TPS TECHNITUBE®
RÖHRENWERKE GMBH

# NON FERROUS
# HEAT EXCHANGER & CONDENSER TUBES

This new catalogue gives you informations about the copper alloy tubes mainly used in heat exchangers and condensers. Beside mill deliveries, TPS keeps these alloys also in stock for immediate and emergency deliveries.

Please ask for our stock catalogue.

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TPS tube mills and bending facilities

| Standard Grade | ASTM B 111 C68700 | EN 12451 CuZn20Al2As (CW702R) | DIN 17660/1785 CuZn20Al2 | BS 2871 Part 3 CZ 110 | NFA 51102 CuZn22Al2 | JIS H3300 C6870 |
|---|---|---|---|---|---|---|
| Cu | 76,0 - 79,0 | 76,0 - 79,0 | 76,0 - 79,0 | 76,0 - 78,0 | 76,0 - 79,0 | 76,0 - 79,0 |
| Al | 1,8 - 2,5 | 1,8 - 2,3 | 1,8 - 2,3 | 1,8 - 2,3 | 1,8 - 2,5 | 1,8 - 2,5 |
| Pb | 0,07 max. | 0,05 max. | 0,07 max. | 0,07 max. | 0,07 max. | 0,07 max. |
| Ni | - | 0,1 max. | 0,1 max. | - | - | - |
| Fe | 0,06 max. | 0,07 max. | 0,07 max. | 0,06 max. | 0,06 max. | 0,06 max. |
| Zn | Rem. | Rem. | Rem. | Rem. | Rem. | Rem. |
| As | 0,02 - 0,10 | 0,02 - 0,06 | 0,02 - 0,035 | 0,02 - 0,06 | 0,02 - 0,06 | 0,02 - 0,06 |
| P | - | 0,01 max. | 0,01 max. | - | - | - |
| Mg | - | - | 0,005 max. | - | - | - |
| Mn | - | 0,1 max. | 0,1 max. | - | - | - |
| Total Impurities | - | Others Total | Others Total | 0,3 max. | 0,03 max. | - |
| | - | 0,3 max. | 0,1 max. | - | - | - |
| CONDITION | O61 | R390 | F39 | M | annealed (X690) | O |
| | - | R340 | F34 | TA | - | - |
| | - | - | - | O | - | - |
| Yield Strength | 125 min. | 150 min. | 150 - 230 | - | - | - |
| N/mm² | - | 120 min. | 120 - 180 | - | - | - |
| | - | - | - | - | - | - |
| Tensile Strength | 345 min. | 390 min. | 390 min. | - | - | 373 min. |
| N/mm² | - | 340 min. | 340 min. | - | - | - |
| | - | - | - | - | - | - |
| Elongation (%) | - | 45 min. | 45 min. | - | - | 40 min. |
| | - | 55 min. | 55 min. | - | - | - |
| | - | - | - | - | - | - |
| Hardness Hv5 | - | - | - | 150 min. | 80 - 130 | - |
| | - | - | - | 85 - 110 | - | - |
| | - | - | - | 75 max. | - | - |
| Grain Size (mm) | 0,010 - 0,045 | 0,010 - 0,045 | 0,010 - 0,050 | 0,050 max. | 0,010 - 0,045 | 0,010 - 0,045 |
| | - | (annealed) | - | (Condition TA) | - | - |

Typical use: Most used copper alloy for heat exchanger tubes application.
Represents the best option for any heat exchanger which is involved with saline water. The addition of arsenic has solved the problem of dezincfication.

Melting Point: 935°C
Density (20°C): 8,33 g/cm³

- Hot Working Properties: OK
- Cold Working Properties: Very Good

Weight formula:
Average Wall: (OD-WT) x WT x 0,0265 = Kg/m (all sizes in mm)
Minimum Wall: (OD-WT) x WT x 0,0275 = Kg/m (all sizes in mm)

