

CPI / Perma Plug Application Data

This document lists specifications of the standard CPI / Perma Plug heat exchanger tube plug and technical information concerning its field application. CPI / Perma Plugs are part of the Pop-A-Plug® Tube Plugging System.

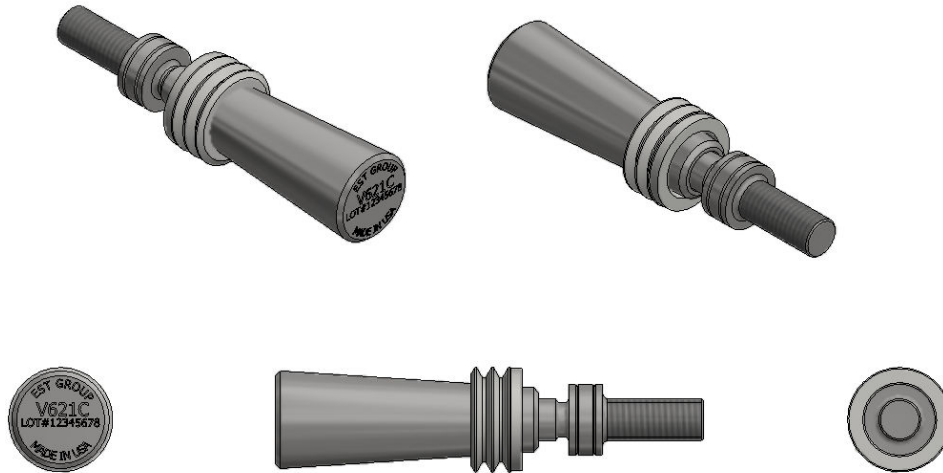


Figure 1: CPI / Perma Pop-A-Plug, Model of V-621-C is shown for reference only

- For Plug Sizes, Ranges & Max. Pressure Ratings see Table 1.
- For Standard Plug Materials and Max. Temperature Ratings see Table 2.
- For other available Special Materials see Table 3 or contact EST Customer Service.

Application Information

The CPI / Perma Plug is designed to be installed in heat exchangers, which meet the above operating conditions. The material of the plug must be matched to the material into which it is being installed to minimize the effects of galvanic corrosion and thermal expansion. Cases where the plug material will differ from the surrounding material may require further evaluation in the form of calculations or tests.

CPI / Perma Plugs must be installed in the tube end within the region of the tube sheet. Ideally, the plug installation depth should be selected so that the pin is slightly recessed within the tube sheet after installation. When plugging tube ends where the tubes are not fully expanded into the tube sheet, select the CPI / Perma Plug size so that the tube ID is at the lower end of the working range of the plug being installed

For the best plug performance, the tube ID or tubesheet hole ID should be free from pits, scars and other leak causing surface defects. Tube / tube hole preparation should be accomplished using a tube preparation brush. Brushing can remove these defects, reduces tube ovality, and effectively prepares the tube surface allowing the installed plug to withstand the highest differential pressure.

