

K65[®]

Processing information

The tube system for high-pressure applications

In air conditioning/refrigeration, and in particular in the area of commercial or industrial refrigeration systems, more and more ecology-oriented concepts are being implemented, with the focus being on efficiency and environmentally friendly refrigerants.

The use of the natural refrigerant CO₂ (R744) leads to higher operating pressures, particularly in transcritical operation. The new K65 system, consisting of tubes and fittings, is particularly suited to these applications.

K65 is a high-strength copper alloy and enables simple, safe and economical installation of refrigeration systems with operation pressures of up to 120 bar (other pressure levels on request).

Both the tubes and the fittings of the K65 system are TÜV-certified and, therefore, meet the requirements of the European Pressure Equipment Directive 97/23/EC.

K65 tubes and K65 fittings are clearly marked, so that the system components can be easily identified at all times.

Your benefits of using K65:

- Cost reduction and improved handling due to weight reduction
- Excellent heat transfer characteristics
- Known and user friendly processing technologies (e.g. brazing)
- Existing processes and equipment can be used
- Clear identification of the system components
- TÜV-certified



Applications

- Air conditioning and refrigeration, heating, non-hazardous refrigerants, in particular the refrigerant CO₂ (R744).
- Further media are possible after consultation with the manufacturer.

Material properties

Material designation

K65, CW 107C,
CuFe2P
UNS C19400

Standards

EN

VdTÜV
UNS*

* *Unified Numbering System (USA)*

Temper*

K65 tubes = R300, according to EN 12449 and VdTÜV 567 (heat treated) and/or R420 according to EN 12449 (hard as drawn)

* *The temper for K65 fittings is above the value R300 due to work-hardening during manufacturing process.*

Corrosion resistance

K65 is insensitive to stress corrosion cracking and exhibits high resistance to natural atmosphere.

Physical properties*

Thermal conductivity >260 W/(mK)
Density 8.91 g/cm³
Coefficient of thermal expansion 17.6·10⁻⁶/K

* *Reference values at room temperature*

Composition

Fe 2.10 – 2.60 %
Zn 0.05 – 0.20 %
P 0.015 – 0.15 %
Pb max. 0.03 %
Cu balance

CuFe2P (EN 12449)
CW107C
Material Sheet 567
C19400

Processing

Proven joining technology – brazing!

K65 has excellent processing properties which are similar to those of pure copper. K65 tubes may be joined with K65 fittings through brazing. K65 fittings are manufactured by IBP Conex/Bänninger.

Silver-containing solders with a silver content of min. 2 % have proved to be very successful.

Usually, no flux is necessary for the brazing of K65 tube and K65 fitting and the use of silver-containing CuP solders. For the joining of copper alloys such as brass the additional use of fluxes, e.g. FH 10 according to DIN EN 1045, is recommended. This ensures optimum filling of the capillary gap. Residual flux has to be removed after brazing (e.g. with a moist cloth).

The processing instructions for the installation of tubes and connecting tubes made of copper, e.g., according to EN 378 and DKI information i164*, common for air conditioning and refrigeration, have to be followed. In addition, compliance with the basic requirements of the European Pressure Equipment Directive 97/23/EC has to be examined in individual cases. The safety precautions of high-pressure systems, particularly for pressure testing and commissioning have to be observed, if necessary by calling in experts.

* *i164, Copper tubes in air conditioning and refrigeration for technical and medical gases*



During brazing, it is imperative that the brazed joint is handled and heated properly. Additional heating and annealing of the tubes and the fitting body are not permitted.

Joining properties of K65

| | |
|--------------------|-----------|
| Brazing | excellent |
| Soft soldering | excellent |
| Inert gas welding | excellent |
| Resistance welding | good |
| Laser welding | good |

Tubes in K65

| | |
|-----------------------------|---|
| Identification: | Wieland K65 120 bar |
| Dimensional tolerances: | according to EN 12735-1 |
| Material: | Wieland K65 |
| Temper: | R300 (heat treated) R420 (hard as drawn) |
| Maximum operating pressure: | 120 bar (respective dimensions see table) |
| Certification: | according to VdTÜV Material Data Sheet 567 |
| Tube ends: | closed |
| Packing: | in small bundles and ballots |

Selection of recommended solders

| Solder according to DIN EN ISO 17672 | Operating temperature °C | Composition in per cent by weight | | | | |
|--------------------------------------|--------------------------|-----------------------------------|------|------|-----|-----|
| | | Ag | Cu | Zn | Sn | P |
| CuP 279 | 740 | 2 | 91.7 | – | – | 6.3 |
| CuP 281 | 710 | 5 | 89 | – | – | 6.0 |
| CuP 284 | 700 | 15 | 80 | – | – | 5.0 |
| Ag 244 | 730 | 44 | 30 | 26 | – | – |
| Ag 134 | 710 | 34 | 36 | 27.5 | 2.5 | – |
| Ag 145 | 670 | 45 | 27 | 25.5 | 2.5 | – |

Recommended fluxes

| Flux DIN EN 1045 | Temperature °C | Note |
|------------------|----------------|--|
| FH 10 | 550–970 | The fluxes are corrosive and have to be removed. |

In difficult-to-reach joints, as they may occur in complex assemblies, the use of phosphorus-free brazing solders with higher silver content, such as Ag 134 or Ag 145, using fluxes is recommended. These solders are characterised by a higher gap-filling level.

