

ACR
TALOS[®]
COPPER TUBES

REFRIGERATION - AIR CONDITIONING

HALCOR



HALCOR

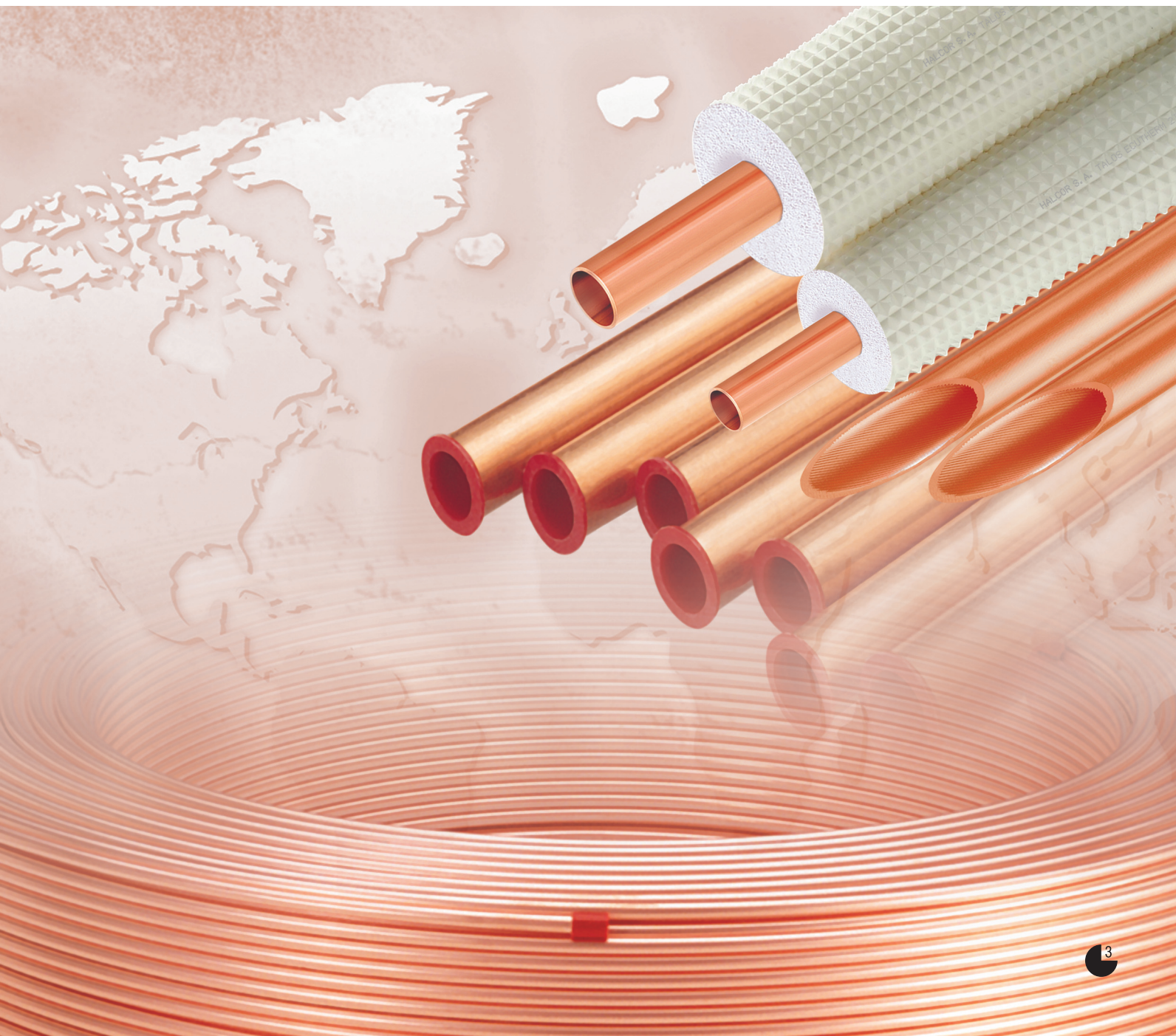
HALCOR is a large-scale modern industrial company with over sixty years of experience in metal processing. It holds a significant position in European and global markets and has four modern plants; three in Greece and one in Bulgaria.

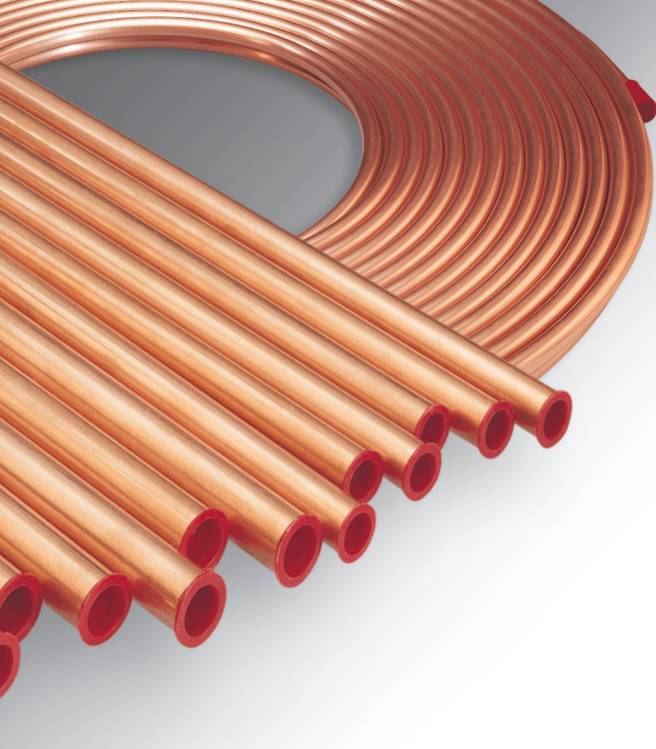
The company is dedicated to achieving high quality. It has ISO 9001:2008 certification, uses state-of-the-art technology and employs highly skilled personnel. Substantial, continual investment in research and know-how allows the company to create innovative new products, which support its aim of being a market leader.

At the same time, HALCOR is committed to sustained development and environmental protection. As such, its production processes are regulated by an ISO 14001:2004 certified Environmental Management System.

Aiming at the total satisfaction of all of its customers' needs, the company focuses on responding reliably and rapidly to demand. It provides exceptional support for its products, which are distributed to more than fifty countries worldwide. HALCOR combines size, strength and technology to achieve its overall vision of putting metals at man's disposal.







ACR
TALOS[®]
COPPER TUBES

REFRIGERATION
AIR CONDITIONING

Advantages of ACR TALOS[®] copper tubes

The unique properties of high purity copper, make ACR TALOS[®] copper tubes, indispensable for refrigeration installations.

- **High thermal conductivity.**
- **Stable mechanical properties covering an extensive temperature range.**
- **Chemically “inert” against the refrigerants (R134A, R404A, R407C, R410A).**
- **High internal purity.**
- **Smooth internal surface enhance flow rate.**
- **Excellent weldability.**
- **Excellent “cold formability”.**

MATERIAL

Copper phosphorus deoxidised (DHP-Cu), having minimum copper content 99.9% and P = 0.015% - 0.040%.

