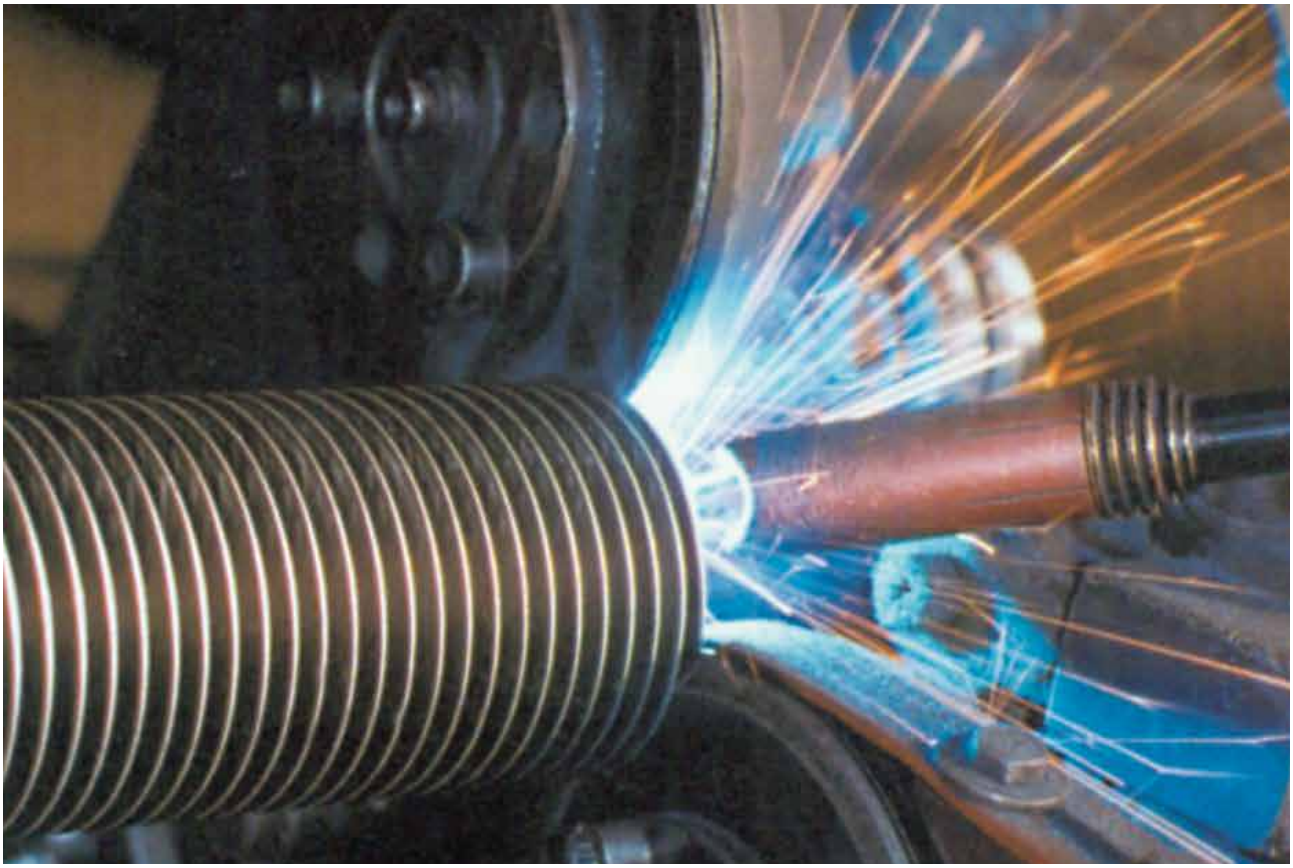
TPS TECHNITUBE®
RÖHRENWERKE GMBH

EXTENDED SURFACE TUBES

TECHNIFIN® | TECHNISTUD®



TECHNIFIN® TUBES

Fin tubes are used whereever electric power is generated or raw materials are refined and where efficient cooling is required. Fin tubes are required in a constandly increasing quantity for the production of heatexchangers, condensers, coolers and furnaces. The great increase of the thermal efficiency when applying fin tubes allows a substantial reduction in size and costs of such cooling equipment. The surface of such tubes is substantially increased and consequently less tubes are required compared with exchangers with plain tubes.

With this catalogue we give you complete information about the main types of fin tubes and sizes. We can of course provide also tubes with non-standard sizes and material combinations upon request.
In order to forward you a promt offer we would be pleased to receive you detailed enquiry containing:

- **Base tube material and quantity**
- **Base tube size**
- **Fin material**
- **Fin type**
- **Fin diameter or height**
- **Fin thickness**
- **Fins per inch/meter or fin pitch**
- **Lenght of plain, unfinned ends (necessary to roll or weld the tubes into tubeplate or assembly)**

Standard Grades – Comparsion Table

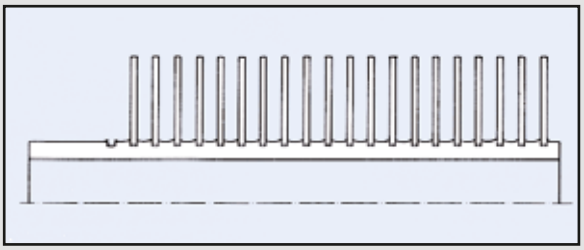
Material	ASTM	DIN	German Mat.-No.	BS	Grade
Carbon Steel	A 179	ST 35.8/I	1.0305	3602/I	CFS 360
Carbon Steel	A 192 / A 161 Gr. LC	ST 35.8/I	1.0305	3059/2	CFS/HFS 360
Carbon Steel	A 210 Gr. A1	ST 45.8/I	1.0405	3602/1	CFS/HFS 410
Carbon Steel	A 210 Gr. C	17 Mn 4	1.0481	3602/1	CFS/HFS 460
Carbon Steel	A 106 Gr. B	ST 45.8/I	1.0305	3602/1	HFS 360
Low Alloy Steel	A 209 T1	16 Mo 5	1.5423	3606	245
Low Alloy Steel	A 213 / A 199 T11/T12	13 CrMo 44	1.7335	3604	621
Low Alloy Steel	A 213 / A 199 T22	10 CrMo 910	1.7380	3059	622-440
Low Alloy Steel	A 213 / A 199 T5	12 CrMo 195	1.7362	3604	625
Low Alloy Steel	A 213 / A 199 T9	X12 CrMo 91	1.7386	3059/3604	629-470
Low Alloy Steel	A 335 P1 / A 161 T1	16 Mo 5	1.5423	3606	245
Low Alloy Steel	A 335 P11 / P12 / A 200 T11/T12	13 CrMo 44	1.7335	3604	620-460
Low Alloy Steel	A 335 P22 / A 200 T22	10 CrMo 910	1.7380	3604	622
Low Alloy Steel	A 335 P5 / A 200 T5	12 CrMo 195	1.7362	3606	625
Low Alloy Steel	A 335 P9 / A 200 T9	X12 CrMo 91	1.7386	3059/2	629-590
Stainless Steel	A 213 / A 312 TP 304	X5 CrNi 189	1.4301	970	304 S 15
Stainless Steel	A 213 / A 312 TP 304L	X2 CrNi 189	1.4306	970	304 S 12
Stainless Steel	A 213 / A 312 TP 321	X10 CrNiTi 189	1.4541	970	321 S 12
Stainless Steel	A 213 / A 312 TP 316	X5 CrNiMo 1810	1.4401	970	315 S 16
Stainless Steel	A 213 / A 312 TP 316L	X2 CrNiMo 1810	1.4404	970	316 S 12
Stainless Steel	A 213 / A 312 TP 347	X10 CrNiNb 189	1.4550	970	347 S 17
Stainless Steel	A 213 / A 312 TP 316Ti	X6 CrNiMoTi 1810	1.4571	970	320 S 17
Stainless Steel	A 789 / A 790 UNS S 31803	X2 CrNiMo 11225	1.4462	—	
Stainless Steel	B 677 Alloy 904L	X2 CrNiMoN 22-5-3	1.4539	—	
Nickel	B 161 UNS NO 2200	Ni 99,2	2.4066	3074	NA 11
Nickel	B 161 UNS NO 2201	Ni 99,2	2.4068	3074	NA 12
Nickel-Copper	B 163 UNS NO 4400	NiCu30Fe	2.4360	3074	NA 13
Nickel-Chrom-Iron	B 163 UNS NO 6600	NiCr15Fe	2.4816	3074	NA 14
Nickel-Chrom-Iron	B 161 UNS NO 8825	NiCr21Mo	2.4858	3074	NA 16
Nickel-Chrom-Iron	B 468 UNS NO 8020	NiCr20CuMo	2.4660	—	
Nickel-Chrom-Iron	B 163 UNS NO 8800	X10 NiCrAlTi 3220	1.4876	3074	NA 15
Copper Alloy	B 75 / B 111 UNS C12200	Sf-Cu	2.0090	2871	C 106
Copper Alloy	B 75 / B 111 UNS C14200	CuAsp	2.1491	2871	C 107
Copper Alloy	B 111 UNS C44300	CuZn28Sn1	2.0470	2871	CZ 111
Copper Alloy	B 111 UNS C68700	CuZn20Al2	2.0460	2871	CZ 110
Copper Alloy	B 111 UNS C60800	CuAl5AS	2.0918	—	
Copper Alloy	B 111 UNS C70600	CuNi10Fe1Mn	2.0872	2871	CN 102
Copper Alloy	B 111 UNS C71500	CuNi30Mn1Fe	2.0882	2871	CN 107
Aluminium Alloys	Alloy 1050 / 1050A	Al 99,5	3.0255	1050A (1B)	
Aluminium Alloys	Alloy 5754	AlMg3	3.3535	(N5)	
Aluminium Alloys	Alloy 3003	AlMnCu	3.0517	—	
Aluminium Alloys	Alloy 5083	AlMg4,5Mn	3.3547	5083 (N8)	
Titanium	B 338 Gr. 2	Ti2	3.7035		

