP-1973-XX	0,780	0,800	19,81	20,32
HEP-2044-XX	0,800	0,820	20,32	20,83
HEP-2080-XX	0,820	0,840	20,83	21,34
HEP-2184-XX	0,840	0,860	21,34	21,84
HEP-2174-XX	0,860	0,880	21,84	22,35
HEP-2245-XX	0,880	0,900	22,35	22,86
HEP-2236-XX	0,900	0,920	22,86	23,37
HEP-2326-XX	0,920	0,940	23,37	23,88
HEP-2397-XX	0,940	0,960	23,88	24,38

T_APPL FFP Series (for fin fan applications)

High pressure plugs for applications in fin fan air-cooled heat exchangers

The KRAIS T_APPL FFP series tube plugs is a specialized, mechanical plug engineered for use in air-cooled fin fan heat exchangers. Designed for high-pressure environments, it offers secure sealing without damaging the tube wall, even under severe thermal stress or vibration.
Unlike general-purpose plugs, the T_APPL is optimized for difficult-to-reach tubesheet locations, especially where compact water box openings and restricted visibility are common.

KEY ADVANTAGES

- Torque-controlled installation - ensures repeatable, consistent radial expansion with no tube deformation.
- Installation requires only a manual torque wrench. No high pressure pumps, no hydraulic breakers.
- The long-reach Push-in Spanner enables easy access in deep or narrow configurations in fin fan systems.
- Engineered expansion delivers a reliable mechanical seal, even under high thermal cycling and vibration.

PROPER TORQUE

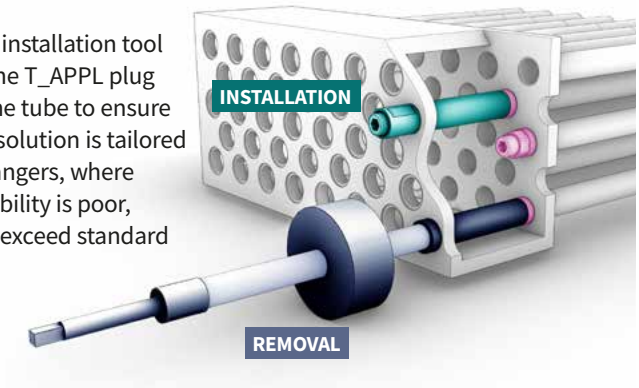
A torque wrench should be used to ensure correct plug installation, since only precise torque application can achieve reliable and leak-tight tube sealing.

EASY PLUG REMOVAL

A dedicated slide hammer, connected to the threaded part of the plug, allows safe extraction of the plug for tube inspection or replacement

PUSH-IN SPANNER

A specially designed installation tool precisely positions the T_APPL plug and presses it into the tube to ensure proper sealing. This solution is tailored for fin fan heat exchangers, where access is limited, visibility is poor, and tool reach must exceed standard dimensions.



TOOL SELECTION TABLE

Please measure your tube IDand select a proper material (XX): CS for Carbon Steel, BR for Admirality Brass, SS for Stainless Stel, CN for Cu Nicel

TUBE OD		WALL	TUBE ID		TOOL NR
[INCH]	[MM]	[BWG]	[INCH]	[MM]	
7/8"	22,22	15	0,731	18,57	FFP-1853-xx
		16	0,745	18,92	FFP-1892-xx
		17	0,759	19,28	
		18	0,777	19,74	FFP-1973-xx
		19	0,791	20,09	
		20	0,805	20,45	FFP-2044-xx
		21	0,811	20,60	FFP-2080-xx
		22	0,819	20,80	

TUBE OD		WALL	TUBE ID		TOOL NR
[INCH]	[MM]	[BWG]	[INCH]	[MM]	
1"	25,4	10	0,732	18,59	FFP-1853-xx
		11	0,760	19,30	FFP-1892-xx
		12	0,782	19,86	FFP-1973-xx
		13	0,810	20,57	FFP-2044-xx
		14	0,834	21,18	FFP-2184-xx
		15	0,856	21,74	FFP-2174-xx
		16	0,870	22,10	
		17	0,884	22,45	FFP-2245-xx
		18	0,902	22,91	FFP-2236-xx
		19	0,916	23,27	FFP-2326-xx
		20	0,930	23,62	

TOOL EXPANSION RANGE TABLE

Please check before order if your measeured tube ID fits in tool range.

