

Introduction

Heldon Copper Fittings are engineered and manufactured to meet or exceed Australian and International Standards in ISO 9000-2001 certified facilities as verified by:

- Proof Testing to exceed 4 times Safe Working Pressure.
- Sectioning and Dimensional Testing.
- Stringent Quality control measures and rigorously tested to ensure minimal wall thicknesses and the removal of stress and fatigue focus points.

Heldon Copper Fittings are suitable for use with the American "Copper Tubes for Air-conditioning & Refrigeration Field Service - ASTM B280" and the "Australian and New Zealand Standard AS/NZS 1571 – Copper Seamless tube for Air-conditioning and Refrigeration".

A large range of Refrigeration Fittings are available to suit all popular refrigerants including the high pressure R410A and CO2 (sub-critical) refrigerants.

Standard Fittings

Heldon's standard copper fittings are substantially thicker on average than other fittings on the market today as they are manufactured to exceed B 16.22-1989. Consequently they also have a higher pressure rating. Burst tests further indicate that Heldon copper fittings are more than 10% stronger than other fittings on the local market. A range of sizes up to 4 1/8" is available.

Note that Heldon's 'Standard' fittings up to 2 5/8" in diameter are also suitable for Low Pressure side applications on R410A systems (2,500 kPa).

R400 Series fittings

Heldon's R400 Series fittings are packed or stamped R400 and are suitable for R410A, R407C and many other 400 series refrigerants, with a Fitting Safe Working Pressure (Fswp) of approximately 5,000 kPa at ambient temperature. A range of sizes of up to 1 5/8" are currently available.

Large Diameter High Pressure Copper Fittings.

Heldon's new range of large diameter copper fittings are now available.

Consisting of a selection of Couplings, 90 degree Elbows and Stop Ends, these Fittings are rated to a Safe Working Pressure of 3,200 kPa up to 50 degrees Celsius. This makes them ideal for the Low Pressure side of R410A and CO2 systems (below 3.2MPa).

Special Fittings

Can be designed and made to customer requirements in many sizes.

Wall Thickness and Pressure Ratings

Working pressure is a function of the wall thickness, diameter and working temperature. Often it appears that fittings are thinner than the tube they are joining, but this may be explained by the allowance designed into the tube for thinning when it is bent or formed. This can be as much as 25%, but the average is 20% for fittings up to 2 5/8". Also, some standard tubes may be thicker than required, due to the limited tube availability versus optimum design.

Tubing

In summary, the Standards AS/NZS 1571, 4041 and ASME B280, give a Safe Working Pressure for annealed tube, with a 5 times safety factor to the Nominal Pressure.

Tswp = Tube Safe Working Pressure

= Burst Pressure approx. / 5.

Fittings

Fittings have a wall thickness reduction of approximately 20%, but a similar Safe Working Pressure. This is because fittings have a 4 times safety factor, as specified by ASME B16.22 2001.

Fswp = Fitting Safe Working Pressure

= Burst Pressure min. / 4.

Joining

Strong, leak-free connections for copper can be made easily by brazing with “filler metals”. Employing “silver brazing alloys” (silver solder), competent tradespeople can install copper pipe work & fittings in accordance with the methodologies as recommended in AS HB40. The use of 15% silver solder is recommended when brazing copper tubing or fittings for use with R410A or other high pressure refrigerants.

Note that in order for silver brazing alloys to melt and flow properly, 620°C to 790°C is required. At these high temperatures the copper will react with oxygen in the air and form copper oxide (scale) on the inner walls of the copper components. This scale will be broken off into flakes by liquid refrigerant passing through the pipe work. These flakes will produce a fine powder which can cause blockages in filter driers, strainers and capillary tubes.

It is recommended to use an inert gas such as Dry Nitrogen, to displace any air inside the pipe work when silver brazing copper and avoid the creation of copper oxide.

Suitability for application

Copper can work harden. These product specifications are based on static in-house tests, calculated data, information from material suppliers and relevant standards. Heldon cannot predict the conditions or unique dynamics created in the working environment by the combination of temperature, pressure, vibration and pulsation that will vary for each particular application. The end user or system designer must satisfy themselves of a part's suitability for use in their systems application. Once satisfied in this regard, they can enjoy the benefits of having chosen a quality Heldon product.

Copper has a considerable drop in allowable stress with increased operating temperatures, reducing by 17% between 50°C and 75°C. Safe Working Pressure tables are listed for most fitting types.

R410A fittings, according to AIRAH, should be rated for 4,200 kPa at 65°C. This is equivalent to 4,670

kPa at 50°C based on allowable stress. Most Heldon R410A fittings meet 5,000 kPa which gives a SWP of 4,150 kPa at 75°C.

Note: Stop Ends, U Bends and Y-pieces have a lower SWP due to their design shape. Consult Heldon Products Australia for details.

Note: R410A SWP equals 4,200 kPa. CO2 SWP equals 5,200 kPa.

Safe Working Pressure at Different Temperatures

Heldon Standard Fittings Safe Working

Size inch	Pressure in kPa			
	-29c to 50c	up to 65c	up to 75c	up to 120c
3/16	10000	8900	8300	8000
1/4	10000	8900	8300	8000
5/16	8500	7565	7055	6800
1/2	6000	5340	4980	4800
5/8	5600	4984	4648	4480
3/4	5000	4450	4150	4000
7/8	4500	4005	3735	3600
1	4500	4005	3735	3600
1 1/8	4000	3560	3320	3200
1 1/4	3900	3471	3237	3120
1 3/8	3500	3115	2905	2800
1 1/2	3500	3115	2905	2800
1 5/8	3300	2937	2739	2640
1 3/4	3500	3115	2905	2800
2	3100	2759	2573	2480
2 1/8	2900	2407	2320	2236
2 1/4	2700	2403	2241	2160
2 1/2	2700	2403	2241	2160
2 5/8	2700	2403	2241	2160
3	2200	1958	1826	1760
3 1/8	2180	1940	1809	1744
3 1/2	2100	1869	1743	1680
3 5/8	2090	1860	1735	1672
4	2050	1825	1702	1640
4 1/8	2020	1825	1702	1616

Heldon R410A Fittings Safe Working

Size inch	Pressure in kPa			
	-29c to 50c	up to 65c	up to 75c	up to 120c
3/16	10000	8900	8300	8000
1/4	10000	8900	8300	8000
5/16	8500	7565	7055	6800
1/2	6000	5340	4980	4800
5/8	5600	4984	4648	4480
3/4	5000	4450	4150	4000
7/8	5000	4450	4150	4000
1	5000	4450	4150	4000
1 1/8	5000	4450	4150	4000
1 1/4	5000	4450	4150	4000
1 3/8	5000	4450	4150	4000
1 1/2	5000	4450	4150	4000
1 5/8	5000	4450	4150	4000

Heldon Large Diameter High Pressure Copper Fittings

SWP in kPa	
2 1/8	3200
2 5/8	3200
3 1/8	3200

*For temperatures greater than 50°C, please consult with Heldon Products.