and other material grades on request.

Description of available types of TECHNIFIN® Tubes

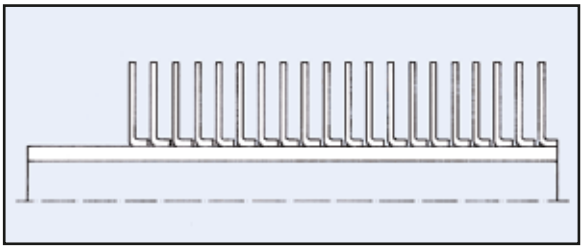
TECHNIFIN® TYPE „G“

The fin strip is wound into a mechanically produced groove and tightened by backfilling of the base material under pressure.
Groove depth appr. 0,4 mm.
Advantages: High fin stability, excellent heat transfer, high operating temperature. **(see details on page 6)**



TECHNIFIN® TYPE „L“, „KL“, „DL“, resp. „LL“

The fin strip is shaped into a „L“ and wound onto the tube surface under tension.
Advantages: Core tube extensively protected against corrosion by the fin foot, finning of very thin-walled tubes possible. **(see details on page 8)**

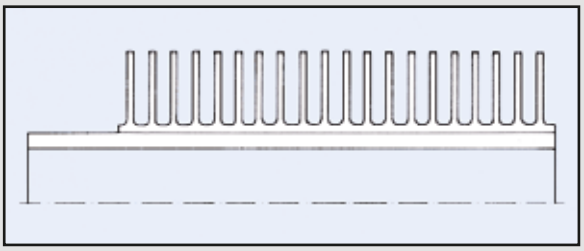


TECHNIFIN® TYPE „HY“

A smooth core tube is inserted into an aluminium tube and then fins are extrudes out of the aluminium tube. Advantages: Bond ot outer and inner tube removes the risk of loss of contact due to thermal stress, fins are more rigid, also available as serrated type TECHNIFIN „HYS“ see below. Core tube extensively protected against corrosion by the aluminium sleeve.

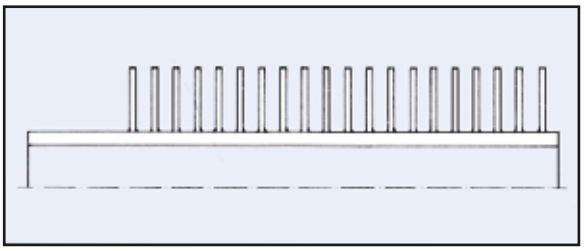
TECHNIFIN® TYPE „HYS“

As per type „HY“, but fins are serrated. Advantages: Higher heat transfer coefficient, for same pressure drop compared with „HY“ fin. **(see details on page 10)**



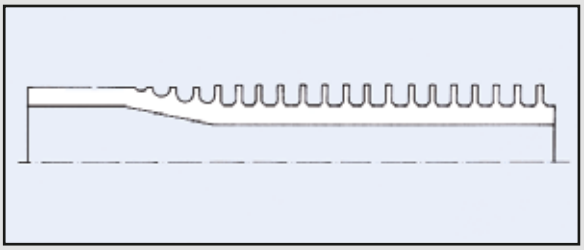
TECHNIFIN® TYPE „I“

The fin strip is tension wound onto the base tube.
Typical fin materials: carbon steel, stainless steel, copper, brass and copper-nickel **(see details on page 12)**



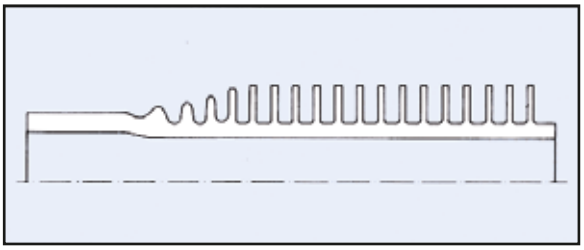
TECHNIFIN® TYPE „N“

The fins are rolled out of the wall of the plain tube.
Tube and fin are consisting of one piece.
Advantages: Excellent heattransfer, good bending properties, wide range of material can be used.
(see details on page 14)



TECHNIFIN® TYPE „M“

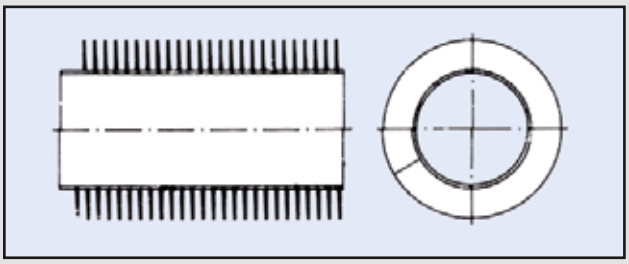
Manufacturing and advantages as described for type „N“ but with higher fins. **(see details on page 16)**



Description of available types of TECHNIFIN® Tubes

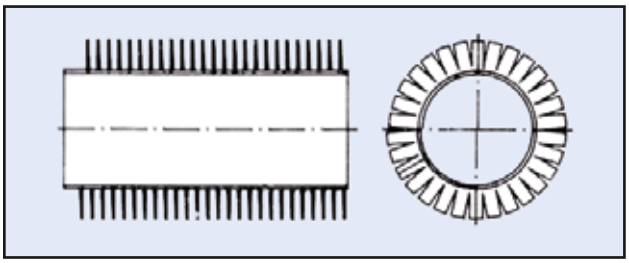
TECHNIFIN® TYPE „WO“

The fin strip is wound spirally onto the tube and welded continuously to the tube along the spiral root.
Advantages: Strong connection between fin and base tube, prevents loosening of fins because of heat stress, oxidization, corrosion etc., use at very high temperatures possible.**(see details on page 18)**