# ADMIRALTY BRASS ALLOY 443

| Standard Grade | ASTM B 111 C44300 | EN 12451 CuZn28Sn1As (CW706R) | DIN 17660/1785 CuZn28Sn1 | BS 2871 Part 3 CZ 111 | NFA 51102 CuZn29Sn1 | JIS H3300 C4430 |
|---|---|---|---|---|---|---|
| Cu | 70,0 - 73,0 | 70,0 - 72,5 | 70,0 - 72,5 | 70,0 - 73,0 | 70,0 - 73,0 | 70,0 - 73,0 |
| Sn | 0,9 - 1,2 | 0,9 - 1,3 | 0,9 - 1,3 | 1,0 - 1,5 | 0,9 - 1,2 | 0,9 - 1,2 |
| Pb | 0,07 max. | 0,05 max. | 0,07 max. | 0,07 max. | 0,07 max. | 0,07 max. |
| Ni | - | 0,1 max. | 0,1 max. | - | - | - |
| Fe | 0,06 max. | 0,07 max. | 0,07 max. | 0,06 max. | 0,06 max. | 0,06 max. |
| Zn | Rem. | Rem. | Rem. | Rem. | Rem. | Rem. |
| As | 0,02 - 0,06 | 0,02 - 0,06 | 0,02 - 0,035 | 0,02 - 0,06 | 0,02 - 0,06 | 0,02 - 0,06 |
| P | - | 0,01 max. | 0,01 max. | - | - | - |
| Mn | - | 0,1 max. | 0,1 max. | - | - | - |
| Total Impurities | - | Others Total | Others Total | 0,3 max. | 0,03 max. | - |
| | - | 0,3 max. | 0,1 max. | - | - | - |
| Condition | O61 | R360 | F36 | M | annealed (X690) | O |
| | - | R320 | F32 | TA | - | - |
| | - | - | - | O | - | - |
| Yield Strength | 105 min. | 140 min. | 140 - 220 | - | - | - |
| N/mm² | - | 100 min. | 100 - 170 | - | - | - |
| | - | - | - | - | - | - |
| Tensile Strength | 310 min. | 360 min. | 360 min. | - | - | 314 min. |
| N/mm² | - | 320 min. | 320 min. | - | - | - |
| | - | - | - | - | - | - |
| Elongation (%) | - | 45 min. | 45 min. | - | - | 30 min. |
| | - | 55 min. | 55 min. | - | - | - |
| | - | - | - | - | - | - |
| Hardness Hv5 | - | - | - | 150 min. | 80 - 120 | - |
| | - | - | - | 85 - 105 | - | - |
| | - | - | - | 75 max. | - | - |
| Grain Size (mm) | 0,010 - 0,045 | 0,010 - 0,050 | 0,010 - 0,050 | 0,050 max. | 0,010 - 0,045 | 0,010 - 0,045 |
| | - | (annealed) | - | (Condition TA) | - | - |

Typical use: The specific copper alloy for application fresh water. Often used for heat exchangers which are involved with operations in petroleum refineries and petrochemical plants.

Melting Point: 935°C

Density (20°C): 8,53 g/cm³

- Hot Working Properties: OK
- Cold Working Properties: Very Good

Weight formula:

Average Wall: (OD-WT) x WT x 0,0270 = Kg/m (all sizes in mm)

Minimum Wall: (OD-WT) x WT x 0,0281 = Kg/m (all sizes in mm)

| Standard Grade | ASTM B 111 C70600 | EN 12451 CuNi10Fe1Mn (CW352H) | DIN 17664/1785 CuNi10Fe1Mn | BS 2871 Part 3 CN 102 | NFA 51102 CuNi10Fe1Mn | JIS H3300 C7060 |
|---|---|---|---|---|---|---|
| Cu | Rem. | Rem. | Rem. | Rem. | Rem. | Rem. |
| Pb | 0,05 max. | 0,02 max. | 0,03 max. | 0,01 max. | 0,05 Sn+Pb max. | 0,05 max. |
| Ni | 9,0 - 11,0 | 9,0 - 11,0 | 9,0 - 11,0 | 10,0 - 11,0 | 9,0 - 11,0 | 9,0 - 11,0 |
| Fe | 1,0 - 1,8 | 1,0 - 2,0 | 1,0 - 1,8 | 1,0 - 2,0 | 1,0 - 2,0 | 1,0 - 1,8 |
| Mn | 1,0 max. | 0,5 - 1,0 | 0,5 - 1,0 | 0,5 - 1,0 | 0,3 - 1,0 | 0,2 - 1,0 |
| Zn | 1,0 max. | 0,5 max. | 0,5 max. | - | 0,5 max. | 0,5 max. |
| S | - | 0,05 max. | 0,05 max. | 0,05 max. | 0,02 max. | - |
| Sn | - | 0,03 max. | - | - | - | - |
| P | - | 0,02 max. | - | - | - | - |
| C | - | 0,05 max. | 0,05 max. | 0,05 max. | 0,05 max. | - |
| Co | - | 0,1 max. | - | - | - | - |
| Cu+Ni+Fe+Mn | - | - | - | - | - | 99,5 min. |
| Total Impurities | - | Others Total | Others Total | 0,3 max. | - | - |
| | - | 0,2 max. | 0,1 max. | - | - | - |
| Condition | O61 | R290 | F29 | M | annealed (X690) | O |
| | H55 | R310 | - | O | - | - |
| | - | R480 | - | - | - | - |
| Yield Strength | 105 min. | 90 min. | 90 - 180 | - | - | - |
| N/mm² | 240 min. | 220 min. | - | - | - | - |
| | - | 400 min. | - | - | - | - |
| Tensile Strength | 275 min. | 290 min. | 290 min. | - | - | 275 min. |
| N/mm² | 310 min. | 310 min. | - | - | - | - |
| | - | 480 min. | - | - | - | - |
| Elongation (%) | - | 30 min. | 30 min. | - | - | 30 min. |
| | - | 12 min. | - | - | - | - |
| | - | 8 min. | - | - | - | - |
| Hardness Hv5 | - | - | - | 150 min. | 70 - 100 | - |
| | - | - | - | 80 - 110 | - | - |
| | - | - | - | - | - | - |
| Grain Size (mm) | 0,010 - 0,045 | 0,010 - 0,050 | 0,010 - 0,050 | 0,050 max. | 0,010 - 0,045 | 0,010 - 0,045 |
| | - | (annealed) | - | (Condition O) | - | - |

