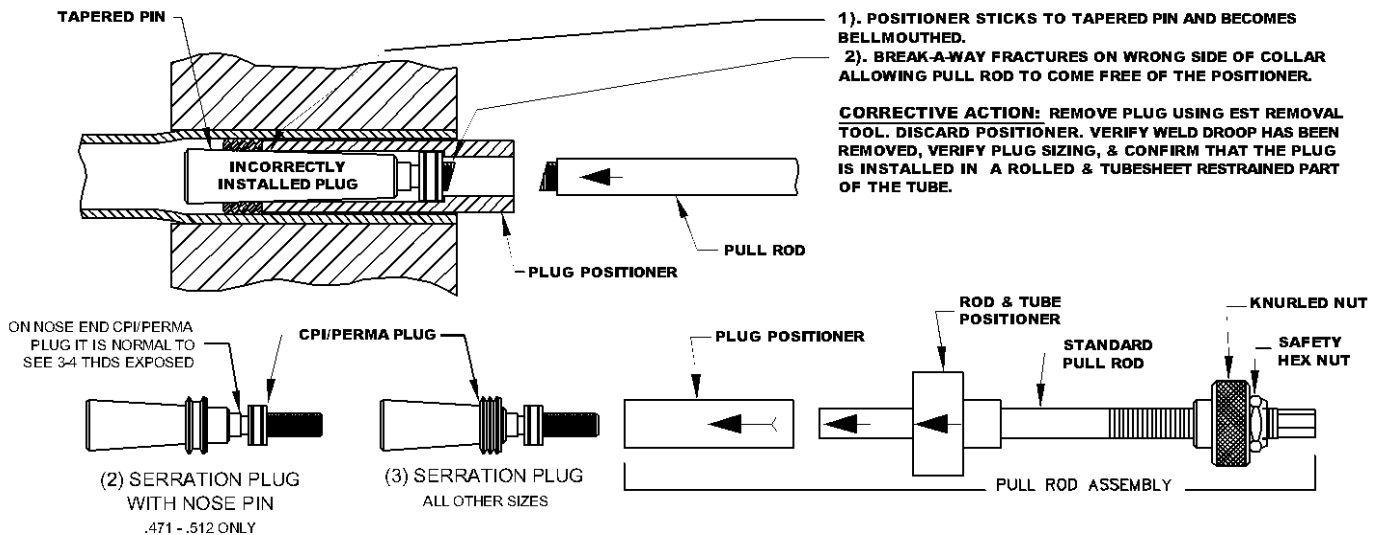


**TITANIUM - ZIRCONIUM CPI / PERMA PLUGS NEAR END INSTALLATION INSTRUCTIONS
(SUPPLEMENTS DC1220)**

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Tube ID's applicable to Titanium - Zirconium CPI / Perma plugs may differ from plugs manufactured in other materials. See chart below for Titanium - Zirconium plugs ranges only. For ID ranges for all other plug materials, see DC1220 Page 2.

FIGURE A: SIGNS OF UNDERSIZED PLUG, A PLUG INSTALLED BEYOND THE TUBESHEET, OR A PLUG INSTALLED IN UNROLLED TUBE INSIDE TUBESHEET



Questions? Contact EST Group Customer Service at any of the following locations.