MECHANICAL PROPERTIES

Temper	Tensile strength N/mm ²	Yield strength in 0,2%	Elongation A5%
Soft Annealed	≥ 200 N/mm ²	> 40 N/mm ²	> 40%
Light Annealed	≥ 220 N/mm ²	> 60 N/mm ²	> 40%
Half Hard	≥ 250 N/mm ²	> 150 N/mm ²	> 30%
Hard	≥ 290 N/mm ²	> 250 N/mm ²	> 3%

SPECIFICATIONS

EN 12735 Part 1-2, ASTM B280/B68/B743, JIS H3300.

All ACR TALOS® copper tubes are certified as meeting the PED 97/23 requirements, as well as the strict German regulation AD 2000/W6 for pressure vessels.

QUALITY MARKS

AENOR, TÜV.

STANDARD DIMENSIONS ACCORDING TO US STANDARDS (ASTM B-280)

PANCAKES (ANNEALED TEMPER)									
Copper tube external diameter	inch	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8
	mm	4,76	6,35	7,94	9,52	12,70	15,88	19,05	22,23
Copper tube wall thickness	inch	0,030	0,030	0,032	0,032	0,032	0,035	0,035	0,045
	mm	0,76	0,76	0,81	0,81	0,81	0,89	0,89	1,14
Weight	Kgr/m	0,085	0,119	0,162	0,198	0,270	0,372	0,451	0,672
Maximum permitted working pressure	bar	175	125	105	86	63	55	45	50

STRAIGHT LENGTHS (HARD TEMPER, 4 OR 5 METERS)														
Copper tube external diameter	inch	3/8	1/2	5/8	3/4	7/8	1 1/8	1 3/8	1 5/8	2 1/8	2 5/8	3 1/8	3 5/8	4 1/8
	mm	9,52	12,70	15,88	19,05	22,23	28,58	34,93	41,28	53,98	66,68	79,38	92,08	104,78
Copper tube wall thickness	inch	0,030	0,035	0,040	0,042	0,045	0,050	0,055	0,060	0,070	0,080	0,090	0,100	0,110
	mm	0,76	0,89	1,02	1,07	1,14	1,27	1,40	1,52	1,78	2,03	2,29	2,54	2,79
Weight	Kgr/m	0,187	0,294	0,424	0,551	0,672	0,970	1,312	1,690	2,598	3,669	4,936	6,359	7,956
Maximum permitted working pressure	bar	126	109	99	86	78	67	61	55	49	46	43	41	40

Customised dimensions are manufactured upon request.

STANDARD DIMENSIONS ACCORDING TO EUROPEAN STANDARDS (EN-12735)

PANCAKES (ANNEALED)									
Copper tube external diameter	mm	4,76	6,35	7,94	9,52	12,70	15,88	19,05	22,23
	mm	0,80	0,80	0,80	0,80	0,80	1,00	1,00	1,00
Weight	Kgr/m	0,089	0,124	0,160	0,195	0,266	0,416	0,505	0,594
Maximum permitted working pressure	bar	186	133	103	84	62	62	51	43

STRAIGHT LENGTHS (HARD TEMPER, 5 METERS)														
Copper tube external diameter	mm	9,52	12,70	15,88	19,05	22,23	28,58	34,93	41,28	53,98	66,68	79,38	92,08	104,78
	mm	0,75	0,80	0,80	0,80	1,00	1,00	1,25	1,25	1,65	2,00	2,30	2,50	2,85
Weight	Kgr/m	0,184	0,266	0,337	0,408	0,594	0,771	1,177	1,399	2,414	3,617	4,957	6,262	8,122
Maximum permitted working pressure	bar	124	97	77	64	68	53	54	45	46	45	43	40	41

Customised dimensions are manufactured upon request.

PACKAGING

Straight lengths, in bundles (hard copper tubes) and in wooden boxes (soft copper tubes)

Pancakes-PNC in shrink-wrapped individual plastic bags. Depending on market requirements, they can be placed in cardboard boxes and pallets.



ACR **TALOS**[®] COPPER TUBES

REFRIGERATION AIR CONDITIONING

ACR TALOS[®] copper tubes for refrigeration units are available in the following types:

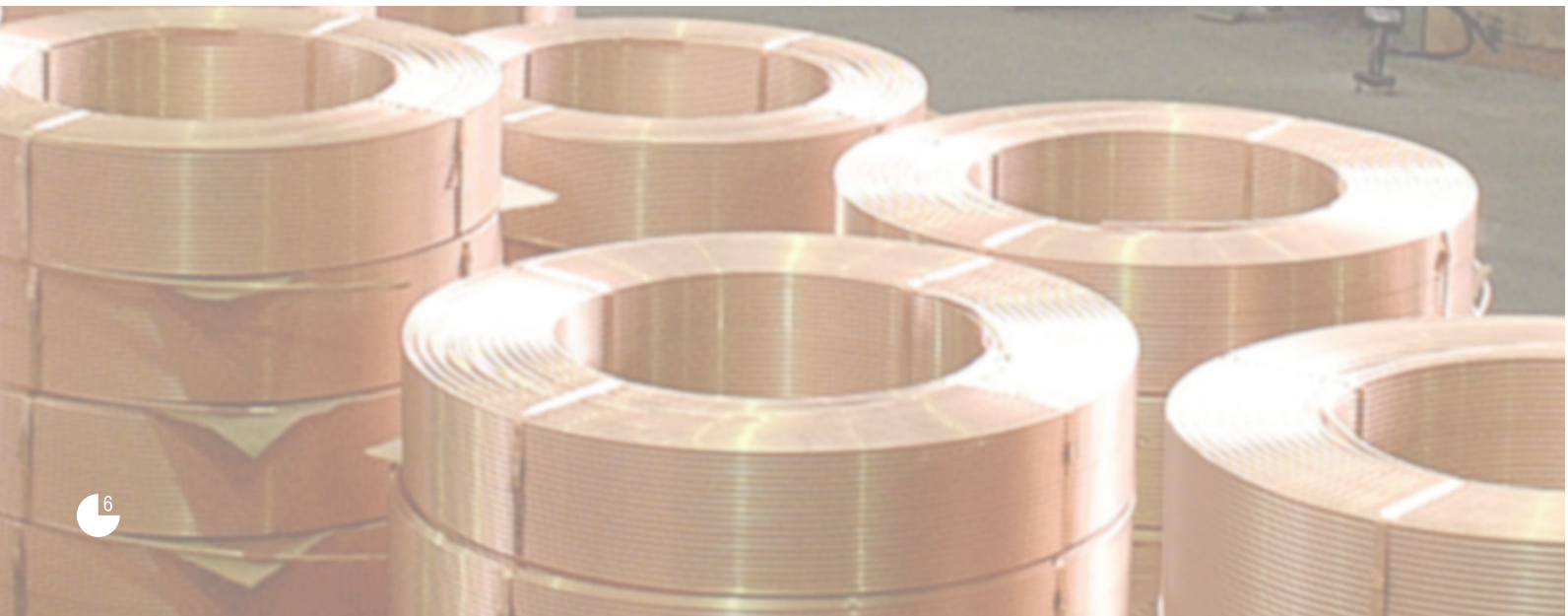
Spools (LWC)

ACR TALOS[®] copper tubes are available in spools (LWC) with or without central support (hard carton). Spool sides may be delivered protected by “flanges” of reinforced cardboard.