Typical use: Used for the working in sea water, mainly for shipbuilding and sea water pipelines, stations, desalination, because of its very good corrosive resistance.

Melting Point: 1150°C
Density (20°C): 8,94 g/cm³

- Hot Working Properties: Good
- Cold Working Properties: Good

Weight formula:
Average Wall: (OD-WT) x WT x 0,0284 = Kg/m (all sizes in mm)
Minimum Wall: (OD-WT) x WT x 0,0295 = Kg/m (all sizes in mm)

# COPPER NICKEL 70/30 ALLOY 715

| Standard Grade | ASTM B 111 C71500 | EN 12451 CuNi30Mn1Fe (CW354H) | DIN 17664/1785 CuNi30Mn1Fe | BS 2871 Part 3 CN 107 | NFA 51102 CuNi30Mn1Fe | JIS H3300 C7150 |
|---|---|---|---|---|---|---|
| Cu | Rem. | Rem. | Rem. | Rem. | Rem. | Rem. |
| Pb | 0,05 max. | 0,02 max. | 0,03 max. | 0,01 max. | 0,05 Sn+Pb max. | 0,05 max. |
| Ni | 29,0 - 33,0 | 30,0 - 32,0 | 30,0 - 32,0 | 30,0 - 32,0 | 29,0 - 32,0 | 29,0 - 33,0 |
| Fe | 0,4 - 1,0 | 0,4 - 1,0 | 0,4 - 1,0 | 0,4 - 1,0 | 0,4 - 0,7 | 0,4 - 0,7 |
| Mn | 1,0 max. | 0,5 - 1,5 | 0,5 - 1,5 | 0,5 - 1,5 | 0,5 - 1,5 | 0,2 - 1,0 |
| Zn | 1,0 max. | 0,5 max. | 0,5 max. | - | 0,5 max. | 0,5 max. |
| S | - | 0,05 max. | 0,06 max. | 0,08 max. | 0,02 max. | - |
| Sn | - | 0,05 max. | - | - | - | - |
| P | - | 0,02 max. | - | - | - | - |
| C | - | 0,05 max. | 0,06 max. | 0,06 max. | 0,06 max. | - |
| Co | - | 0,1 max. | - | - | - | - |
| Cu+Ni+Fe+Mn | - | - | - | - | - | 99,5 min. |
| Total Impurities | - | Others Total | Others Total | 0,3 max. | 0,1 max. | - |
| | - | 0,2 max. | 0,1 max. | - | - | - |
| Condition | O61 | R370 | F37 | M | annealed (X690) | O |
| | HR50 | R480 | - | O | - | - |
| | - | - | - | - | - | - |
| Yield Strength | 125 min. | 120 min. | 120 - 220 | - | - | - |
| N/mm² | 345 min. | 300 min. | - | - | - | - |
| | - | - | - | - | - | - |
| Tensile Strength | 360 min. | 370 min. | 370 min. | - | - | 363 min. |
| N/mm² | 495 min. | 480 min. | - | - | - | - |
| | - | - | - | - | - | - |
| Elongation (%) | - | 35 min. | 35 min. | - | - | 30 min. |
| | 12 min. (WT<1,21 mm) | 12 min. | - | - | - | - |
| | 15 min. (WT>1,21 mm) | - | - | - | - | - |
| Hardness Hv5 | - | - | - | 150 min. | 90 - 130 | - |
| | - | - | - | 90 - 120 | - | - |
| | - | - | - | - | - | - |
| Grain Size (mm) | 0,010 - 0,045 | 0,010 - 0,050 | 0,010 - 0,050 | 0,050 max. | 0,010 - 0,045 | 0,010 - 0,045 |
| | - | (annealed) | - | (Condition O) | - | - |

Typical use: This alloy has all the characteristics of CuNi 90/10, but also offers excellent corrosion resistance in high velocity sea water. Also the operating temperature is much higher than of CuNi 90/10. Can assure a long service life and reliability.