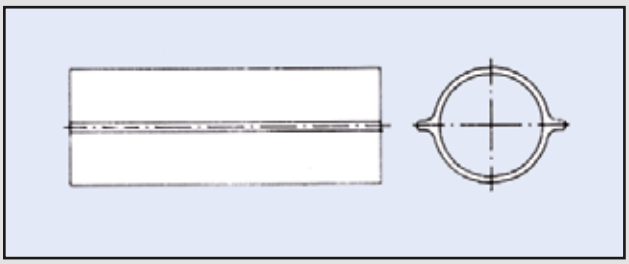
TECHNIFIN® TYPE „WOS“

As per type „WO“, but fins are serrated.
Advantages: Higher heat transfer coefficient, for the same pressure drop compared with „WO“ fin.
(see details on page 18)



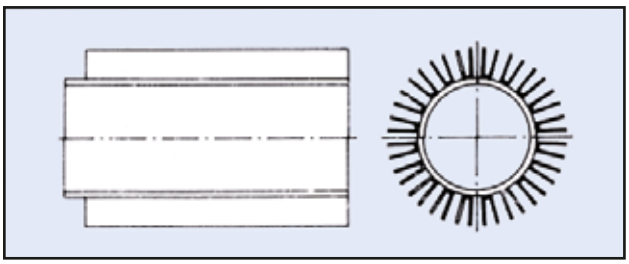
TECHNIFIN® TYPE „LFS“

Extruded or drawn fin tube , seamless with two longitudinal opposite fins. Used in boiler wall constructions.
Advantage compared to standard boiler wall construction as no steel strip required only one weld nessesary to connect 2 tubes. **(see details on page 22)**



TECHNIFIN® TYPE „LFW“

I/L or U fins welded longitudinally onto the base tube.
Also U-Bend execution possible
(see details on page 24)

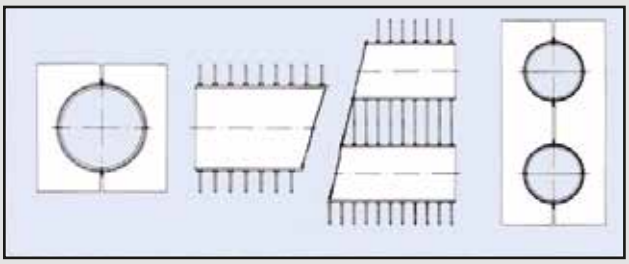


TECHNIFIN® TYPE „S“

Square fins are welded onto a round base tube.
(see details on page 26)

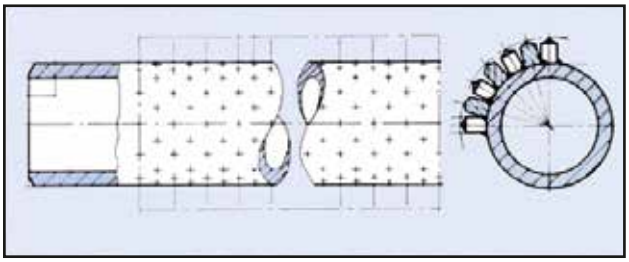
TECHNIFIN® TYPE „Double S“

Square fins are welded onto two round base tubes.
(see details on page 27)

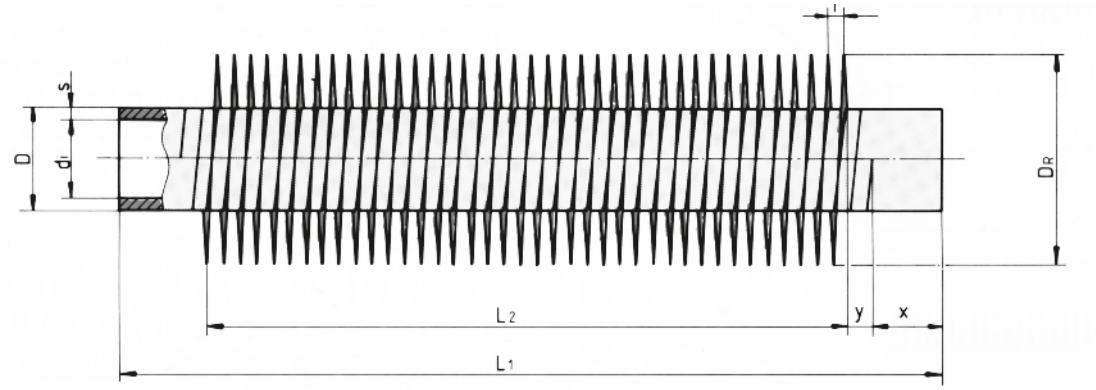


TECHNISTUD®

Steel studs are welded onto the base tube.
(see details on page 28)



TECHNIFIN® TYPE „G“ (resp. also called „Embedded“)



L1 = total length of tube
L2 = finned length
Y max. = 4 x t

Fin Thickness = 0,3 - 0,5 mm
x = acc. to clients specification
t = fin pitch

Fa = Outer Tube Surface Area incl. Surface Area of Fins
Fi = Interior Tube Surface Area per Meter (m2/m)
FZR = Uncovered Tube Area between the fins

MATERIAL COMBINATIONS

Core Tube

Carbon steels, low-alloy steels, stainless steels, brass, copper, copper-nickel alloys, aluminium bronze, nickel-alloys (Alloy 400, etc.), bimetal, titanium and others

Fins

Aluminium / Copper / Steel / Galvanized Steel

FIELDS OF APPLICATION

- the petroleum, chemical and petrochemical industries
- natural gas treatment
- the steel industry: blast furnace and converter systems
- power generation: steam turbine exhaust condensing
  - contact condensing with cooling of circulating condensate
  - fossil and nuclear power plants
- air conditioning (freon, ammonia, propane)
- incineration of household refuse
- compressor coolers, ect.

MANUFACTURING PROCESS

The manufacturing tool is made up of 2 non-cutting plates set at 90° to the axis of the base tube. The first plate effects a groove for metal spinning. The second directs the ribbon in the groove and sets the fin foot in the groove through pressure on the metal displaced for the groove.
A similar plate made of tungsten carbure allows us to manufacture G finned tubes with base tubes made of austenitic steel or exotic alloys.

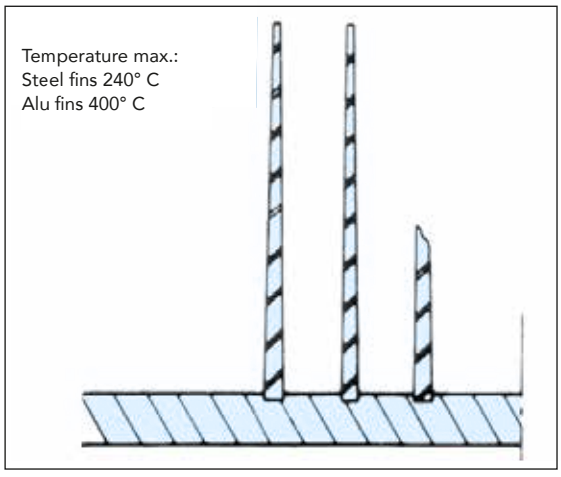
ADVANTAGES

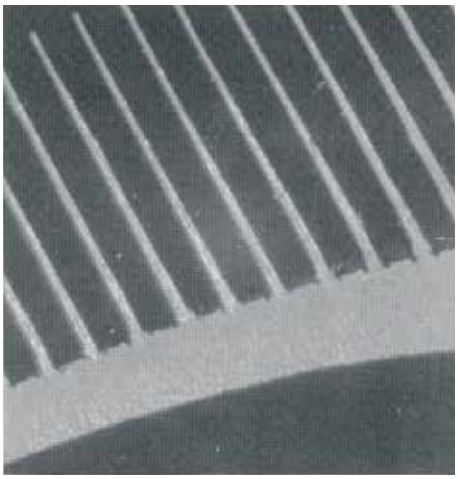
1) Thermal

The fin/tube wall contact is constant because of the setting and makes it possible to use a wall temperature of up to 400° C.