“CD” coils: Spools with a “central” decoiling

Spools with a “central” decoiling are especially prepared so that they unwind from the center.

They provide significant advantages to the user, such as reduction in packaging materials, unwinding “on the pallet”, greater weights per spool and, therefore, increased production efficiency. “CD” ACR TALOS[®] copper tubes do not require special unwinding equipment; they have lower handling costs, reducing machine downtime and enhancing performance.

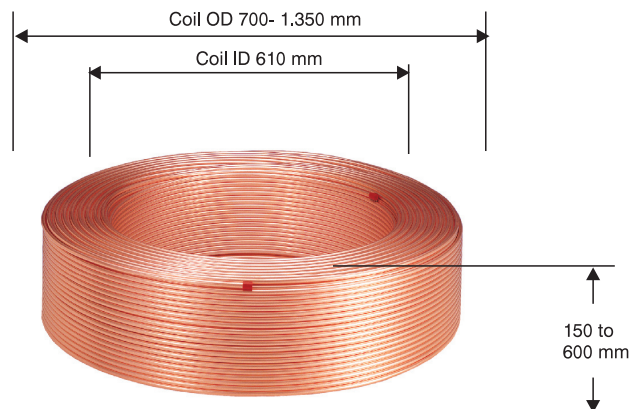


AVAILABLE DIMENSIONS

External diameter		Thickness (inch) (mm)							
		0,011 0,28	0,012 0,30	0,014 0,35	0,016 0,41	0,018 0,45	0,020 0,51	0,025 0,635	0,028 0,71
5/16	7,94								
3/8	9,52								
1/2	12,70								
5/8	15,87								

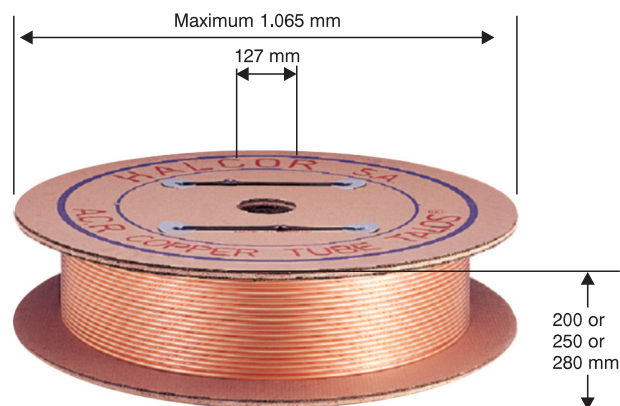
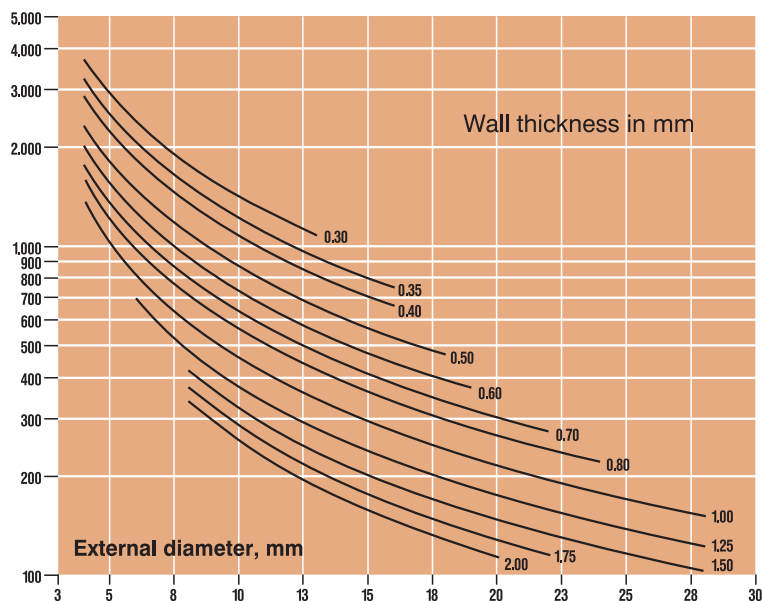
Recommended dimensions for LWC spools

SPOOL (LWC) DIMENSIONS



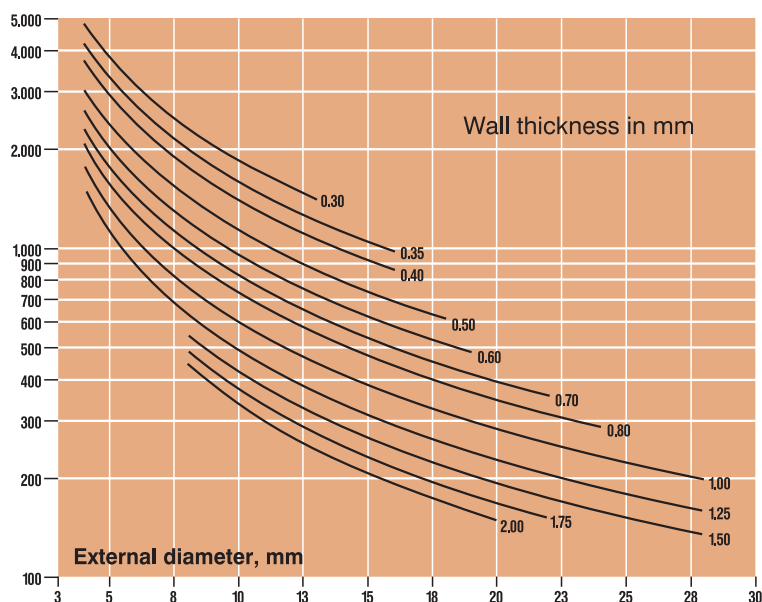
Without carton spool.
Maximum Coil Weight 580 kg