In compliance with the requirements of the AD2000 rules and the VdTÜV Material Data Sheet 567 the following dimensions are available from stock for operating pressures of up to 120 bar.

The dimensions mentioned here can be cold bent with suitable bending equipment and bending segments that are precisely tailored to the outside diameter. Hot bending is not recommended.

Additional dimensions and forms of delivery (e.g. level-wound tubes) are possible for industrial applications according to the customer's specification and for other pressures as well.

| Wieland K65 tube for max. 120 bar | | | | | | | | | |
|-----------------------------------|-------|----------------------|----------------------|-----------------------------|-------------------------|--------------------------|-------------------|--------|------------------------------|
| Outside diameter | | Wall thickness mm | Wieland material No. | Small bundle | | Ballot | | Temper | Minimum bending radius mm |
| Zoll | mm | | | Number of tubes of 5 m each | Metres per small bundle | Small bundles per ballot | Metres per ballot | | |
| 3/8" | 9.52 | 0.65 | 433009520 | 10 | 50 | 20 | 1,000 | R420 | 43 |
| 1/2" | 12.70 | 0.85 | 433012700 | 10 | 50 | 20 | 1,000 | R420 | 52 |
| 5/8" | 15.87 | 1.05 | 433015870 | 10 | 50 | 20 | 1,000 | R300 | 63 |
| 3/4" | 19.05 | 1.30 | 433019060 | 10 | 50 | 20 | 1,000 | R300 | 75 |
| 7/8" | 22.23 | 1.50 | 433022230 | 10 | 50 | 10 | 500 | R300 | 98 |
| 1 1/8" | 28.57 | 1.90 | 433028510 | 5 | 25 | 20 | 500 | R300 | 115 |
| 1 3/8" | 34.92 | 2.30 | 433034920 | 5 | 25 | 10 | 250 | R300 | –* |
| 1 5/8" | 41.27 | 2.70 | 433041270 | 3 | 15 | 10 | 250 | R300 | –* |

* No standard bending radii defined

Changes in surface colour are possible with this material but have no impact on technical properties.

Fittings in K65

Designation of the fitting

The fitting is designated by

- shape (e.g. bend, elbow, T-piece, coupling)
- item number
- dimension

In your order, please state at least:

- item number
- dimension
- number of units

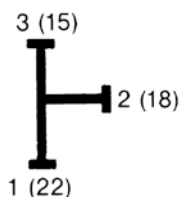
Equal fittings whose outlets all have the same connection dimension are sufficiently designated by this one dimension, e.g. K5130 3/4"-3/4"-3/4" = K5130 3/4"

Reduced fittings are designated by the outlets with the respective connection dimension as follows:

Start with the larger dimension; for T-pieces and reducers with the larger surface of the larger dimension of the passage.



Please state the outlets with the respective tube outside diameter in the following order:

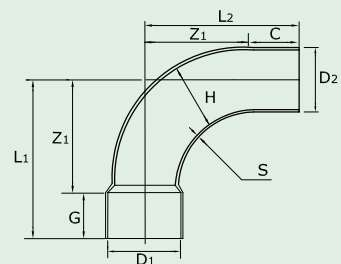


Designation of a fitting with 2 outlets,
e.g. red. nipple K5243 3/4"-1/2"
e.g. bend K5002 3/4"

Designation of T-pieces
e.g. T K5130 3/4"-3/4"-5/8"

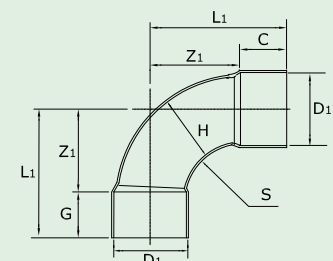
K5001
Bend 90° I/A

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|-----------|------|------|----|------|----|----|-----------------|
| 3/8" | 20.0 | 22.0 | | 12.0 | | | K5001 003000000 |
| 1/2" | 25.5 | 27.5 | | 16.0 | | | K5001 004000000 |
| 5/8" | 31.5 | 33.5 | | 20.0 | | | K5001 005000000 |
| 3/4" | 37.5 | 39.5 | | 24.0 | | | K5001 006000000 |
| 7/8" | 44.5 | 46.5 | | 28.0 | | | K5001 007000000 |
| 1 1/8" | 52.5 | 54.5 | | 36.0 | | | K5001 009000000 |
| 1 3/8" | 65.0 | 67.0 | | 44.0 | | | K5001 011000000 |
| 1 5/8" | 73.0 | 75.0 | | 52.0 | | | K5001 013000000 |