2) Mechanical

The fin is set throughout its length and consequently does not unwind even when partially uprooted.





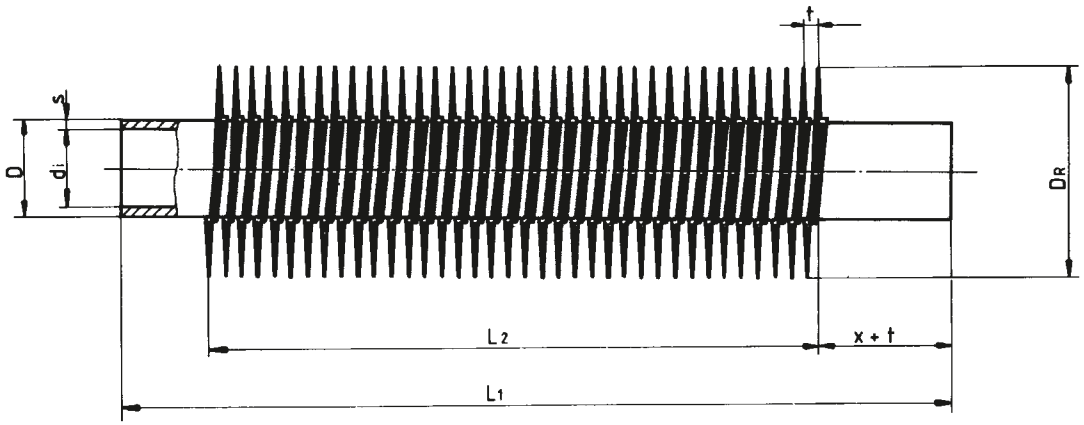
Standard Size Range on 1" Base tubes

D = 25,4 mm DR = 50,8 mm + DR = 57,15 mm

ORDER-No.		s mm	di mm	Fins/in.	Fa m²/m	Fa/Fi	Weight Kg/m	FZR m²/m
TECHNIFIN® G	1.2.51- 5	2	21,4	5	0,678	10,09	1,51	0,0234
TECHNIFIN® G	1.2.51- 6			6	0,798	11,87	1,58	0,0230
TECHNIFIN® G	1.2.51- 7			7	0,918	13,65	1,65	0,0226
TECHNIFIN® G	1.2.51- 8			8	1,037	15,43	1,72	0,0222
TECHNIFIN® G	1.2.51- 9			9	1,157	17,21	1,79	0,0218
TECHNIFIN® G	1.2.51-10			10	1,277	18,99	1,85	0,0214
TECHNIFIN® G	1.2.51-11			11	1,396	20,77	1,94	0,0210
TECHNIFIN® G	1.2,5	2,11 (14 BWG) Min. Wall -2,5	(20,4)	5	0,678	10,58	1,76	0,0234
TECHNIFIN® G	1.2,5.51- 6			6	0,798	12,45	1,83	0,0230
TECHNIFIN® G	1.2,5.51- 7			7	0,918	14,32	1,90	0,0226
TECHNIFIN® G	1.2,5.51- 8			8	1,037	16,19	1,98	0,0222
TECHNIFIN® G	1.2,5.51- 9			9	1,157	18,05	2,05	0,0218
TECHNIFIN® G	1.2,5.51-10			10	1,277	19,92	2,11	0,0214
TECHNIFIN® G	1.2,5.51-11			11	1,396	21,79	2,19	0,0210
TECHNIFIN® G	1.3.51- 5	2,77 (12 BWG) Min. Wall -3,0	(19,4)	5	0,678	11,13	2,01	0,0234
TECHNIFIN® G	1.3.51- 6			6	0,798	13,09	2,08	0,0230
TECHNIFIN® G	1.3.51- 7			7	0,918	15,06	2,15	0,0226
TECHNIFIN® G	1.3.51- 8			8	1,037	17,02	2,22	0,0222
TECHNIFIN® G	1.3.51- 9			9	1,157	18,98	2,29	0,0218
TECHNIFIN® G	1.3.51-10			10	1,277	20,95	2,36	0,0214
TECHNIFIN® G	1.3.51-11			11	1,396	22,91	2,44	0,0210
TECHNIFIN® G	1.2.57- 5	2	21,4	5	0,885	13,16	1,65	0,0291
TECHNIFIN® G	1.2.57- 6			6	1,046	15,56	1,73	0,0286
TECHNIFIN® G	1.2.57- 7			7	1,207	17,95	1,82	0,0281
TECHNIFIN® G	1.2.57- 8			8	1,368	20,35	1,92	0,0276
TECHNIFIN® G	1.2.57- 9			9	1,529	22,74	2,01	0,0271
TECHNIFIN® G	1.2.57-10			10	1,690	25,14	2,11	0,0266
TECHNIFIN® G	1.2.57-11			11	1,851	27,53	2,20	0,0261
TECHNIFIN® G	1.2,5.57- 5	2,11 (14 BWG) Min. Wall -2,5	(20,4)	5	0,885	13,81	1,89	0,0291
TECHNIFIN® G	1.2,5.57- 6			6	1,046	16,32	1,99	0,0286
TECHNIFIN® G	1.2,5.57- 7			7	1,207	18,83	2,08	0,0281
TECHNIFIN® G	1.2,5.57- 8			8	1,368	21,35	2,18	0,0276
TECHNIFIN® G	1.2,5.57- 9			9	1,529	23,86	2,27	0,0271
TECHNIFIN® G	1.2,5.57- 10			10	1,690	26,37	2,37	0,0266
TECHNIFIN® G	1.2,5.57- 11			11	1,851	28,88	2,46	0,0261
TECHNIFIN® G	1.3.57- 5	2,77 (12 BWG) Min. Wall -3,0	(19,4)	5	0,885	14,42	2,14	0,0291
TECHNIFIN® G	1.3.57- 6			6	1,046	17,16	2,23	0,0286
TECHNIFIN® G	1.3.57- 7			7	1,207	19,80	2,33	0,0281
TECHNIFIN® G	1.3.57- 8			8	1,368	22,45	2,42	0,0276
TECHNIFIN® G	1.3.57- 9			9	1,529	25,09	2,52	0,0271
TECHNIFIN® G	1.3.57-10			10	1,690	27,73	2,61	0,0266
TECHNIFIN® G	1.3.57-11			11	1,851	30,37	2,71	0,0261

Given weights are for steel tubes with Aluminium fins. Weight calculation for steel fins: Kg/m ~ weight of table + 0,1827 x fins per inch.
(Base tubes from 12,7 mm OD (½") up to 38,1 mm (1½") possible with different fin characteristics.)