TOOL NR	[INCH]		[MM]	
	MIN	MAX	MIN	MAX
FFP-1853-XX	0,730	0,750	18,54	19,05
FFP-1892-XX	0,750	0,770	19,05	19,56
FFP-1973-XX	0,780	0,800	19,81	20,32
FFP-2044-XX	0,800	0,820	20,32	20,83
FFP-2080-XX	0,820	0,840	20,83	21,34
FFP-2184-XX	0,840	0,860	21,34	21,84
FFP-2174-XX	0,860	0,880	21,84	22,35
FFP-2245-XX	0,880	0,900	22,35	22,86
FFP-2236-XX	0,900	0,920	22,86	23,37
FFP-2326-XX	0,920	0,940	23,37	23,88
FFP-2397-XX	0,940	0,960	23,88	24,38

1. Tube Plug Sizing

Choosing the correct plug size is essential for optimal performance, reliability, and safety of KRAIS tube plugs. Use the detailed sizing chart to determine the appropriate plug dimensions, ensuring compatibility and precise fitting within your specific tubing system and operational requirements

- **Plug Size:** Clearly identified by the tube diameter and the Birmingham Wire Gauge (BWG).
- **Expansion Range:** Defines the minimum and maximum expansion limits, ensuring reliable sealing without damaging tube integrity.
- **Tool Requirements:** Lists exact wrench sizes and specialty tools needed for safe and efficient installation and plug removal.

KRAIS Tube Hole Gauge K200

2. Selecting the correct tube plug

1. **Entry Measurement:** Accurately measure the tube opening's internal diameter using precision tools, such as KRAIS Tube Hole Gauge
2. **Sealing Surface Measurement:** Precisely identify the effective sealing region inside the tube to ensure a perfect match with the plug's expansion range, enhancing sealing performance and durability.
3. **Plug Matching:** Cross-reference the precise measurements with the comprehensive KRAIS sizing chart to select the most suitable plug, ensuring both entry and sealing area requirements are fully met.

Special Plug Considerations

In cases where standard plug sizes may not precisely fit due to factors such as tube projections, weld beads, or unique geometries, KRAIS can provide custom-engineered tube plugs. These bespoke solutions are specifically crafted to handle specialized installation conditions, ensuring effective sealing and reliable long-term performance.

3. Tube preparation

Before installing tube plugs, thoroughly clean the tubes to remove contaminants, including dirt, grease, oils, corrosion products, and particulate debris. Utilize an appropriate solvent-based cleaning agent, followed by drying thoroughly to prevent residue-induced sealing failure.

Scale and Deposit Removal

Employ an electric or pneumatic drill equipped with specially sized wire brushes to effectively remove hardened deposits, corrosion, and scale. Use the following recommended brush sequence for optimal results:

- Begin with a brush precisely matching the minimum expansion dimension.
- Progressively utilize slightly larger brushes (0.020"–0.030" and 0.040"–0.060" increments) as required.

- Apply a uniform back-and-forth motion for approximately 30–45 seconds, thoroughly cleaning the entire plug insertion depth.
- In case of heavy rust or other surface damage to the tube, we recommend machining a small amount of the tube wall using our MiniDrill-500. Use the wall-reducing head with carbide inserts or a reamer for best results.

Ventilation Safety

Prioritize tube ventilation procedures to ensure tubes are appropriately vented before plugging. Proper venting prevents dangerous internal pressure accumulation, significantly reducing the risk of plug ejection and subsequent injury during maintenance or removal.

4. Plug preparation

Appropriate thread lubrication is critical to ensuring smooth installation, avoiding thread damage, and maintaining plug integrity:

- **Stainless Steel & Nickel Alloys:** Use nickel- or copper-based anti-seize lubricant.
- **Chrome, Brass, and Carbon Alloys:** Apply a copper-based anti-seize lubricant generously.

Always choose and apply KRAIS-approved lubricants for optimal plug performance, ease of installation, and enhanced long-term reliability.

5. Plug Installation & Torqueing

- Determine correct torque values from provided torque charts based on plug material and size.
- Accurately set and verify calibration of your torque wrench.
- Insert the plug into the prepared tube, ensuring correct positioning and alignment.
- Hold the plug securely and apply the specified torque carefully and uniformly to ensure even plug expansion and reliable sealing.