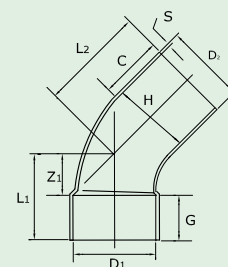
K5002
Bend 90°

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|-----------|------|----|----|------|----|----|-----------------|
| 3/8" | 22.0 | | | 14.0 | | | K5002 003000000 |
| 1/2" | 27.5 | | | 18.0 | | | K5002 004000000 |
| 5/8" | 33.5 | | | 22.0 | | | K5002 005000000 |
| 3/4" | 39.5 | | | 26.0 | | | K5002 006000000 |
| 7/8" | 43.5 | | | 27.0 | | | K5002 007000000 |
| 1 1/8" | 54.5 | | | 38.0 | | | K5002 009000000 |
| 1 3/8" | 67.5 | | | 46.0 | | | K5002 011000000 |
| 1 5/8" | 75.5 | | | 54.0 | | | K5002 013000000 |



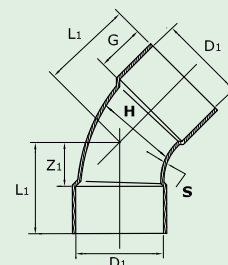
K5040
Bend 45° I/A

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|-----------|------|------|----|------|----|----|-----------------|
| 3/4" | 21.5 | 37.5 | | 8.0 | | | K5040 006000000 |
| 7/8" | 25.5 | 27.5 | | 9.0 | | | K5040 007000000 |
| 1 1/8" | 28.0 | 31.0 | | 12.0 | | | K5040 009000000 |
| 1 3/8" | 38.0 | 43.0 | | 17.0 | | | K5040 011000000 |
| 1 5/8" | 39.0 | 51.0 | | 18.0 | | | K5040 013000000 |



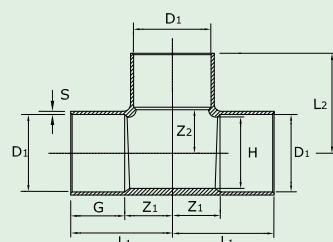
K5041
Bend 45°

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|-----------|------|----|----|------|----|----|-----------------|
| 3/4" | 21.5 | | | 8.0 | | | K5041 006000000 |
| 7/8" | 25.0 | | | 16.5 | | | K5041 007000000 |
| 1 1/8" | 27.0 | | | 10.5 | | | K5041 009000000 |
| 1 3/8" | 39.0 | | | 18.0 | | | K5041 011000000 |
| 1 5/8" | 43.0 | | | 22.0 | | | K5041 013000000 |



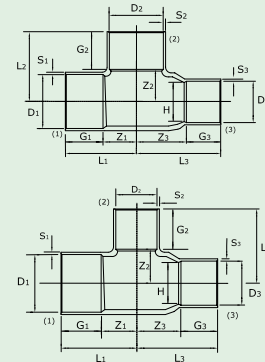
K5130
Tee

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|-----------|------|------|----|------|------|----|-----------------|
| 3/8" | 14.5 | 14.5 | | 6.5 | 6.5 | | K5130 003003003 |
| 1/2" | 18.0 | 18.0 | | 8.5 | 8.5 | | K5130 004004004 |
| 5/8" | 22.0 | 22.0 | | 10.5 | 10.5 | | K5130 005005005 |
| 3/4" | 26.0 | 26.0 | | 12.5 | 12.5 | | K5130 006006006 |
| 7/8" | 30.5 | 30.5 | | 14.0 | 14.0 | | K5130 007007007 |
| 1 1/8" | 34.0 | 34.0 | | 17.5 | 17.5 | | K5130 009009009 |
| 1 3/8" | 42.0 | 42.0 | | 21.0 | 21.0 | | K5130 011011011 |
| 1 5/8" | 46.0 | 46.0 | | 25.0 | 25.0 | | K5130 013013013 |