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PLUG SIZE	TUBE I.D. RANGE (INCHES) (SEE NOTE 5)	TUBE I.D. RANGE (mm) (SEE NOTE 5)	CPI/PERMA PLUG KIT (SEE NOTE 1)	PLUG POSITIONER	PULL ROD ASSEMBLY	CHANNEL HEAD PULL ROD ASSEMBLY (SEE NOTE 2)	TUBE PREPARATION BRUSH KIT (SEE NOTE 3&4)
.471	.472 TO .507	11.99 TO 12.88	V-471-T(ZC)	P-471	PA-471	CPA-471-YY	BSH-471-HT
.491	.492 TO .530	12.50 TO 13.45	V-491-T(ZC)	P-491	PA-491	CPA-491-YY	BSH-491-HT
.512	.513 TO .551	13.03 TO 14.00	V-512-T(ZC)	P-512	PA-512	CPA-512-YY	BSH-512-HT
.524	.525 TO .562	13.34 TO 14.29	V-524-T(ZC)	P-524	PA-524	CPA-524-YY	BSH-524-HT
.555	.556 TO .597	14.12 TO 15.17	V-555-T(ZC)	P-555	PA-555	CPA-555-YY	BSH-555-HT
.584	.585 TO .628	14.86 TO 15.96	V-584-T(ZC)	P-584	PA-584	CPA-584-YY	BSH-584-HT
.621	.622 TO .667	15.80 TO 16.95	V-621-T(ZC)	P-621	PA-621	CPA-621-YY	BSH-621-HT
.649	.650 TO .698	16.51 TO 17.72	V-649-T(ZC)	P-649	PA-649	CPA-649-YY	BSH-649-HT
.670	.671 TO .720	17.04 TO 18.28	V-670-T(ZC)	P-670	PA-670	CPA-670-YY	BSH-670-HT
.712	.713 TO .766	18.11 TO 19.45	V-712-T(ZC)	P-712	PA-712	CPA-712-YY	BSH-712-HT
.735	.736 TO .790	18.69 TO 20.07	V-735-T(ZC)	P-735	PA-735	CPA-735-YY	BSH-735-HT
.774	.775 TO .838	19.69 TO 21.29	V-774-T(ZC)	P-774	PA-774	CPA-774-YY	BSH-774-HT
.804	.805 TO .865	20.45 TO 21.97	V-804-T(ZC)	P-804	PA-804	CPA-804-YY	BSH-804-HT
.837	.838 TO .902	21.29 TO 22.91	V-837-T(ZC)	P-837	PA-837	CPA-837-YY	BSH-837-HT
.853	.854 TO .918	21.69 TO 23.31	V-853-T(ZC)	P-853	PA-853	CPA-853-YY	BSH-853-HT
.899	.900 TO .963	22.86 TO 24.46	V-899-T(ZC)	P-899	PA-899	CPA-899-YY	BSH-899-HT
.919	.920 TO .991	23.37 TO 25.17	V-919-T(ZC)	P-919	PA-919	CPA-919-YY	BSH-919-HT
.962	.963 TO 1.027	24.46 TO 26.09	V-962-T(ZC)	P-962	PA-962	CPA-962-YY	BSH-962-HT
.979	.980 TO 1.079	24.89 TO 27.41	V-979-T(ZC)	P-979	PA-979	CPA-979-YY	BSH-979-HT
1.024	1.025 TO 1.088	26.04 TO 27.64	V-1024-T(ZC)	P-1024	PA-1024	CPA-1024-YY	BSH-1024-NY
1.054	1.055 TO 1.154	26.80 TO 29.31	V-1054-T(ZC)	P-1054	PA-1054	CPA-1054-YY	BSH-1054-NY
1.087	1.088 TO 1.152	27.64 TO 29.26	V-1087-T(ZC)	P-1087	PA-1087	CPA-1087-YY	BSH-1087-NY
1.103	1.104 TO 1.203	28.04 TO 30.56	V-1103-T(ZC)	P-1103	PA-1103	CPA-1103-YY	BSH-1103-NY
1.149	1.150 TO 1.213	29.21 TO 30.81	V-1149-T(ZC)	P-1149	PA-1149	CPA-1149-YY	BSH-1149-NY
1.171	1.172 TO 1.270	29.77 TO 32.26	V-1171-T(ZC)	P-1171	PA-1171	CPA-1171-YY	BSH-1171-NY
1.212	1.213 TO 1.336	30.81 TO 33.93	V-1212-T(ZC)	P-1212	PA-1212	CPA-1212-YY	BSH-1212-NY
1.334	*1.335 TO 1.458	33.91 TO 37.03	V-1334-T(ZC)	P-1334	PA-1334-L	CPA-1334-L-YY	BSH-1334-NY
1.456	*1.457 TO 1.579	37.01 TO 40.11	V-1456-T(ZC)	P-1456	PA-1456-L	CPA-1456-L-YY	BSH-1456-NY
1.578	*1.579 TO 1.701	40.11 TO 43.21	V-1578-T(ZC)	P-1578	PA-1578-L	CPA-1578-L-YY	BSH-1578-NY
1.700	*1.701 TO 1.823	43.21 TO 46.30	V-1700-T(ZC)	P-1700	PA-1700-L	CPA-1700-L-YY	BSHV-1700-NY
1.822	*1.823 TO 1.945	46.30 TO 49.40	V-1822-T(ZC)	P-1822	PA-1822-L	CPA-1822-L-YY	BSH-1822-NY
1.944	*1.945 TO 2.067	49.40 TO 52.50	V-1944-T(ZC)	P-1944	PA-1944-L	CPA-1944-L-YY	BSH-1944-NY

*Must use Large Hydraulic Ram, P/N: PAP-1750, to install these plugs

NOTES:

1. CPI/PERMA Plug kits contain 10 plugs. The suffix "T" in the CPI/PERMA PLUG kit part designates Titanium, "ZC" designates Zirconium. Plug material must match tube material.
2. The extended length of the Channel Head Assembly allows the installer to properly position the plug without having to reach or lean into heat exchangers with channel barrels or divider plates. The suffix YY signifies the length, in feet, of the Channel Head Extension. These parts are available in 1, 2, 3, 4 and 6 foot lengths. Replace YY with 01, 02, etc. for respective Channel Head Extension size required.
3. Brushes are required for tube preparation with all CPI/PERMA Plugs. The part number suffix "HT" is used to denote the most aggressive brushes for Titanium applications. The part number suffix "NY" is used to denote the nylon coated brushes for all materials. For Utility applications, (1) brush kit per order plus (1) additional brush kit per each (5) plug kits ordered is recommended. For Petro/Chem applications, (2) brush kits per order plus (2) additional brush kits per each (5) plug kits ordered are recommended.
4. EST can provide a brush lubricant / spark inhibitor, which will reduce the potential of sparking during all brushing and reaming, P/N: BSH-LUBE.
5. If tube is not expanded into the tubesheet the maximum tube ID limit is reduced by 0.020"(0.51mm). Titanium - Zirconium Plug tube ID ranges differ from plugs manufactured from other materials. See DC1220 installation instructions for all other material plugs.

Questions? Contact EST Group Customer Service at any of the following locations.



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