ASTM B467 / ASME SB467

SPECIFICATION FOR WELDED COPPER-NICKEL PIPE

This specification covers welded copper-nickel alloy pipe for general engineering purposes. The following alloys are covered:

Copper Alloy UNS No.	Previously Used Designation	Nominal Composition, %	
		Copper	Nickel
C70600	706	90	10
C71500	715	70	30

A. Chemical Composition :-

The material shall conform to the composition limits specified in Table 1.

Table 1

Copper Alloy UNS No[A]	C70600	C71500
Copper[B]	remainder	remainder
Nickel[C]	9.0–11.0	29.0–33.0
Lead,[D] max	0.05	0.05
Iron	1.0–1.8	0.40–1.0
Zinc,[D] max	1.0	1.0
Manganese, max	1.0	1.0
Sulfur, max	0.02	0.02
Phosphorus, max	0.02	0.02
Other Elements	D	D

[A] *New designation established in accordance with Practice E 527.*

[B] *Silver counting as copper.*

[C] *Cobalt counting as nickel.*

[D] *When the product is for subsequent welding applications and so specified by the purchaser, zinc shall be 0.50% max, lead 0.02% max, and carbon 0.05% max.*

B. Mechanical Requirements:-

The material shall conform to the Mechanical requirements prescribed in Table 2, 3 & 4.

C. Temper :-

1. The pipe shall be supplied in any one of the following tempers as specified and shall meet the mechanical requirements of Tables 2, 3.
   - i. As welded from annealed sheet, strip, or plate (WM50),
   - ii. As welded from cold-worked sheet, strip, or plate (WM00, WM01, WM02, etc.),
   - iii. Welded and annealed (WO50),
   - iv. Welded and cold drawn in either light drawn (Alloy C70600 only) or hard drawn, stress relieved (WR00), (WR04), or
   - v. Fully finished as annealed (WO61) light drawn (Alloy C70600 only), or hard drawn, stress relieved (WH00, WH04).

TABLE 2: MECHANICAL REQUIREMENTS OF AS-WELDED AND FULLY FINISHED PIPE WHEN FURNISHED IN THE ANNEALED TEMPER (W061)

Copper Alloy UNS No.	Outside Diameter, in.	Tensile Strength min, ksi	Yield Strength at 0.5 % Extension Under Load, min, ksi	Elongation in 2 in. min, %
C70600	up to 4(1⁄2) incl	40	15	25.0
	over 4(1⁄2)	38	13	25.0
C71500	up to 4(1⁄2) incl	50	20	30.0
	over 4(1⁄2)	45	15	30.0

TABLE 3: MECHANICAL REQUIREMENTS OF WELDED AND COLD-DRAWN AND FULLY-FINISHED PIPE IN DRAWN TEMPERS

Copper Alloy UNS No.	Outside Diameter, in.	Tensile Strength min, ksi	Yield Strength at 0.5 % Extension Under Load, min, ksi[A]	Elongation in 2 in. min, %
C71500	up to 2 incl, for wall thicknesses up to 0.048 incl	72	50	12.0
	for wall thicknesses over 0.048 in.	72	50	15.0

TABLE 4: MECHANICAL REQUIREMENTS OF AS-WELDED PIPE

Copper Alloy UNS No.	Condition	Outside Diameter, in.	Tensile Strength min, ksi	Yield Strength at 0.5 % Extension Under Load, min, ksi
C70600	welded from annealed strip	up to 4(1⁄2) incl	45	30
	welded from cold-rolled strip	up to 4(1⁄2) incl	54	45

D. Expansion Test for Pipe :-

1. The annealed material shall be capable of being expanded in accordance with Test Method B 153. Pipe supplied in the "as welded" condition shall be expanded to 20% of its outside diameter.
2. The annealed ends of pipe furnished end annealed shall be capable of being expanded 30% of its outside diameter in accordance with Test Method B 153.

E. Non-destructive Tests for Pipe :-

1. Radiographic Examination— Radiographic examination of the welds shall be as agreed upon.
2. Eddy-Current Test— Testing shall follow the procedures of Practice E 243.
3. Other Non-destructive Tests — By agreement between the manufacturer or supplier and purchaser, testing of the material by one of the methods in point D.3.i and point D.3.ii may be required.
   i. Hydrostatic Test — Each length of pipe shall withstand, without showing weakness or defects, an internal hydrostatic pressure sufficient to subject the material to a fiber stress of 7000 psi, determined by the following equation for thin hollow cylinders under tension. The pipe need not be tested at a hydrostatic pressure of over 1000 psig, unless so specified.

$$P = 2St / (D - 0.8t)$$

   where: P = hydrostatic pressure, psig,
   t = wall thickness of the pipe, in.,
   D = outside diameter of the pipe, in., and
   S = allowable stress of the material.

   ii. Pneumatic Test — When specified, the pipe shall be subjected to an internal air pressure of 60 psig minimum for 5 s without showing evidence of leakage.

F. Test Methods :-

The properties enumerated in this specification shall, in case of disagreement, be determined in accordance with the following applicable methods of the American Society for Testing and Materials:

Test	ASTM Designation
Chemical analysis	E 75
Tension test	E 8

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