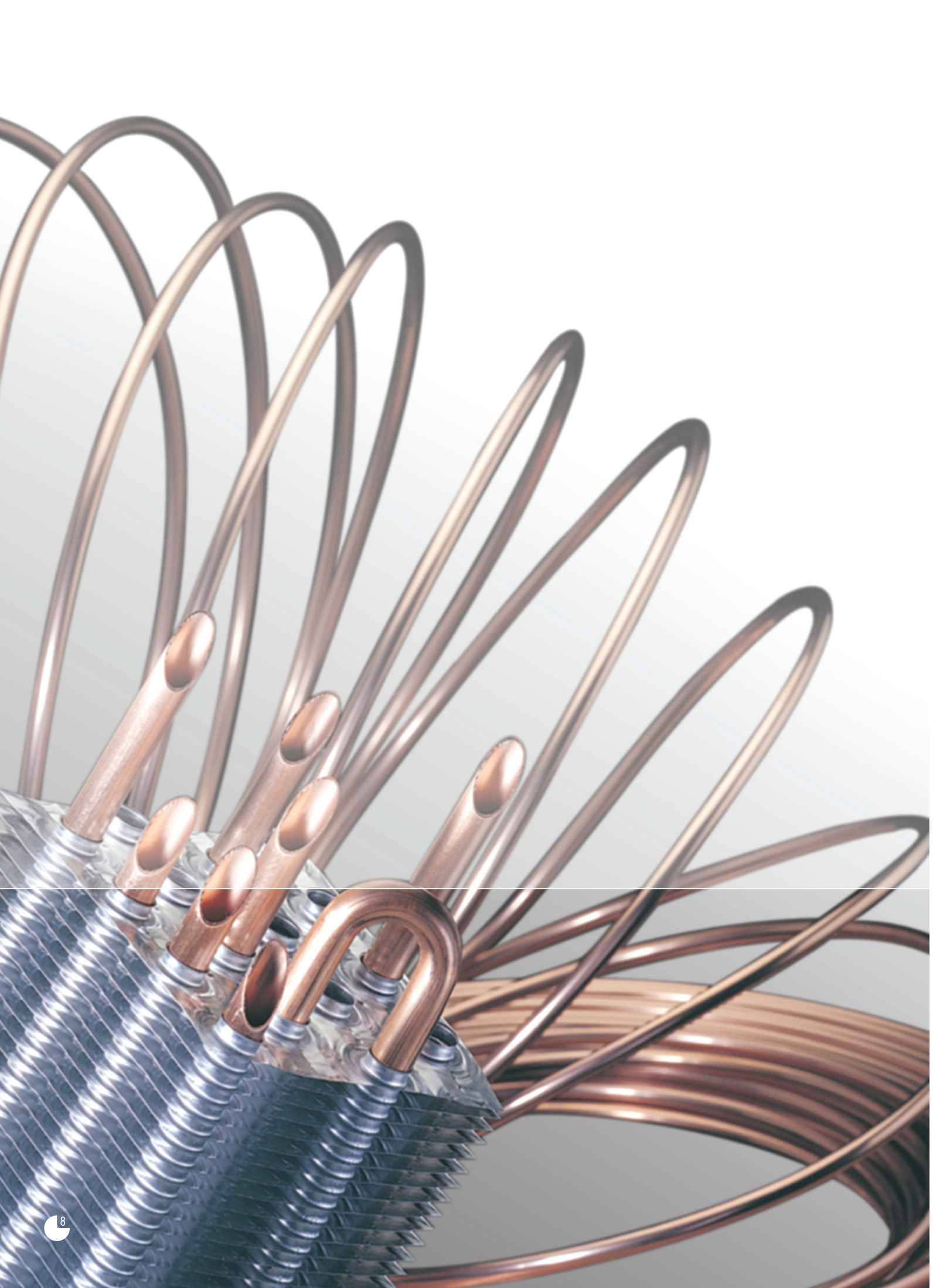
TUBE LENGTH IN METERS (BASED ON LWC SPOOLS OF 115 KGS)



With carton spool.
Spool weight: 90 to 230 kg
(Spools of greater weight are available upon request)

TUBE LENGTH IN METERS (BASED ON LWC SPOOLS OF 150 KGS)





INNER GROOVED
ACR
TALOS[®]
COPPER TUBES
HEAT EXCHANGERS

Inner grooved tubes

HALCOR has developed its own standard with regard to the design of new high thermal efficiency tubes with inner grooves. With these tubes, the thermal efficiency of refrigeration units is improved, enabling the reduction of the size of these units, whilst reducing the quantity of the refrigeration mixture required.

