

SPECIFICATION SHEET- TALOS® S80

SEAMLESS ROUND COPPER TUBES FOR HIGH-PRESSURE APPLICATIONS UP TO 80 BAR
IN REFRIGERATION SYSTEMS

1. Material

Seamless drawn round tubes made of high purity copper, grade Cu-DHP (CW024A). Tubes are supplied in straight lengths in the material condition hard meeting or exceeding the requirements of EN 12735-1 and designed for a Maximum Operating Pressure of 80 bar according to EN14276:2020 complying with the European Pre Equipment Directive (PED) 2014/68/EU.

2. Mechanical Properties

Material Condition	Tensile Strength	Elongation	Indicative Hardness
	Rm [MPa]	A [%]	[HV]
R290-Hard	≥ 290	≥ 3	≥ 100

3. Nominal Tube Dimensions:

Table 1

Size (inch)	Weight kg/m	Length (m)	Pieces/sub bundles	Sub bundles/bundle (pcs)	Pieces/bundle (pcs)	Bundle (pcs)	Bundle weight approx. (kg)
5/16" x 0,70	0,142	5	10	75		3750	500
3/8" x 0,80	0,195	5	10	54		2700	500
1/2" x 0,90	0,297	5	10	35		1700	500
5/8" x 1,05	0,435	5	10	20		1000	500
3/4" x 1,30	0,645	5	10	15		750	500
7/8" x 1,50	0,869	5	10	11		550	500
1 1/8" x 1,90	1,417	5	10	7		350	500
1 3/8" x 2,30	2,098	5	5	9		225	500
1 5/8" x 2,70	2,912	5	5	8		200	500
2 1/8" x 3,60	5,071	5			21	105	500
2 5/8" x 4,50	7,823	5			14	70	500

4. Surface Quality & Cleanliness

Tubes are bright and smooth, free from cracks, slivers, seams, scales and other surface defects. The inner and outer surface of the tube shall be clean, free from grease, oxides and dirt. The carbon residue on the inner surface shall not exceed 0,38 mg/dm².

5. Eddy Current Testing

The Cu-tubes are 100% tested in an eddy current unit capable of detecting and rejecting any defect detrimental to subsequent processing or the end use of the tube.

6. Marking on tube

The tubes shall be durably ink marked at repeated distances along their length with at least the following information:

- Manufacturer's identification [HALCOR ACR TALOS S80]
- Pertinent EN standard [EN 12735-1]
- Material designation [Cu-DHP]
- Nominal Outside Diameter and Wall thickness in mm [OD x Wall]
- Material condition [R290]
- Date of production [Year and Month]
- Lot number

7. Form of Delivery and Packing

The tubes are delivered in straight lengths of 5m and packaged as described in table 1.
The tubes will be with ends capped.

8. Maximum Allowable Pressure

The tubes shall withstand a maximum operating pressure of 80 bar at temperatures up to 100 °C according to EN 14276:2020 and in compliance with the European Pressure Equipment Directive (PED) 2014/68/EU.

9. Inspection Document

An inspection document / a mill test certificate Type 3.1 according to EN 10204 shall be supplied with each dispatch upon request.

11. Bending

On-site Bending

Copper tube can be formed around bends by simple hand tools, or power bending machines on-site (Table 1). A proper bent will not collapse on the outside of the bend and will not buckle on the inside of the bend. The compatibility between the tube (material and geometry) and the bending tool used is essential.

Tube Material. Both annealed tube and hard drawn tube can be bent with the appropriate bending tools, however the softer the tube the easier the bend is. Tubes in annealed (R220) and half-hard (R250) temper are preferred for bending, due to their higher plasticity and elongation.

Bending Tool. There are several bending tools available on the market, Figure 1 illustrates the basic and most common tools used on-site today. The bending tool size must always match the tube size. Typically, the bending radius at the centerline of the bend shall be at least 3.5 times the outside diameter of the tube. It is also important that the bending tool manufacturer technical instructions are followed. Size mismatch between the bending tool and the tube may cause defective bents (Table 2).

Tube Geometry. As the tube's diameter is increased, the required bending force is increased and the on-site bending becomes harder. Regarding the tube's wall thickness, bending defects like wrinkling and/or flattening are less possible to appear on thick-walled tubes (Table 2).

Table 1: Common bending tools










Type	Illustration	
One-component	Spring 	Plastic Insert 
	Hand-powered 	Electric-powered 
<u>Cross-bow</u>	Mechanical, Electrical or Hydraulic 	

Table 2: Bending Defect's Troubleshooting

Defect		Troubleshooting
Cracking		Increase bend radius
		Decrease hardness. (Use softer temper tube)
Flattening		Use the correct size bending tool
		Increase wall thickness
Wrinkling		Increase bend radius
		Increase wall thickness and/or hardness
Kinking		Use the correct size bending tool
		Make sure the tube is properly inserted in the tool

12. Brazing

Brazing. Cu-DHP tubes may be joined together by brazing, using standardized fittings. Suitable brazing materials include copper-phosphorus-silver alloys, which need to be selected according to the specific joint requirements. A minimum of 5% silver content or higher is suggested for brazing Cu-DHP tubes with CuFe2P tubes or fittings. For brazing with other copper alloy materials (e.g. brass) a higher silver content is suggested according to common practice.

Please note that the ultimate selection of brazing alloy depends also on other factors (vibration, operating temperatures) and must be clarified with the brazing alloy supplier for each specific application. Recommended brazing materials are listed in the Table 3.

The common installation practices and safety precautions for high-pressure refrigeration systems should be followed (e.g. EN378), as well as any specific joining instructions of the manufacturer of the fittings.

Table 3: Recommended brazing materials

EN ISO 17672 Brazing alloy	DIN EN 1044 Brazing alloy	Working temperature [°C]	Composition [% by weight]				
			Ag	Cu	Zn	Sn	P
Ag 145*	AG 104*	670	45	27	25.5	2.5	-
Ag 134*	AG 106*	710	34	36	27.5	2.5	-
Ag 244*	AG 203*	730	44	30	26.0	-	-
CuP 284	CP 102	700	15	80	-	-	5.0
CuP 281	CP 104	710	5	89	6.0	-	-
CuP 279	CP 105	740	2	92	-	-	6.3

* A flux of type FH10 according to EN 1045 is required. Flux residues are corrosive and must be removed.