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

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TABLE 1: CPI / PERMA PLUG SIZES, RANGES AND MAX PRESSURE RATINGS

SALES NUMBER	PLUG SIZE	RANGE				MAX PRESSURE	
		MIN	MAX	MIN	MAX	PSIG	BARG
		(in)		(mm)			
V-471-Q	0.471	0.472	0.515	11.99	13.08	1000	68.9
V-491-Q	0.491	0.492	0.540	12.50	13.72	1000	68.9
V-512-Q	0.512	0.513	0.562	13.03	14.27	1000	68.9
V-524-Q	0.524	0.525	0.585	13.34	14.86	1000	68.9
V-555-Q	0.555	0.556	0.616	14.12	15.65	1000	68.9
V-584-Q	0.584	0.585	0.649	14.86	16.48	1000	68.9
V-621-Q	0.621	0.622	0.689	15.80	17.50	1000	68.9
V-649-Q	0.649	0.650	0.713	16.51	18.11	1000	68.9
V-670-Q	0.670	0.671	0.740	17.04	18.80	1000	68.9
V-712-Q	0.712	0.713	0.777	18.11	19.74	1000	68.9
V-735-Q	0.735	0.736	0.810	18.69	20.57	1000	68.9
V-774-Q	0.774	0.775	0.838	19.69	21.29	1000	68.9
V-804-Q	0.804	0.805	0.890	20.45	22.61	1000	68.9
V-837-Q	0.837	0.838	0.902	21.29	22.91	1000	68.9
V-853-Q	0.853	0.854	0.949	21.69	24.10	1000	68.9
V-899-Q	0.899	0.900	0.963	22.86	24.46	1000	68.9
V-919-Q	0.919	0.920	1.019	23.37	25.88	1000	68.9
V-962-Q	0.962	0.963	1.027	24.46	26.09	1000	68.9
V-979-Q	0.979	0.980	1.079	24.89	27.41	1000	68.9
V-1024-Q	1.024	1.025	1.088	26.04	27.64	1000	68.9
V-1054-Q	1.054	1.055	1.154	26.80	29.31	1000	68.9
V-1087-Q	1.087	1.088	1.152	27.64	29.26	1000	68.9
V-1103-Q	1.103	1.104	1.203	28.04	30.56	1000	68.9
V-1149-Q	1.149	1.150	1.213	29.21	30.81	1000	68.9
V-1171-Q	1.171	1.172	1.270	29.77	32.26	1000	68.9
V-1212-Q	1.212	1.213	1.336	30.81	33.93	1000	68.9
V-1334-Q	1.334	1.335	1.458	33.91	37.03	1000	68.9
V-1456-Q	1.456	1.457	1.579	37.01	40.11	1000	68.9
V-1578-Q	1.578	1.579	1.701	40.11	43.21	1000	68.9
V-1700-Q	1.700	1.701	1.823	43.21	46.30	1000	68.9
V-1822-Q	1.822	1.823	1.945	46.30	49.40	1000	68.9
V-1944-Q	1.944	1.945	2.067	49.40	52.50	1000	68.9

SALES NUMBER (TITANIUM/ZIRCONIUM)	PLUG SIZE	RANGE				MAX PRESSURE	
		MIN	MAX	MIN	MAX	PSIG	BARG
		(in)		(mm)			
V-471-T/ZC	0.471	0.472	0.507	11.99	12.88	1000	68.9
V-491-T/ZC	0.491	0.492	0.530	12.50	13.46	1000	68.9
V-512-T/ZC	0.512	0.513	0.551	13.03	14.00	1000	68.9
V-524-T/ZC	0.524	0.525	0.562	13.34	14.27	1000	68.9
V-555-T/ZC	0.555	0.556	0.597	14.12	15.16	1000	68.9
V-584-T/ZC	0.584	0.585	0.628	14.86	15.97	1000	68.9
V-621-T/ZC	0.621	0.622	0.667	15.80	16.94	1000	68.9
V-649-T/ZC	0.649	0.650	0.698	16.51	17.73	1000	68.9
V-670-T/ZC	0.670	0.671	0.720	17.04	18.29	1000	68.9
V-712-T/ZC	0.712	0.713	0.766	18.11	19.46	1000	68.9
V-735-T/ZC	0.735	0.736	0.790	18.69	20.07	1000	68.9
V-774-T/ZC	0.774	0.775	0.832	19.69	21.13	1000	68.9
V-804-T/ZC	0.804	0.805	0.865	20.45	21.97	1000	68.9
V-837-T/ZC	0.837	0.838	0.902	21.29	22.91	1000	68.9
V-853-T/ZC	0.853	0.854	0.918	21.69	23.32	1000	68.9
V-899-T/ZC	0.899	0.900	0.963	22.86	24.46	1000	68.9
V-919-T/ZC	0.919	0.920	0.991	23.37	25.17	1000	68.9
V-962-T/ZC	0.962	0.963	1.027	24.46	26.09	1000	68.9
V-979-T/ZC	0.979	0.980	1.052	24.89	26.72	1000	68.9
V-1024-T/ZC	1.024	1.025	1.088	26.04	27.64	1000	68.9
V-1054-T/ZC	1.054	1.055	1.133	26.80	28.78	1000	68.9
V-1087-T/ZC	1.087	1.088	1.152	27.64	29.26	1000	68.9
V-1103-T/ZC	1.103	1.104	1.186	28.04	30.12	1000	68.9
V-1149-T/ZC	1.149	1.150	1.213	29.21	30.81	1000	68.9
V-1171-T/ZC	1.171	1.172	1.259	29.77	31.98	1000	68.9
V-1212-T/ZC	1.212	1.213	1.303	30.81	33.10	1000	68.9
V-1334-T/ZC	1.334	1.335	1.434	33.91	36.42	1000	68.9
V-1456-T/ZC	1.456	1.457	1.565	37.01	39.75	1000	68.9
V-1578-T/ZC	1.578	1.579	1.701	40.11	43.21	1000	68.9
V-1700-T/ZC	1.700	1.701	1.823	43.21	46.30	1000	68.9
V-1822-T/ZC	1.822	1.823	1.945	46.30	49.40	1000	68.9
V-1944-T/ZC	1.944	1.945	2.067	49.40	52.50	1000	68.9

NOTES:

The suffix "-Q" in the Part Number column is the plug material designator.