| | | |
|---|---|---|
| Melting Point: | 1240°C | • Hot Working Properties: Good |
| Density (20°C): | 8,94 g/cm³ | • Cold Working Properties: Good |

| | | |
|---|---|---|
| Weight formula: | Average Wall: | (OD-WT) x WT x 0,0284 = Kg/m (all sizes in mm) |
| | Minimum Wall: | (OD-WT) x WT x 0,0295 = Kg/m (all sizes in mm) |

# COPPER NICKEL IRON MANGANESE 66/30/2/2 ALLOY 71640

| Standard Grade | ASTM B 111 C71640 | EN 12451 CuNi30Fe2Mn2 (CW353H) | DIN 17664/1785 CuNi30Fe2Mn2 | BS 2871 Part 3 CN 108 | NFA 51102 CuNi30Fe2Mn2 | JIS H3300 C7164 |
|---|---|---|---|---|---|---|
| Cu | Rem. | Rem. | Rem. | Rem. | Rem. | Rem. |
| Pb | 0,05 max. | 0,02 max. | 0,02 max. | - | 0,05 Sn+Pb max. | 0,05 max. |
| Ni | 29,0 - 32,0 | 29,0 - 32,0 | 29,0 - 32,0 | 29,0 - 32,0 | 29,0 - 32,0 | 29,0 - 32,0 |
| Fe | 1,7 - 2,3 | 1,5 - 2,5 | 1,5 - 2,5 | 1,7 - 2,3 | 1,5 - 2,0 | 1,7 - 2,3 |
| Mn | 1,5 - 2,5 | 1,5 - 2,5 | 1,5 - 2,5 | 1,5 - 2,5 | 1,5 - 2,0 | 1,5 - 2,5 |
| Zn | 1,0 max. | 0,5 max. | 0,5 max. | - | 0,5 max. | 0,5 max. |
| S | - | 0,05 max. | 0,06 max. | - | 0,02 max. | - |
| Sn | - | 0,05 max. | - | - | - | - |
| P | - | 0,02 max. | - | - | - | - |
| C | - | 0,05 max. | 0,05 max. | - | 0,06 max. | - |
| Co | - | 0,1 max. | - | - | - | - |
| Cu+Ni+Fe+Mn | - | - | - | - | - | 99,5 min |
| Total Impurities | - | Others Total | 0,3 max. | 0,3 max. | 0,1 max. | - |
| | - | 0,2 max. | - | - | - | - |
| Condition | O61 | R420 | F42 | M | annealed (X690) | O |
| | HR50 | - | - | O | - | - |
| | - | - | - | - | - | - |
| Yield Strength | 170 min. | 150 min. | 150 - 260 | - | - | - |
| N/mm² | 400 min. | - | - | - | - | - |
| | - | - | - | - | - | - |
| Tensile Strength | 435 min. | 420 min. | 420 min. | - | - | 430 min. |
| N/mm² | 560 min. | - | - | - | - | - |
| | - | - | - | - | - | - |
| Elongation (%) | - | 30 min. | 30 min. | - | - | 30 min. |
| | - | - | - | - | - | - |
| | - | - | - | - | - | - |
| Hardness Hv5 | - | - | - | 150 min. | 90 - 130 | - |
| | - | - | - | 90 - 120 | - | - |
| | - | - | - | - | - | - |
| Grain Size (mm) | 0,010 - 0,045 | 0,010 - 0,050 | 0,010 - 0,050 | 0,050 max. | 0,010 - 0,045 | 0,010 - 0,045 |
| | - | (annealed) | - | (Condition O) | - | - |

Typical use: Has the most resistance against impingement attack and corrosion by suspended solids of all copper based alloys which are used for heat exchanger tube applications. This alloy is preferred for desalination plants.

| | | |
|---|---|---|
| Melting Point: | 1240°C | • Hot Working Properties: Good |
| Density (20°C): | 8,94 g/cm³ | • Cold Working Properties: Good |

| | | |
|---|---|---|
| Weight formula: | Average Wall: | OD-WT) x WT x 0,0284 = Kg/m (all sizes in mm) |
| | Minimum Wall: | (OD-WT) x WT x 0,0295 = Kg/m (all sizes in mm) |


Headquarter


Project Office


Mill 1


Mill 2


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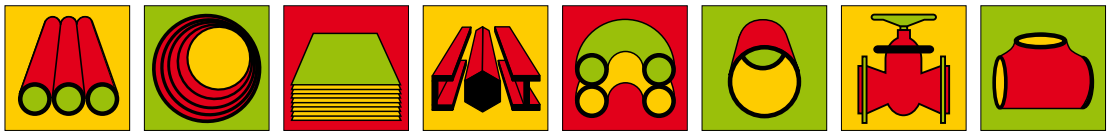

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