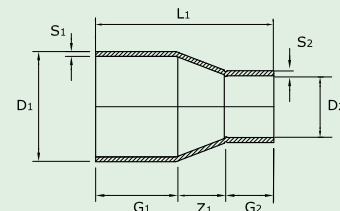
K5130
Reduction tee

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|--------------------|------|------|------|------|------|------|-----------------|
| 1/2-3/8-3/8" | | | | | | | K5130 004003003 |
| 1/2-1/2-3/8" | 18.0 | 18.0 | 18.0 | 8.5 | 8.5 | 10.0 | K5130 004004003 |
| 5/8-5/8-1/2" | 22.0 | 22.0 | 21.0 | 10.5 | 10.5 | 11.5 | K5130 004005004 |
| 5/8-1/2-1/2" | 21.0 | | 20.0 | 9.5 | 10.5 | | K5130 005004004 |
| 5/8-5/8-3/8" | 22.0 | 22.0 | 21.0 | 10.5 | 10.5 | 13.0 | K5130 005005003 |
| 3/4-3/4-5/8" | 26.0 | 26.0 | 25.0 | 12.5 | 12.5 | 13.5 | K5130 006006005 |
| 7/8-7/8-3/4" | 31.0 | 31.0 | 28.0 | 14.5 | 14.5 | 14.5 | K5130 007007006 |
| 1 1/8-1 1/8-5/8" | 34.0 | 34.0 | 33.0 | 17.5 | 17.5 | 16.5 | K5130 009009007 |
| 1 3/8-1 3/8-7/8" | 42.0 | 42.0 | 45.0 | 21.5 | 21.0 | 28.5 | K5130 011011007 |
| 1 5/8-1 5/8-1 3/8" | 46.0 | 46.0 | 45.0 | 25.5 | 25.0 | 24.0 | K5130 013013011 |



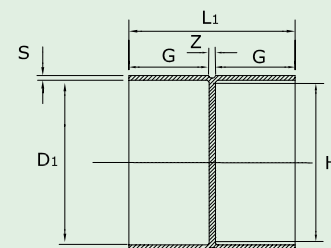
K5243
Reduction coupling

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|--------------|------|----|----|------|----|----|-----------------|
| 1/2-3/8" | 25.0 | | | 7.5 | | | K5243 004003000 |
| 5/8-1/2" | 28.5 | | | 7.5 | | | K5243 005004000 |
| 5/8-3/8" | 29.0 | | | 9.5 | | | K5243 005003000 |
| 3/4-5/8" | 32.0 | | | 7.0 | | | K5243 006005000 |
| 3/4-1/2" | 32.0 | | | 9.0 | | | K5243 006004000 |
| 3/4-3/8" | 35.0 | | | 13.5 | | | K5243 006003000 |
| 7/8-3/4" | 38.0 | | | 8.0 | | | K5243 007006000 |
| 7/8-3/8" | 46.0 | | | 21.5 | | | K5243 007003000 |
| 7/8-5/8" | 38.5 | | | 10.5 | | | K5243 007005000 |
| 1 1/8-7/8" | 43.5 | | | 10.5 | | | K5243 009007000 |
| 1 3/8-7/8" | 43.0 | | | 13.0 | | | K5243 009006000 |
| 1 1/8-5/8" | 46.0 | | | 18.0 | | | K5243 009005000 |
| 1 3/8-1 1/8" | 48.0 | | | 10.5 | | | K5243 011009000 |
| 1 3/8-1 3/8" | 52.5 | | | 10.5 | | | K5243 013011000 |



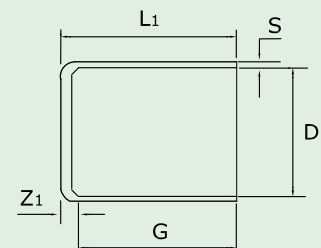
K5270
Straight coupling

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|-----------|------|----|----|------|----|----|-----------------|
| 3/8" | 23.0 | | | 7.0 | | | K5270 003000000 |
| 1/2" | 27.0 | | | 8.0 | | | K5270 004000000 |
| 5/8" | 32.0 | | | 9.0 | | | K5270 005000000 |
| 3/4" | 37.0 | | | 10.0 | | | K5270 006000000 |
| 7/8" | 43.0 | | | 10.0 | | | K5270 007000000 |
| 1 1/8" | 45.0 | | | 12.0 | | | K5270 009000000 |
| 1 3/8" | 56.0 | | | 14.0 | | | K5270 011000000 |
| 1 5/8" | 57.0 | | | 15.0 | | | K5270 013000000 |



K5301
End cap

| Dimension | L1 | L2 | L3 | Z1 | Z2 | Z3 | Item number |
|-----------|------|----|----|-----|----|----|-----------------|
| 1/2" | 12.6 | | | 3.1 | | | K5301 004000000 |
| 5/8" | 14.9 | | | 3.4 | | | K5301 005000000 |
| 3/4" | 18.7 | | | 5.2 | | | K5301 006000000 |
| 7/8" | 22.5 | | | 6 | | | K5301 007000000 |
| 1 1/8" | 23.6 | | | 7.1 | | | K5301 009000000 |
| 1 3/8" | 29.3 | | | 8.3 | | | K5301 011000000 |
| 1 5/8" | 30.4 | | | 9.4 | | | K5301 013000000 |



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