PROPER TORQUE FOR T_APPL PLUGS

TOOL NR	[INCH]		[MM]		CARBON		STAINLESS		BRASS	
	MIN	MAX	MIN	MAX	FT/LBS	NM	FT/LBS	NM	FT/LBS	NM
xxP-1351-xx	0,530	0,550	13,46	13,97	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1422-xx	0,550	0,570	13,97	14,48	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1483-xx	0,570	0,590	14,48	14,99	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1539-xx	0,610	0,630	15,49	16,00	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1610-xx	0,630	0,650	16,00	16,51	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1656-xx	0,650	0,670	16,51	17,02	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1691-xx	0,670	0,690	17,02	17,53	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1762-xx	0,690	0,710	17,53	18,03	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1803-xx	0,710	0,730	18,03	18,54	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1853-xx	0,730	0,750	18,54	19,05	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1892-xx	0,750	0,770	19,05	19,56	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-1973-xx	0,780	0,800	19,81	20,32	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-2044-xx	0,800	0,820	20,32	20,83	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-2080-xx	0,820	0,840	20,83	21,34	24 - 29	33 - 39	30 - 36	41 - 49	22	30
xxP-2184-xx	0,840	0,860	21,34	21,84	39 - 46	53 - 62	46	62	n/a	n/a
xxP-2174-xx	0,860	0,880	21,84	22,35	39 - 46	53 - 62	46	62	n/a	n/a
xxP-2245-xx	0,880	0,900	22,35	22,86	39 - 46	53 - 62	46	62	n/a	n/a
xxP-2236-xx	0,900	0,920	22,86	23,37	39 - 46	53 - 62	46	62	n/a	n/a
xxP-2326-xx	0,920	0,940	23,37	23,88	39 - 46	53 - 62	46	62	n/a	n/a
xxP-2397-xx	0,940	0,960	23,88	24,38	39 - 46	53 - 62	46	62	n/a	n/a

6. Tube Plug Removal Procedure

- Loosen the plug nut gently until flush with the plug's stud.
- Use controlled, moderate force with a suitable hammer to tap around the plug nut and body at various points (12, 3, 6, 9 o'clock positions).
- After loosening, remove the plug manually or with appropriate extraction tools, taking care to prevent damage to the tube.

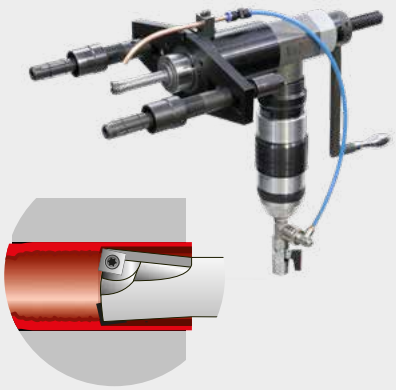
For additional technical guidance or troubleshooting, please contact KRAIS technical support directly.

Search for leaks with KVLD-3000

The ideal tool for identifying tubes that need plugging with our T_APPL tube plugs.
The KVLD-3000 vacuum leak tester offers a fast, precise method for detecting leaky tubes in boilers, condensers, and heat exchangers. Using compressed air, it creates a vacuum inside the tube—if the gauge reading holds steady, the tube is intact; a drop indicates a leak.

Prepare tube with MiniDrill-500-WTRT-AC

Perfect tool for preparing tubes before plugging, effectively removing rust, scale, and other deposits to ensure a clean, secure seal.
The MiniDrill-500-WTRT-AC is engineered for rapid and reliable tube wall reduction across a variety of demanding materials — from carbon steel and stainless steel to tough alloys like Inconel in heat exchangers.



ORTC - One Revolution Tube Cutter

Tools designed for cutting both ferrous and non-ferrous tubes commonly found in heat exchangers, boilers and condensers. Standard tool length is adjustable from 1”-6” (25-155 mm). Longer reach tools are available in 10” (254 mm) increments. The tool is designed to be used with a hand or ratchet wrench only. Impact wrenches should never be used with these tools. The Cutting of the tube is based on the eccentric principle, where the cutter bit moves out to the tube wall as the cutter is rotated. Continued clockwise rotation will puncture and cut the tube in one revolution. Simply rotating the tool counterclockwise closes the bit and the tool can be removed from the tube.

ORTCC - ONE REVOLUTION TUBE CUTTER VERSION C

One Revolution Tube Cutter version C is used for piercing heavy wall, carbon steel tubes for ventilation prior to plugging the leaky tubes. Delivered in two length version 6” and 12”.