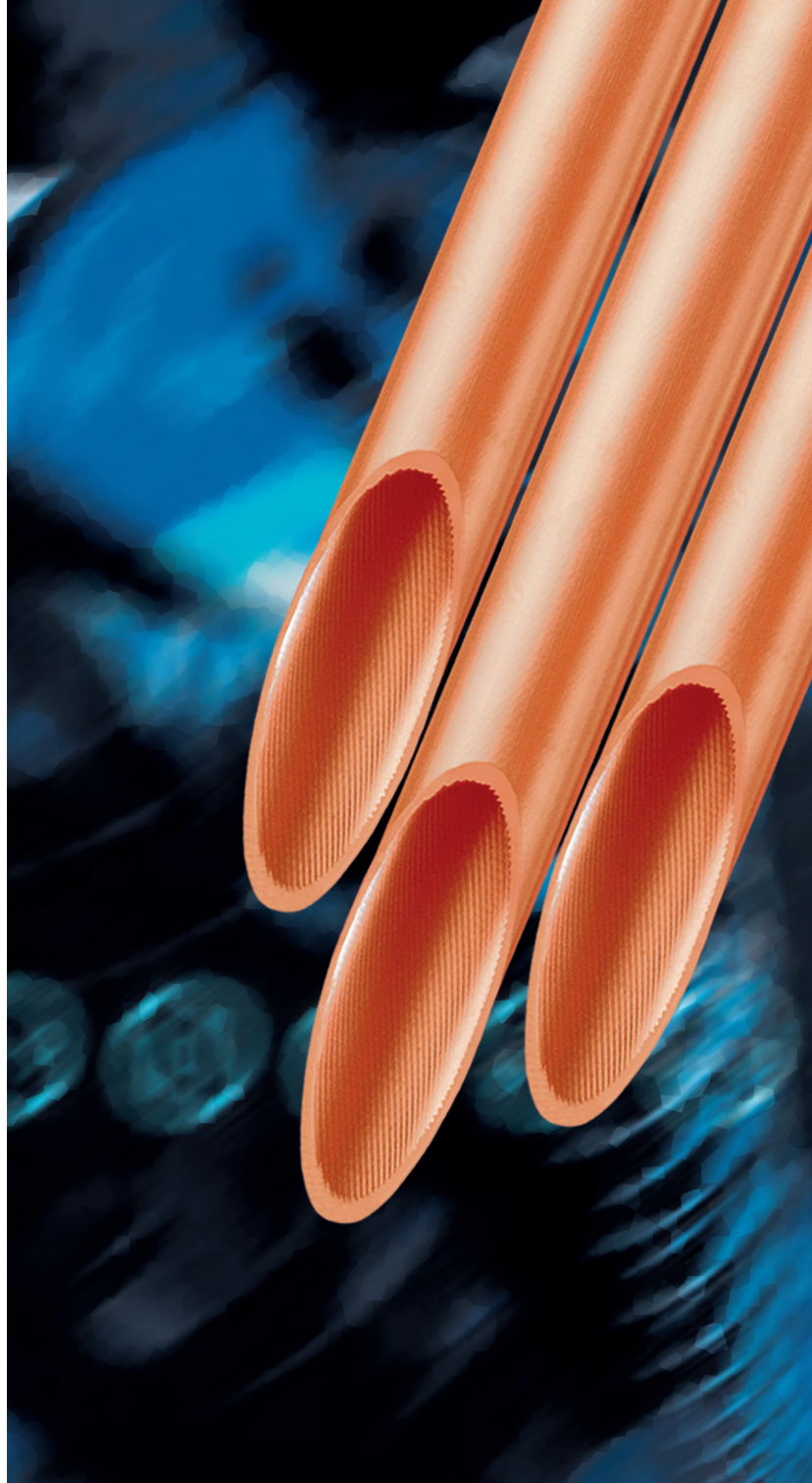
MATERIAL

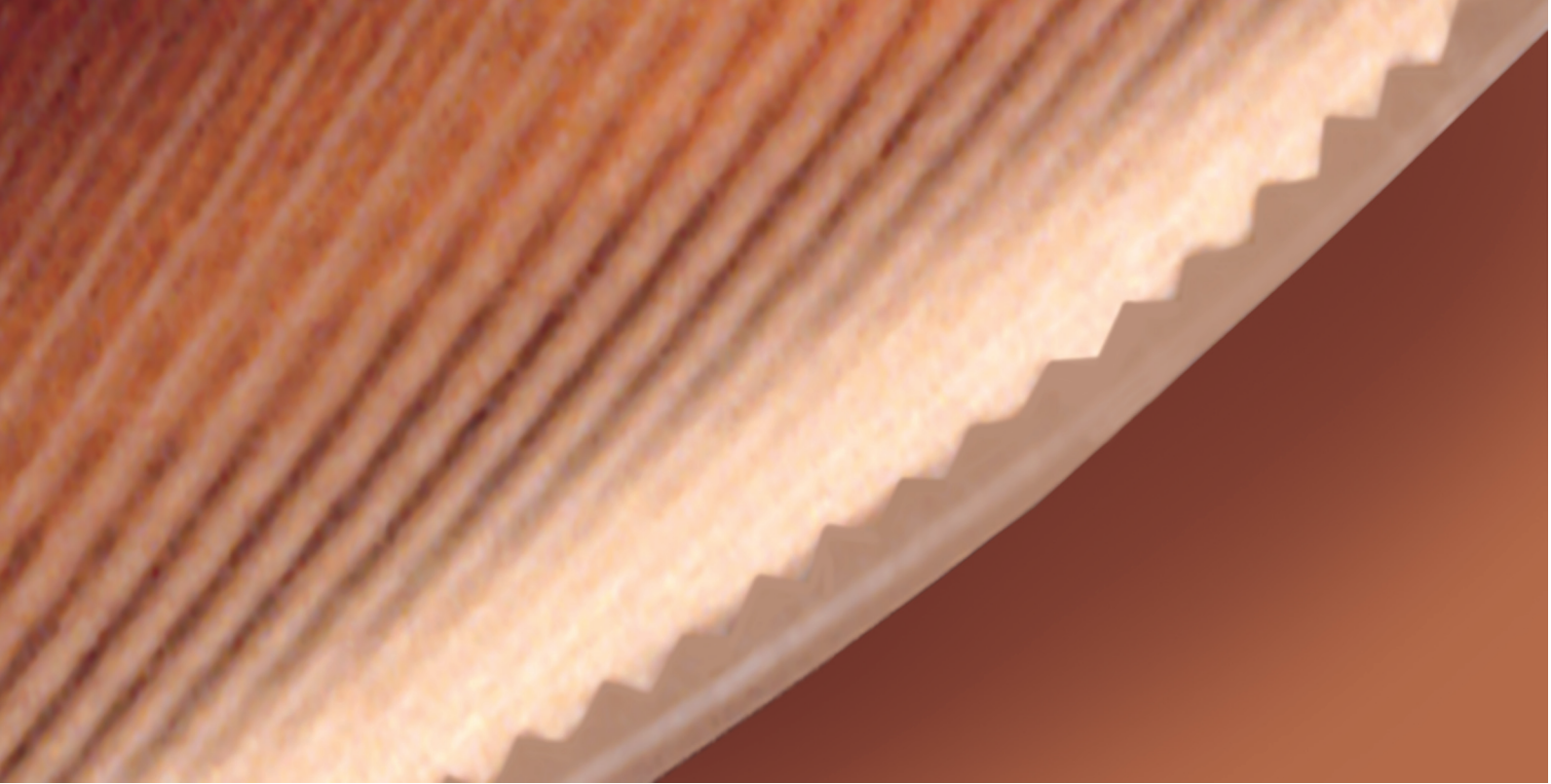
Copper phosphorus deoxidised (DHP-Cu), having minimum copper content 99.9% and P=0.015% - 0.040%.

MATERIAL SPECIFICATIONS

CW024A	EN 12735	pt1 & pt2
C12200	ASTM B 743	
C1220	JIS H 3300	

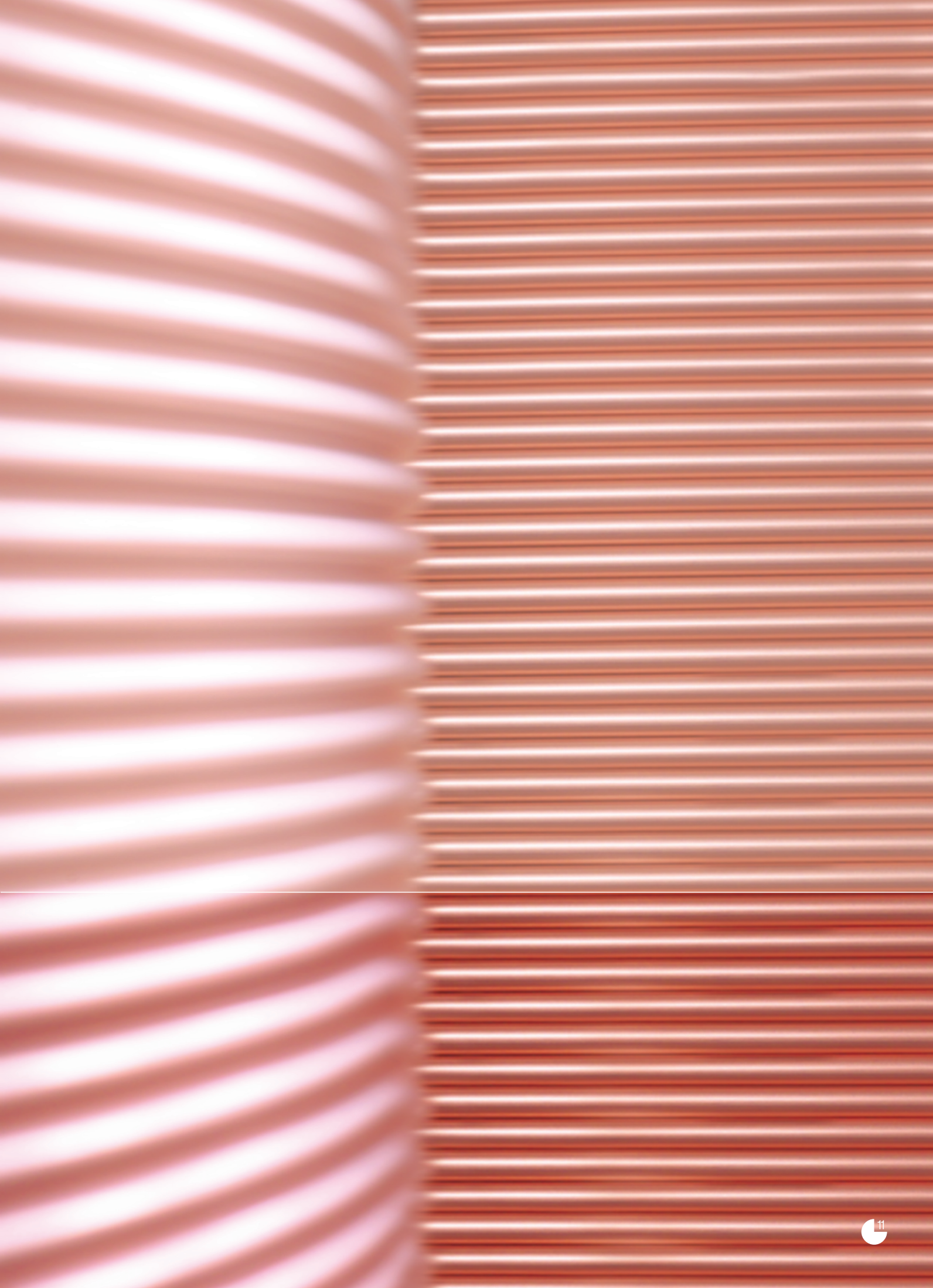
TEMPER: Light or fully annealed.