Replace the "-Q" with the appropriate material designator from Tables 2 or 3.

Example: V-919-B for Brass, V-1024-C for Carbon Steel.

Note: Titanium and Zirconium plugs have different operating ranges.

Additional sizes available, please contact EST Customer Service for assistance.

Special sizing, extended range, and higher-pressure plugs available. Please contact EST Customer Service for assistance.

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TABLE 2: STANDARD 'CPI / PERMA' PLUG MATERIALS & MAX. TEMPERATURE RATINGS

STANDARD MATERIALS					
CODE	DESCRIPTION	MIN. TEMP		MAX. TEMP	
		°F	°C	°F	°C
-B	BRASS 360/464	-325	-198	400	204
-C	CARBON STEEL (1018 AND/OR 1045)	-20	-29	700	371
-E	304/304L STAINLESS STEEL	-321	-196	900	482
-H	COPPER NICKEL 70/30	-423	-253	500	260
-S	316/316L STAINLESS STEEL	-76	-60	900	482
-T	TITANIUM	-75	-59	900	482

Standard materials are generally available in stock.

TABLE 3: SPECIAL MATERIALS & MAX. TEMPERATURE RATINGS

SPECIAL MATERIALS AVAILABLE					
CODE	DESCRIPTION	MIN. TEMP		MAX. TEMP	
		°F	°C	°F	°C
-317L	317L STAINLESS STEEL	-320	-196	900	482
-904L	904L STAINLESS STEEL	-20	-29	900	482
-A	ALLOY 4142	-20	-29	900	482
-AL	ALUMINUM ALLOY, 6061/7075	-20	-29	500	260
-B3	HASTELLOY B3	-20	-29	900	482
-CB	ALLOY 20 (20C3B STAINLESS STEEL)	-20	-29	900	482
-D	DUPLEX 2205 STAINLESS STEEL	-20	-29	900	482
-F11	ALLOY STEEL A-182 (F11)	-20	-29	900	482
-F22	ALLOY STEEL A-182 (F22)	-20	-29	900	482
-F5	ALLOY STEEL A-182 (F5)	-20	-29	900	482
-F9	ALLOY STEEL A-182 (F9)	-20	-29	900	482
-H20	HASTELLOY 2000	-20	-29	900	482
-HC	HASTELLOY C276	-20	-29	900	482
-I	INCONEL 600	-20	-29	800	427
-K	410 A-479 STAINLESS STEEL	-20	-29	900	482
-L7	ALLOY 4140	-150	-101	900	482
-LTC	LOW TEMP A-350 LF2 CL1	-50	-46	700	371
-M	MONEL 405	-325	-198	900	482
-N	COPPER NICKEL 90/10	-325	-198	500	260
-NI	NICKEL 200/201	-325	-198	800	427
-P	430 A-479 STAINLESS STEEL	-20	-29	900	482
-S10	310/310L STAINLESS STEEL	-20	-29	900	482
-S21	321L STAINLESS STEEL	-320	-196	900	482
-S347	S347 A-479 STAINLESS STEEL	-320	-196	900	482
-SD	SUPER DUPLEX (UNS S32750)	-20	-29	900	482
-SO254	254 SMO STAINLESS STEEL	-20	-29	900	482
-W	INCONEL 625	-20	-29	800	427
-X	AL6XN	-320	-196	900	482
-Y	INCOLOY (825 & 800)	-110	-79	900	482
-Y800	INCOLOY 800	-110	-79	900	482
-ZC	ZIRCONIUM	-20	-29	500	260

* Various specialty materials are available and plugs can be made to order. If the material you require is not found in either Table 2 or Table 3, please contact EST Customer Service for assistance.

**Increased temperature or pressure ratings available, please contact EST Customer Service for assistance.

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