TUBE OD		TUBE GAUGE	TUBE ID				TOOL NO.	TOOL BIT
			[MM]		[INCH]			
[INCH]	[MM]	[BWG]	MIN	MAX	MIN	MAX		
1/2	12,70	18-19	10,20	10,70	0,402	0,421	ORTCC-100	N-625-4
		20	11,00	11,30	0,433	0,445	ORTCC-108	N-625-4
5/8	15,88	14	11,40	11,90	0,449	0,469	ORTCC-113	N-625-3
		15-16	12,00	12,90	0,472	0,508	ORTCC-119	N-625-3
		17-18	12,70	13,50	0,500	0,531	ORTCC-123	N-625-2
		19-20	13,50	14,20	0,531	0,559	ORTCC-131	N-625-2
		22	14,00	14,70	0,551	0,579	ORTCC-139	N-750-2
3/4	19,05	14-15	14,70	15,50	0,579	0,610	ORTCC-145	N-750-2
		16	15,20	16,50	0,598	0,650	ORTCC-151	N-750-2
		17-18	15,90	16,50	0,626	0,650	ORTCC-153	N-750-2
		19-20	16,70	17,50	0,657	0,689	ORTCC-163	N-1000-1
7/8	22,23	14-15	17,80	18,50	0,701	0,728	ORTCC-174	N-1000-1
		16-17	18,80	19,50	0,740	0,768	ORTCC-184	N-1000-1
		18	19,30	20,00	0,760	0,787	ORTCC-190	N-1000-1
		19-20	19,80	20,60	0,780	0,811	ORTCC-193	N-1000-2
1	25,40	12	19,80	20,60	0,780	0,811	ORTCC-193	N-1000-2
		14	20,80	21,60	0,819	0,850	ORTCC-205	N-1000-2
1	25,40	15	21,30	22,10	0,839	0,870	ORTC-210	N-1000-2
		16-17	21,80	22,60	0,858	0,890	ORTC-215	N-1000-2
		18-20	22,60	23,10	0,890	0,909	ORTC-223	N-1000-2
		22	23,90	24,60	0,941	0,969	ORTC-232	N-1000-2
1-1/4	31,75	10-11	24,90	25,60	0,980	1,008	ORTC-245	N-1000-2
		12	25,90	26,70	1,020	1,051	ORTC-255	N-1000-2
		13-14	26,70	27,40	1,051	1,079	ORTC-264	N-1000-2
		15-16	27,90	28,70	1,098	1,130	ORTC-274	N-1000-2
		17-19	28,70	29,60	1,130	1,165	ORTC-283	N-1000-2

TUBE OD		TUBE GAUGE	TUBE ID				TOOL NO.	TOOL BIT
			[MM]		[INCH]			
[INCH]	[MM]	[BWG]	MIN	MAX	MIN	MAX		
1-1/2	38,10	10-11	31,30	32,10	1,232	1,264	ORTC-309	N-1500-1
		12-13	32,50	33,30	1,280	1,311	ORTC-320	N-1500-1
		14-15	33,80	34,50	1,331	1,358	ORTC-333	N-1500-1
		16-17	34,50	35,30	1,358	1,390	ORTC-339	N-1500-1
		18-19	35,30	36,10	1,390	1,421	ORTC-350	N-1500-1
1-3/4	44,45	10-11	37,00	38,50	1,457	1,516	ORTC-369	N-1500-1
		12-14	38,80	40,30	1,528	1,587	ORTC-383	N-1500-1
		15-16	40,80	41,20	1,606	1,622	ORTC-403	N-1500-1
		17-18	41,30	42,00	1,626	1,654	ORTC-410	N-1500-1
2	50,80	10	44,00	44,00	1,732	1,732	ORTC-435	N-1500-1
		11	44,70	44,70	1,760	1,760	ORTC-442	N-1500-1
		12-13	45,00	46,00	1,772	1,811	ORTC-447	N-1500-1
		14-15	46,20	48,20	1,819	1,898	ORTC-457	N-1500-1
		16-17	47,20	48,20	1,858	1,898	ORTC-468	N-1500-1
		18-19	48,00	49,00	1,890	1,929	ORTC-476	N-1500-1
2-1/4	57,15	10	50,30	50,30	1,980	1,980	ORTC-497	N-2250-1
		11	51,00	51,00	2,008	2,008	ORTC-505	N-2250-1
		12-13	51,60	52,30	2,031	2,059	ORTC-511	N-2250-1
		14-15	52,90	53,50	2,083	2,106	ORTC-524	N-2250-1
		16-17	53,80	54,80	2,118	2,157	ORTC-533	N-2250-1
		18-19	54,60	55,60	2,150	2,189	ORTC-541	N-2250-1
2-1/2	63,50	10	56,70	56,70	2,232	2,232	ORTC-562	N-2250-1
		11	57,40	57,40	2,260	2,260	ORTC-569	N-2250-1
		12-13	57,60	58,60	2,268	2,307	ORTC-572	N-2250-1
		14-15	58,90	60,00	2,319	2,362	ORTC-585	N-2250-1
		16-17	60,00	61,00	2,362	2,402	ORTC-586	N-2250-1
		18-19	60,70	61,70	2,390	2,429	ORTC-602	N-2250-1

KRAIS® Tube & Pipe Tools

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