TECHNIFIN® TYPE „L“, „KL“, „DL“, RESP. „LL“



L_1 = total length of tube
L_2 = finned length
Fin Thickness = 0,3 - 0,5 mm
x = acc. to clients specification
t = fin pitch
Fa = Outer Tube Surface Area incl. Surface Area of Fins
Fi = Interior Tube Surface Area per Meter (m2/m)
F_{ZR} = Uncovered Tube Area between the fins

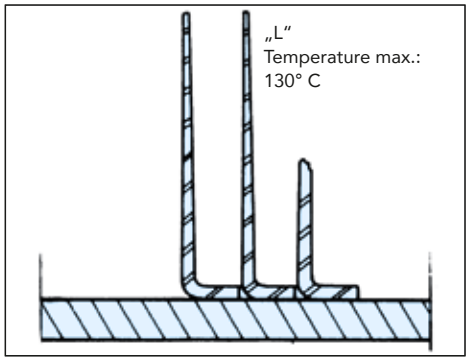
MATERIAL COMBINATIONS

Core Tube

Carbon steels low-alloy steels, stainless steels, brass, copper, copper-nickel alloys, aluminium bronze, nickel-alloys (Alloy 400, ext.), bimetal, titanium and others

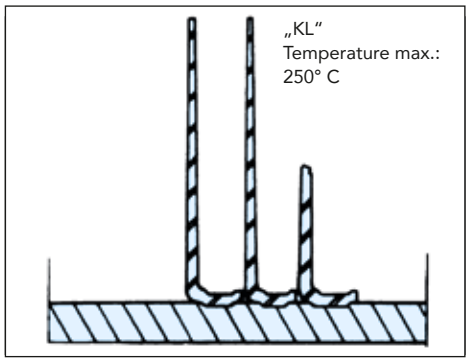
Fins

Aluminium, Copper



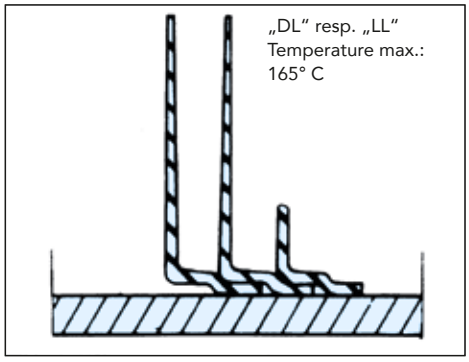
FIELDS OF APPLICATION

- the petroleum, chemical and petrochemical industries
- natural gas treatment
- the steel industry: blast furnace and converter systems
- power generation: steam turbine exhaust condensing
  - contact condensing with cooling of circulating condensate
  - fossil and nuclear power plants
- air conditioning (freon, ammonia, propane)
- incineration of household refuse
- compressor coolers, ect.



MANUFACTURING PROCESS

The manufacturing strip is folded to from an L shape and then wound around the base tube. The feet of the fins are joined together and cover the whole of the finned surface. Both ends are clamped down to avoid unrolling through damage.



ADVANTAGES

Economic

This method of manufacturing enables us to place the finning on a very thin-walled tube with is particularly desirable when using high value alloys (titanium, stainless, copper, nickel).
The tube can withstand a temperature of up to 130°C without the risk of atmospheric corrosion or thermal stress.

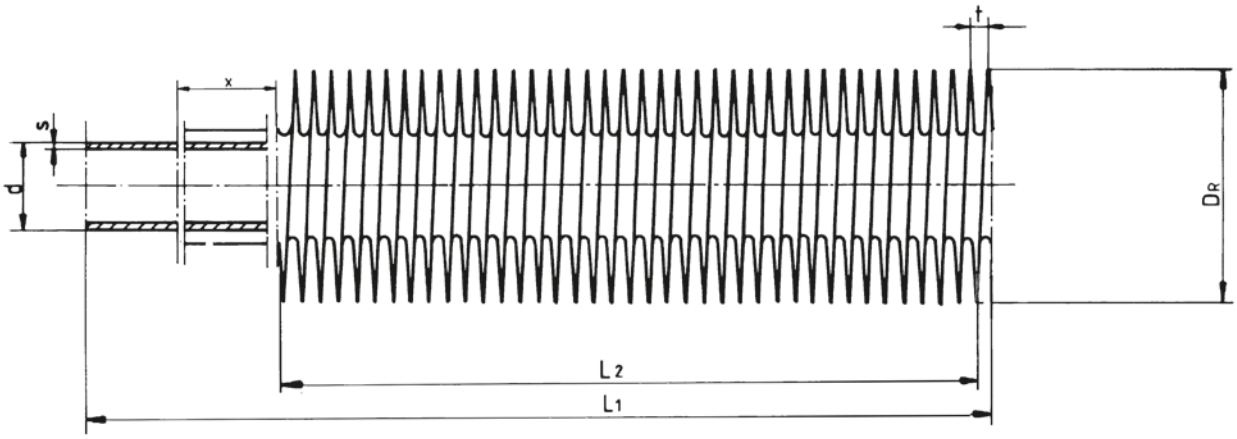
Standard Size Range on a 1" Base tube

D = 25,4 mm DR = 50,8mm + DR = 57,15 mm

ORDER-No.		s mm	di mm	Fins/in.	Fa m²/m	Fa/Fi	Weight Kg/m	FZR m²/m
TECHNIFIN® L	1.2.51.-5			5	0,678	10,09	1,51	0,0229
TECHNIFIN® L	1.2.51-6			6	0,798	11,87	1,58	0,0224
TECHNIFIN® L	1.2.51-7			7	0,918	13,65	1,65	0,0219
TECHNIFIN® L	1.2.51-8	2	21,4	8	1,037	15,43	1,72	0,0214
TECHNIFIN® L	1.2.51-9			9	1,157	17,21	1,79	0,0209
TECHNIFIN® L	1.2.51-10			10	1,277	18,99	1,85	0,0204
TECHNIFIN® L	1.2.51-11			11	1,396	20,77	1,94	0,0199
TECHNIFIN® L	1.2,5.51-5			5	0,678	10,58	1,76	0,0229
TECHNIFIN® L	1.2,5.51-6			6	0,798	12,45	1,83	0,0224
TECHNIFIN® L	1.2,5.51-7	2,11 (14 BWG) Min. Wall -2,5		7	0,918	14,32	1,90	0,0219
TECHNIFIN® L	1.2,5.51-8		-20,4	8	1,037	16,19	1,98	0,0214
TECHNIFIN® L	1.2,5.51-9			9	1,157	18,05	2,05	0,0209
TECHNIFIN® L	1.2,5.51-10			10	1,277	19,92	2,11	0,0204
TECHNIFIN® L	1.2,5.51-11			11	1,396	21,79	2,19	0,0199
TECHNIFIN® L	1.3.51-5			5	0,678	11,13	2,01	0,0229
TECHNIFIN® L	1.3.51-6			6	0,798	13,09	2,08	0,0224
TECHNIFIN® L	1.3.51-7	2,77 (12 BWG) Min. Wall -3		7	0,918	15,06	2,15	0,0219
TECHNIFIN® L	1.3.51-8		-19,4	8	1,037	17,02	2,22	0,0214
TECHNIFIN® L	1.3.51-9			9	1,157	18,98	2,29	0,0209
TECHNIFIN® L	1.3.51-10			10	1,277	20,95	2,36	0,0204
TECHNIFIN® L	1.3.51-11			11	1,396	22,91	2,44	0,0199
TECHNIFIN® L	1.2.57-5			5	0,885	13,16	1,65	0,0286
TECHNIFIN® L	1.2.57-6			6	1,046	15,56	1,73	0,0280
TECHNIFIN® L	1.2.57-7			7	1,207	17,95	1,82	0,0274
TECHNIFIN® L	1.2.57-8	2	21,4	8	1,368	20,35	1,92	0,0268
TECHNIFIN® L	1.2.57-9			9	1,529	22,74	2,01	0,0262
TECHNIFIN® L	1.2.57-10			10	1,690	25,14	2,11	0,0256
TECHNIFIN® L	1.2.57-11			11	1,851	27,53	2,2	0,0250
TECHNIFIN® L	1.2,5.57-5			5	0,885	13,81	1,89	0,0286
TECHNIFIN® L	1.2,5.57-6			6	1,046	16,32	1,99	0,0280
TECHNIFIN® L	1.2,5.57-7	2,11 (14BWG) Min.Wall -2,5		7	1,207	18,83	2,08	0,0274
TECHNIFIN® L	1.2,5.57-8		-20,4	8	1,368	21,35	2,18	0,0268
TECHNIFIN® L	1.2,5.57-9			9	1,529	23,86	2,27	0,0262
TECHNIFIN® L	1.2,5.57-10			10	1,690	26,37	2,37	0,0256
TECHNIFIN® L	1.2,5.57-11			11	1,851	28,88	2,46	0,0250
TECHNIFIN® L	1.3.57-5			5	0,885	14,42	2,14	0,0286
TECHNIFIN® L	1.3.57-6			6	1,046	17,16	2,23	0,0280
TECHNIFIN® L	1.3.57-7	2,77 (12BWG) Min.Wall -3		7	1,207	19,8	2,33	0,0274
TECHNIFIN® L	1.3.57-8		-19,4	8	1,368	22,45	2,42	0,0268
TECHNIFIN® L	1.3.57-9			9	1,529	25,09	2,52	0,0262
TECHNIFIN® L	1.3.57-10			10	1,690	27,73	2,61	0,0256
TECHNIFIN® L	1.3.57-11			11	1,851	30,37	2,71	0,0250