DIMENSIONS

Groove type /HALCOR Code	Nominal size	External diameter (mm)	Internal diameter (mm)	Bottom wall (mm)	Groove depth (mm)	Total wall thickness (mm)	Number of grooves	Lead angle (degrees)	Top angle (degrees)	Unit weight (gr/m)
A-1	9.52 x 0.35	9.52	8.66	0.28	0.15	0.43	65	25	90	94
A-2	9.52 x 0.41	9.52	8.54	0.34	0.15	0.49	65	25	85	104
B-2	7.94 x 0.30	7.94	7.06	0.26	0.18	0.44	50	18	40	64
B-3	8.00 x 0.30	8.00	7.12	0.26	0.18	0.44	50	18	40	65
B-6	9.52 x 0.36	9.52	8.52	0.30	0.20	0.50	60	18	53	93
B-10	9.52 x 0.35	9.52	8.66	0.28	0.15	0.43	60	18	53	89
B-15	7.00 x 0.30	7.00	6.14	0.25	0.18	0.43	50	18	40	57
B-21	12.70 x 0.45	12.70	11.48	0.36	0.25	0.61	70	18	58	155
B-22	12.70 x 0.45	12.70	11.48	0.36	0.25	0.61	75	18	58	155
B-25	12.00 x 0.45	12.00	10.80	0.35	0.25	0.60	70	18	55	145
C-1	9.52 x 0.33	9.52	8.62	0.27	0.18	0.45	70	25	25	84
C-2	9.52 x 0.39	9.52	8.40	0.31	0.25	0.56	65	25	25	99





WATER SUPPLY
HEATING
AIR CONDITIONING
REFRIGERATION
SOLAR SYSTEMS
INDUSTRIAL NETWORKS

Advanced technology that saves energy and protects the environment

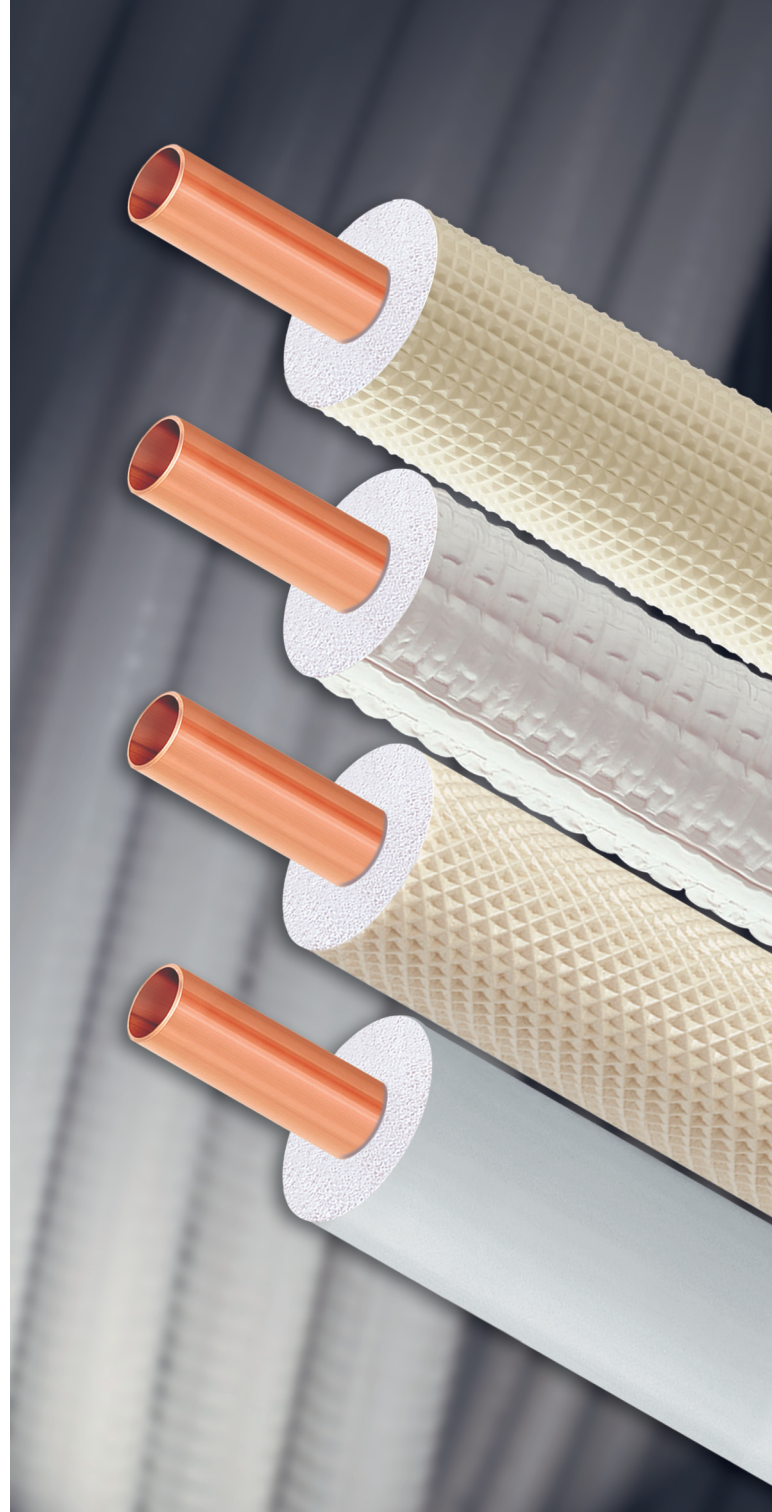
- Significant and continuous energy savings.
- Safe network operation.
- Reduction of installation time.
- High resistance to mechanical stress.
- Ease of formability.
- External or embedded installations.
- Resistance to extreme atmospheric conditions.
- 30-year guarantee, covering the quality of manufacture of the copper tube.

TALOS ECUTHERM™ pre-insulated copper tubes are advanced technology products, of high added value and significantly superior in effectiveness, compared to conventional insulation methods. The unique advantages offered by the TALOS ECUTHERM™ copper tubes, such as copper resistance and durability, coupled with high performance pre-insulation (Engineering Foams), result in significant energy savings. With a significantly competitive market price and low installation cost, TALOS ECUTHERM™ copper tubes are easily, the ideal choice for every modern application.

High performance technological product

The insulating material used in the manufacture of TALOS ECUTHERM™ (PE-X) copper tubes is an extruded high quality cross-linked polyethylene (PEF) suitably expanded to form a foamy substance with closed microcells. The raw material used in the production of this insulating material, is low density PEF free of HCFC and fibrous substances. A layer of thin polyethylene coating is adhered to the foamy crosslinked substrate, providing a skin of improved operational features and esthetic appearance.

The closed microcells of the insulating material, combined with the protective outer polyethylene skin, form an integral barrier to aggressive environments, rendering the tube suitable for a variety of applications, such as heating, cooling, air-conditioning and a multitude of plumbing installations.