Given weights are for steel tubes with Aluminium fins. Weight calculation for steel fins: Kg/m ~ weight of table + 0,1827 x fins per inch.
(Base tubes from 12,7 mm OD (½") up to 38,1 mm (1½") possible with different fin characteristics.)

TECHNIFIN® TYPE „HY“, „HYS“ (Extruded, Extruded serrated)



L_1 = total length of tube
L_2 = finned length

Fin Thickness = 0,4 mm ave.
t = fin pitch
x = acc. to clients requirements

Fa = Outer Tube Surface Area incl. Surface Area of Fins
Fi = Interior Tube Surface Area per Meter (m2/m)
F_{ZR} = Uncovered Tube Area between the fins

MATERIAL COMBINATIONS

Core Tube

Carbon steels, low-alloy steels, stainless steels, brass, copper, copper-nickel alloys, aluminium bronze, nickel-alloys, as well as exotic grades.
Core tubes with extremely thin wall materials can be applied.

Exterior Tube & Fins

Generally Aluminium (different grades available)

FIELDS OF APPLICATION

- the petroleum, chemical and petrochemical industries
- natural gas treatment
- the steel industry: blast furnace and converter cooling systems
- power generation: steam turbine exhaust condensing
  - contact condensing with cooling of circulating condensate
  - fossil and nuclear power plants
- air conditioning (freon, ammonia, propane)
- incineration of household refuse
- compressor coolers, ect.

MANUFACTURING PROCESS

A polished and deoiled base tube is set in an aluminium sleeve. The whole goes through the fin-machine wich consists of three spindles set at 120° each on bearing a stack of plates. These plates, stacked in from and diameter first build the fin, then bond the outer and inner tubes together.

In certain cases (high air speed) the fins are serrated after fin process so as to increase the heat transfer coefficient.

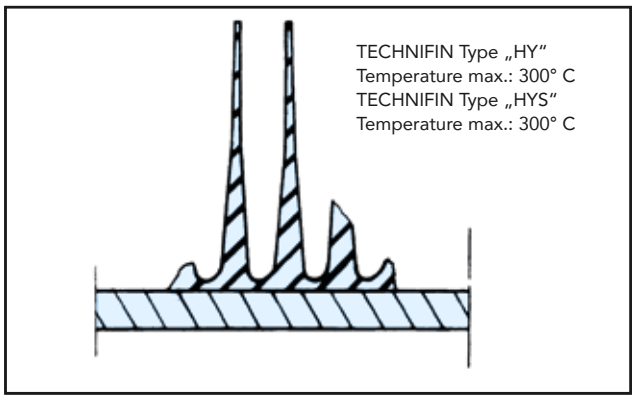
ADVANTAGES

1) Thermal

The bonding of the outer and inner tubes removes the risk of loss of contact with the aluminium due to thermal stress.
Maximum operating temperature: 250° C.
The transfer coeffcient remains steady.
Additionally as the outer sleeve is continuous no electrolytic couple is created.

2) Mechanical

The fins are more rigid and stand the handling shocks better, compared to types „G“ an „L“.



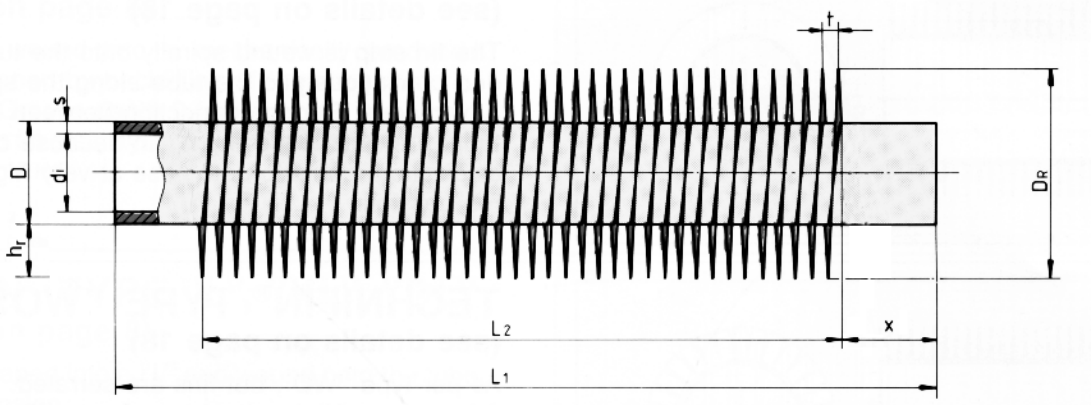
Standard Size Range on a 1" Base Tube

D = 25,4 mm DR = 50,8 mm + DR = 57,15 mm

ORDER-No.		s mm	di mm	Fins/in.	Fa m²/m	Fa/Fi	Weight Kg/m	FZR m²/m
TECHNIFIN® HY	1.1.51-8			8	0,991	13,48	1,49	0,0204
TECHNIFIN® HY	1.1.51-9	1,0	23,4	9	1,105	15,02	1,49	0,0200
TECHNIFIN® HY	1.1.51-10			10	1,218	16,56	1,49	0,0197
TECHNIFIN® HY	1.1,2.51-8			8	0,991	13,72	1,68	0,0204
TECHNIFIN® HY	1.1,2.51-9	1,2	23,0	9	1,105	15,28	1,68	0,0200
TECHNIFIN® HY	1.1,2.51-10			10	1,218	16,85	1,68	0,0197
TECHNIFIN® HY	1.1,5.51-8			8	0,991	14,09	1,85	0,0204
TECHNIFIN® HY	1.1,5.51-9	1,5	22,4	9	1,105	15,69	1,85	0,0200
TECHNIFIN® HY	1.1,5.51-10			10	1,218	17,3	1,85	0,0197
TECHNIFIN® HY	1.2.51-8			8	0,991	14,74	2,12	0,0204
TECHNIFIN® HY	1.2.51-9	2,0	21,4	9	1,105	16,43	2,12	0,0200
TECHNIFIN® HY	1.2.51-10			10	1,218	18,11	2,12	0,0197
TECHNIFIN® HY	1.2,5.51-8			8	0,991	15,47	2,38	0,0204
TECHNIFIN® HY	1.2,5.51-9	2,5	20,4	9	1,105	17,23	2,38	0,0200
TECHHIFIN® HY	1.2,5.51-10			10	1,218	19,00	2,38	0,0197
TECHNIFIN® HY	1.3.51-8			8	0,991	16,26	2,62	0,0204
TECHNIFIN® HY	1.3.51-9	3,0	19,4	9	1,105	18,12	2,62	0,0200
TECHNIFIN® HY	1.3.51-10			10	1,218	19,98	2,62	0,0197
TECHNIFIN® HY	1.1.57-8			8	1,330	18,10	1,69	0,0259
TECHNIFIN® HY	1.1.57-9	1,0	23,4	9	1,486	20,23	1,69	0,0254
TECHNIFIN® HY	1.1.57-10			10	1,642	22,33	1,69	0,0249
TECHNIFIN® HY	1.1,2.57-8			8	1,33	18,41	1,88	0,0259
TECHNIFIN® HY	1.1,2.57-9	1,2	23,0	9	1,486	20,58	1,88	0,0254
TECHNIFIN® HY	1.1,2.57-10			10	1,642	22,72	1,88	0,0249
TECHNIFIN® HY	1.1,5.57-8			8	1,330	18,91	2,05	0,0259
TECHNIFIN® HY	1.1,5.57-9	1,5	22,4	9	1,486	21,11	2,05	0,0254
TECHNIFIN® HY	1.1,5.57-10			10	1,642	23,33	2,05	0,0249
TECHNIFIN® HY	1.2.57-8			8	1,330	19,79	2,32	0,0259
TECHNIFIN® HY	1.2.57-9	2,0	21,4	9	1,486	22,12	2,32	0,0254
TECHINFIN® HY	1.2.57-10			10	1,642	24,41	2,32	0,0249
TECHNIFIN® HY	1.2,5.57-8			8	1,330	20,76	2,58	0,0259
TECHNIFIN® HY	1.2,5.57-9	2,5	20,4	9	1,486	23,20	2,58	0,0254
TECHNIFIN® HY	1.2,5.57-10			10	1,642	25,61	2,58	0,0249
TECHNIFIN® HY	1.3.57-8			8	1,330	21,83	2,82	0,0259
TECHNIFIN® HY	1.3.57-9	3,0	19,4	9	1,486	24,40	2,82	0,0254
TECHNIFIN® HY	1.3.57-10			10	1,642	26,93	2,82	0,0249

Given weights are for steel tubes with Aluminium fins. Weight calculation for steel fins: Kg/m ~ weight of table + 0,1827 x fins per inch.
(Base tubes from 12,7 mm OD (½") up to 38,1 mm (1½") possible with different fin characteristics.)

TECHNIFIN® TYPE „I“



SIZE RANGE

Base tube size: 6-219.1 (other sizes upon request)
Fins: 50-500 fins/meter
Fin thickness: 0.2-1.5 mm

Fin quantity and size depend on diameter of base tube. In case of deviation against the sizes of the opposite page, please ask us.

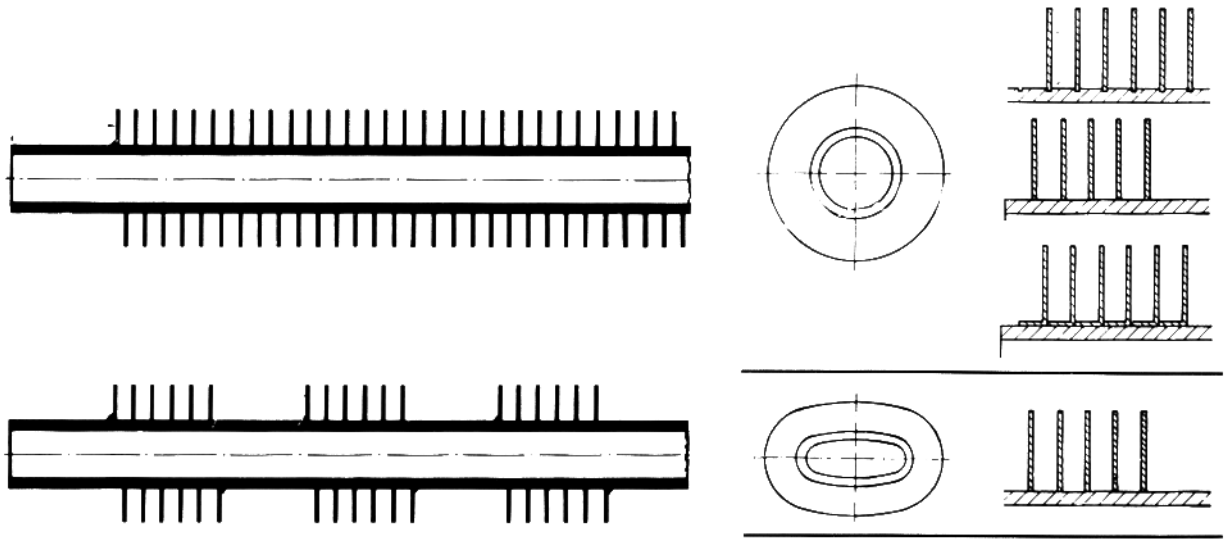
Tolerances:	Fin height:	+/- 1mm
	Fins/meter:	+/- 2%
	Plain ends:	+/- 5mm

MANUFACTURING PROCESS

Fins are spirally wound on a base tube, without welding, just fin spot welded. Non ferrous tubes and fins on either root soldered or completely tinned Execution: black, galvanized and for special applications Stainless Steel, Copper, Brass, and/or Aluminium. Ends can be bevelled, bended upon request.