The TALOS ECUTHERM™ (PE-X) copper tubes are produced in compliance to the requirements of standards in force in most of the European Union countries, as regards insulation properties, chemical characteristics & resistance to fire. They have low λ coefficient, determining its heat conductance properties and very good μ coefficient which determines its resistance of steam and water penetration.

The TALOS ECUTHERM™ (PE-X) tubes conform to the harmonised European specification EN 14313 concerning insulating materials made from PEF and destined for structural (plumbing) installations as well as for industrial applications. The TALOS ECUTHERM™ (PE-X) copper tubes are available in coils of 25 & 50 meter lengths and insulator thicknesses of 6, 9 and 13mm, suiting a variety of insulation needs.



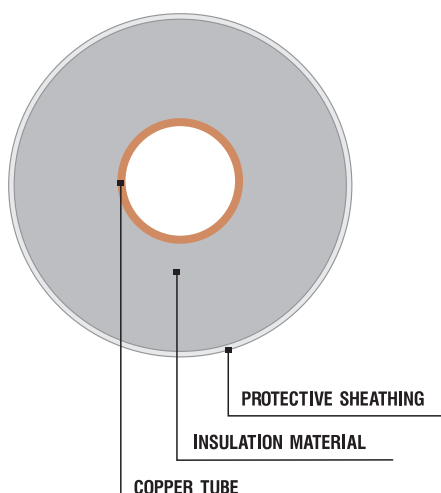
Reliability that only TALOS® copper tubes can provide

TALOS® copper tubes are manufactured according to (a) the Harmonised European Standard EN 1057 for use in plumbing installations and (b) the Harmonised European Standard EN 12735-1 for use in air conditioning and refrigeration installations.

TALOS® copper tubes meet the current requirements, imposed by the new green refrigerants (R 410-A, etc.), adopted by major refrigeration and air conditioning unit manufacturers, both in Greece and abroad.

TALOS® copper tubes have been awarded most major international quality marks and are exported to more than 50 countries, throughout the world. TALOS® copper tubes, with their high quality of manufacture, provide:

- **Unlimited lifetime.**
- **Resistance to pressure, temperature and fire.**
- **Complete network impermeability.**
- **Hygienic, safe, and bacteria-free potable water.**
- **Quality and reliability of installation.**
- **Versatile applications.**
- **Comprehensive range sizes.**
- **Style and space saving.**
- **Low thermal expansion.**



COPPER TUBE MATERIAL

Copper phosphorus deoxidised (DHP-Cu), having minimum copper content 99.9% and P=0.015% - 0.040%

MECHANICAL PROPERTIES

Temper	EN 1057 Classification	Tensile strength N/mm ²	Minimum elongation A5%
Soft	R-220	>220	>40

SPECIFICATIONS

WATER PIPES: EN 1057
REFRIGERATION PIPES: EN 12735-1

QUALITY MARKS

WATER PIPES: RAL/DVGW, BSI, AFNOR, AENOR, NSF, CSTB (Avis Technique), NSAI.
REFRIGERATION PIPES: AENOR, TÜV, GL.

INSULATION TECHNICAL PROPERTIES

MATERIAL PEF	PE-X
DENSITY ACCORDING TO DIN 53420 ASTM D 1667	30-33 Kg/m ³
THERMAL CONDUCTIVITY COEFFICIENT (λ) ACCORDING TO ASTM C 335	0,035 W/m-K
VAPOUR-WATER DIFFUSION RESISTANCE COEFFICIENT (μ) ACCORDING TO DIN 52615	> 9.000
WORKING TEMPERATURE	-80 °C to +110 °C
FIRE RESISTANCE	EN 13501-1 CLASS E, DIN 4102 B2, BS 476, NF P 92 501-M1
RESISTANCE TO CHEMICAL AGENTS ACCORDING TO ASTM 543-56 T	Very good
SOUND ABSORPTION ACCORDING TO DIN 4109 300-2500Hz	≈ 60%

Values are listed, as obtained under standard laboratory conditions and may be amended, without prior notice.

STANDARD DIMENSIONS ACCORDING TO EN 1057

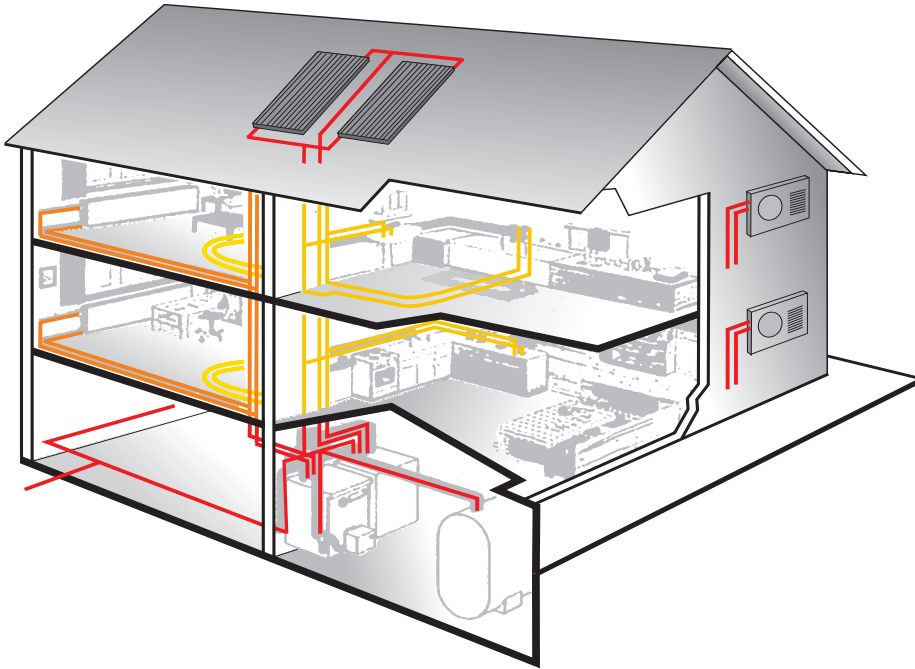
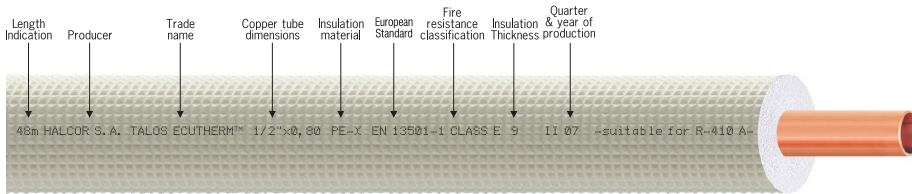
Copper tube external diameter	mm	6	8	10	12	15	16	18	22
Copper tube wall thickness	mm	0,80	0,80	0,80	1,00	1,00	1,00	1,00	1,00
Overall external diameter with 9mm thick insulation	mm	24	26	28	30	33	34	36	40
Maximum permitted working pressure	bar	142	102	80	84	66	61	54	44

STANDARD DIMENSIONS ACCORDING TO EN 12735-1

Copper tube external diameter	inch	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8
	mm	4,76	6,35	7,94	9,52	12,70	15,87	19,05	22,23
Copper tube wall thickness	mm	0,80	0,80	0,80	0,80	0,80	1,00	1,00	1,00
Overall external diameter with 9mm thick insulation	mm	22,76	24,35	25,94	27,52	30,70	33,87	37,05	40,23
Maximum permitted working pressure	bar	186	133	103	84	62	62	51	43

TALOS ECUTHERM™ copper tubes, are also available in straight lengths of 5m, with half hard copper tube, upon request.

MARKING



TALOS ECUTHERM™ 1/2" AND 5/8" INDICATIVE CALCULATION OF INSULATION THICKNESS

Air conditioning and refrigeration units, operate in temperatures lower than ambient temperature; therefore, this difference must be compensated by the appropriate insulation thickness, to prevent vapour condensation.

The thickness of the insulation (with reference to Mollier's diagram), is calculated taking into consideration the temperature of the fluid (or gas) inside the pipes, ambient temperature and the relative humidity of the air.

SURFACE TEMPERATURE CALCULATION FORMULA

$$t_s = \frac{0,2 \cdot \lambda \cdot (t_i - t_e)}{(d+2s) \cdot L \cdot \frac{(d+2s)}{d}} + t_e$$

TEMPERATURE INSIDE THE TUBE (°C)	INSULATION THICKNESS (mm)											
	AMBIENT TEMPERATURE (°C) AND RELATIVE HUMIDITY (%)											
	25 °C			30 °C			35 °C			40 °C		
	50%	60%	70%	50%	60%	70%	50%	60%	70%	50%	60%	70%
+15		6	6	6	6	6	6	6	9	6	6	9
+10	6	6	6	6	6	9	6	6	9	6	6	9
+5	6	6	9	6	6	9	6	6	9	6	9	9
0	6	6	9	6	6	9	6	9	9	6	9	13
-5	6	6	9	9	6	9	9	9	13	6	9	13
-10	6	9	9	6	9	13	6	9	13	9	9	13
-20	6	9	13	9	9	13	9	9	13	9	13	13

1/2 inch - 12,7 mm

5/8 inch - 15,88 mm



COPPER TUBES
ACR
TALOS
ECUTHERM 2™

REFRIGERATION
 AIR CONDITIONING

Clear advantage in refrigeration and air conditioning

ACR TALOS ECUTHERM 2™ pre-insulated copper tubes, manufactured by HALCOR are an innovation that ensures significant advantages for refrigeration and air conditioning specialists.

- Simplified installation process and reduction of installation time.
- Reduction of overall network installation cost.
- Reliable operation of installations and significant energy savings.
- Competitively purchase price.
- Stylish and space saving.
- 30-year guarantee, covering the quality of manufacture of the copper tube.

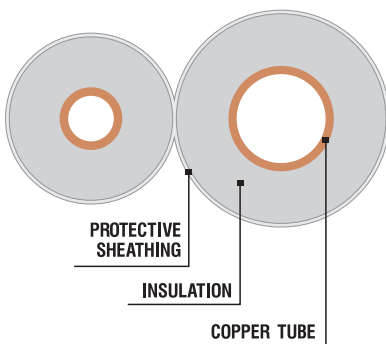
Pair combinations for any application

ACR TALOS ECUTHERM 2™ copper tubes are manufactured in pairs, firmly connected along their entire length, and in eight standard size combinations which cover sufficiently the usual connectivity requirements of any refrigeration or air conditioning unit.

ACR TALOS ECUTHERM 2™ copper tube pairs, form a single unit which is installed easily and fast, ensuring professional results.

Certified quality

ACR TALOS ECUTHERM 2™ pre-insulated copper tubes, have been certified by the German quality assurance organisation RWTUV, with regard to trials and manufacturing tests. The quality and reliability of such products, is ensured through the implementation of a Quality Assurance System, according to standard ISO 9001: 2000, certified by TÜV Hellas.



PAIR DIAMETERS
1/4 + 3/8
1/4 + 1/2
1/4 + 5/8
1/4 + 3/4
3/8 + 1/2
3/8 + 5/8
3/8 + 3/4
1/2 + 3/4

Appropriate also for the new green refrigeration units

According to the new Harmonised European Standard EN 12735-1:2001, as well as current market requirements, laid down by the use of new green refrigerants, including R 410-A, already adopted by all major manufacturers of refrigeration and air conditioning units, both in Greece and abroad, the following standardisation is applied to ACR TALOS ECUTHERM 2 copper tubes:

- For an external diameter of 1/4" to 1/2", the wall thickness is standardised at 0.80 mm.
- For an external diameter of 5/8" to 3/4", the wall thickness is standardised at 1.00 mm.

COPPER TUBE MATERIAL

Copper phosphorus deoxidised (DHP-Cu), having minimum copper content 99.9% and P=0.015% - 0.040%.

MECHANICAL PROPERTIES

Temper	EN 12735-1 Classification	Tensile strength N/mm ²	Minimum elongation A5%
Soft	R-220	>220	>40

QUALITY MARKS

REFRIGERATION PIPES: AENOR, TÜV, GL.

INSULATION TECHNICAL PROPERTIES

MATERIAL PEF	PE-X
DENSITY ACCORDING TO DIN 53420 ASTM D 1667	30-33 Kg/m ³
THERMAL CONDUCTIVITY COEFFICIENT (λ) ACCORDING TO ASTM C 335	0,035 W/m-K
VAPOUR-WATER DIFFUSION RESISTANCE COEFFICIENT (μ) ACCORDING TO DIN 52615	> 9.000
WORKING TEMPERATURE	-80°C to +110°C
FIRE RESISTANCE	EN 13501-1 CLASS E, DIN 4102 B2, BS 476, NF P 92 501-M1
RESISTANCE TO CHEMICAL AGENTS ACCORDING TO ASTM 543-56 T	Very good
SOUND ABSORPTION ACCORDING TO DIN 4109 300-2500Hz	≈ 60%

Values are listed, as obtained under standard laboratory conditions and may be amended, without prior notice.

STANDARD PAIR DIMENSIONS (COILS 15m, 25m, 30m LONG)

Copper tube external diameter	inch	1/4 - 3/8	1/4 - 1/2	1/4 - 5/8	1/4 - 3/4	3/8 - 1/2	3/8 - 5/8	3/8 - 3/4	1/2 - 3/4
	mm	6,35-9,52	6,35-12,7	6,35-15,88	6,35 - 19,05	9,52-12,7	9,52-15,88	9,52-19,05	12,7-19,05
Copper tube wall thickness	mm	0,80-0,80	0,80-0,80	0,80-1,00	0,80 - 1,00	0,80-0,80	0,80-1,00	0,80-1,00	0,80-1,00
Overall external diameter with 9mm thick insulation	mm	24,4 - 27,5	24,4 - 30,7	24,4 - 33,9	24,4 - 37,1	27,5 - 30,7	27,5 - 33,9	27,5 - 37,1	30,7 - 37,1
Maximum permitted working pressure	bar	133 - 84	133 - 62	133 - 62	133 - 51	84 - 62	84 - 62	84 - 51	62 - 51

Other sizes and special packaging in pallets or cardboard boxes are available upon request.

HALCOR

METAL WORKS S.A.

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Tel. : + 33 1 4527 0754, Fax : + 33 1 4527 0708
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