FIELDS OF APPLICATION

Climatic Industry, Cooling
Heating, Drying



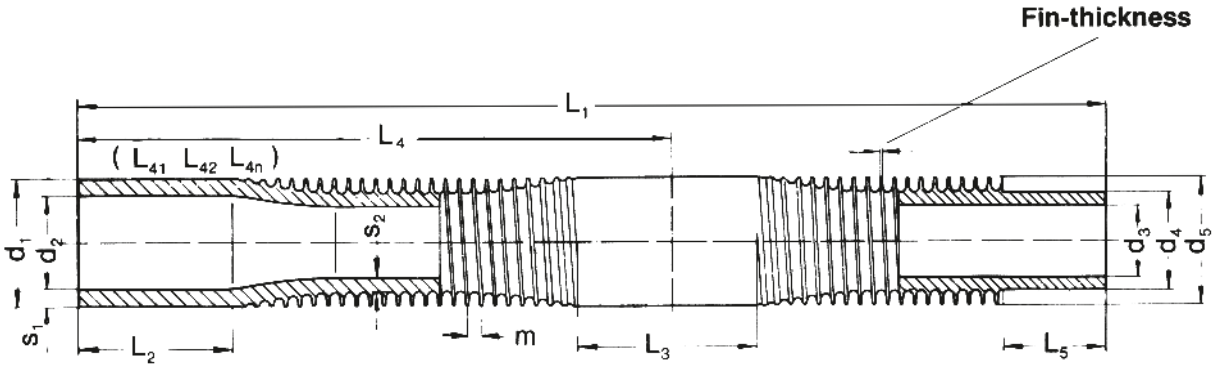
Standard Size Range

Tube		Strip Size	Fins		Surface Area Weight	Weight
OD	Wall		Diam.	Fins/m		kg/m
10,2	1,6	10 x 0,4	30	115 200 320	0,22 0,37 0,57	0,60 0,83 1,09
15	1,5	10 x 0,4	35	150 250 350	0,34 0,54 0,74	0,91 1,16 1,47
17,2	1,8	10 x 0,4	37,2	80 150 225 300 330	0,22 0,37 0,52 0,68 0,74	0,91 1,11 1,32 1,54 1,62
17,2	1,8	14 x 0,4	45,2	85 110 210 250	0,35 0,44 0,80 0,95	1,10 1,21 1,70 1,88
18	2	10 x 0,4	38	80 150 200 250 300	0,22 0,37 0,48 0,59 0,70	1,02 1,22 1,37 1,51 1,65
18	2	14 x 0,4	46	81 150 220 290	0,35 0,60 0,85 1,11	1,18 1,52 1,88 2,21
20	2	10 x 0,4	48	80 120 180 250 300	0,24 0,33 0,47 0,62 0,74	1,13 1,25 1,44 1,65 1,80
20	2	14 x 0,4	48	100 150 200 250	0,44 0,63 0,82 1,01	1,40 1,65 1,91 2,17
21,3	2	10 x 0,4	41,3	100 130 185 210 300	0,30 0,37 0,49 0,55 0,76	1,27 1,37 1,54 1,62 1,94
21,3	2	14 x 0,4	49,3	98 150 200 250	0,45 0,65 0,84 1,04	1,49 1,78 2,05 2,32
21,3	2	20 x 0,5	61,3	65 100 135	0,51 0,75 1,00	1,70 2,17 2,50
25	2	14 x 0,4	53	100 150 200 250	0,49 0,70 0,91 1,12	1,69 2,09 2,26 2,55
26,9	2,3	14 x 0,4	54,9	100 160 210	0,51 0,77 0,99	1,99 2,34 2,64
26,9	2,3	20 x 0,5	66,9	60 100 140	0,53 0,83 1,14	2,15 2,65 3,15
30	2,6	20 x 0,5	70	100 150 200	0,88 1,28 1,67	3,08 3,73 4,38
33,7	2,6	20 x 0,5	73,7	40 110 157 220	0,43 1,02 1,41 1,93	2,56 3,52 4,32 5,03
33,7	2,6	26 x 1	85,7	40 67 110	0,60 0,95 1,48	3,64 4,75 6,51

Tube		Strip Size	Fins		Surface Area Weight	Weight
OD	Wall		Diam.	Fins/m		kg/m
38	2,6	26 x 1	90	40 80 123	0,64 1,17 1,74	4,01 5,73 7,58
38	2,6	30 x 1	98	48 83 128	0,91 1,49 2,24	4,88 6,77 9,20
38	2,6	35 x 1	108	48 88 120	1,14 2,00 2,68	5,62 8,40 10,62
44,5	2,6	26 x 1	96,5	50 85 120	0,84 1,34 1,84	5,00 6,61 8,23
44,5	2,6	30 x 1	104,5	44 72 120	0,91 1,41 2,26	5,22 6,84 9,61
44,5	2,6	35 x 1	114,5	50 70 105	1,27 1,72 2,51	6,38 7,85 10,42
48,3	2,6	26 x 1	100,3	40 85 155	0,74 1,40 2,43	4,86 7,02 10,37
48,3	2,6	30 x 1	108,3	62,5 91 115	1,29 1,82 2,26	6,69 8,4 9,81
48,3	2,6	35 x 1	118,3	50 70 90	1,32 1,78 2,25	6,75 8,27 9,79
57	2,9	30 x 1	117	67 92 117 140	1,50 2,00 2,50 2,95	8,21 9,83 11,44 12,93
57	2,9	35 x 1	127	52 72 92 112	1,48 1,98 2,49 2,99	8,14 9,78 11,42 13,04
57	2,9	50 x 1	157	33 40 52,5	1,64 1,95 2,50	8,66 9,67 11,47
76,1	2,9	30 x 1	136,1	63 77 98 110	1,69 2,01 2,49 2,77	10,01 11,05 12,62 13,52
76,1	2,9	35 x 1	146,1	44 61 78 96	1,50 2,00 2,50 3,00	8,58 11,30 12,60 14,30
76,1	2,9	50 x 1	176,1	36 45 56	2,03 2,48 3,02	11,00 12,56 14,33
88,9	3,2	35 x 1	158,9	55 71 87	2,00 2,51 3,01	12,43 14,06 15,70
88,9	3,2	50 x 1	188,9	35 50 65	2,14 2,95 3,75	12,88 15,49 18,09
108	3,6	35 x 1	178	47 62 76	1,99 2,52 3,01	14,71 16,42 18,03
108	3,6	40 x 1	188	51 69 86	2,50 3,27 3,99	16,37 18,86 21,22
108	3,6	50 x 1	208	30 45 62	2,10 2,98 3,98	15,06 17,93 21,18

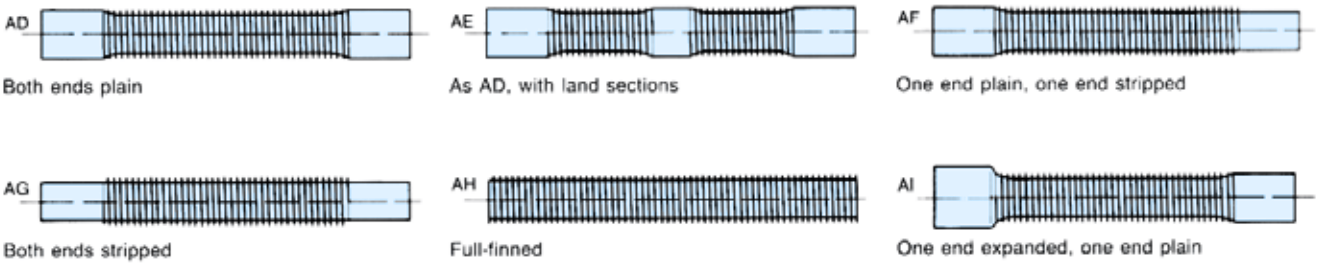
Other sizes are possible on request.

TECHNIFIN® TYPE „N“ (Low-finned tubes)

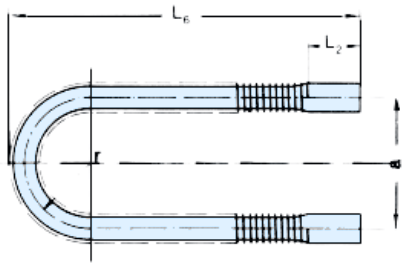


Fin-height h = 1.5 mm ± 0,15 mm Fin-thickness ~ 0.3 mm Length max. 12.0 m

d1	d5	d4	d4 stripped	S1	S2	L2	L3	L4	L5	L1
+0 -0,2	+0 -0,2	± 0,15	+0 -0,2	± 10%	± 10%	+5 -0	+5 -0	± 3 mm	+1 -0	< 2000 mm + 2 mm 2000 - 8000 mm + 1 ‰ max. 5 mm > 8000 mm + 0,7 ‰



U-BENT FIN TUBES



SURFACES

can be pickled or tinned upon request.

MATERIALS

Please refer to the „Alloy table for fintubes TECHNIFIN Type N and M“.

FIELDS OF APPLICATION

Chemical-, Petrochemical- and Petroleum Industries. Used in condensers, oilcoolers, waterheaters, heatex-changers, evaporators and heat-recoverers.

MANUFACTURING PROCESS

The fins are rolled out of the wall of the plain tube by use of a pass roller. Tube and fin consist of same piece. Fin tubes will be supplied in hard as finned / as finned condition.

ADVANTAGES

Economical solution of heatexchange problems of media with different heat conduction abilities or different current conditions. High chemical-, thermal- and mechanical resistance, suitable for rough working conditions.

Standard Size Range 16, 19 and 26 fins/inch (28, 30 and 36 fins on request)

16 FINS / INCH FIN PITCH M = 1.59

Plain section					Finned section							
Code No. TECHNIFIN® „N“	External Ø		Int.	Wall-thickn.	Root dia. Ø		Ext. Ø	Wall-thickn.		Ext. surface	Radio outs. to ins.	Weight
	Inch	d1 mm	d2 mm	S1 mm	Int. d3 mm	Ext. d4 mm	d5 mm	BWG	S2 mm	Aa m²/m	Aa/Ai	G Cu ca. kg/m
16.1/2.19	1/2"	12,70	9,80	1,45	7,50	9,50	12,50	19	1,00	0,08	3,6	0,38
16.1/2.18			9,40	1,65	7,00			18	1,25		3,8	0,43
16.5/8.17	5/8"	15,90	11,90	2,00	9,70	12,70	15,70	17	1,50	0,11	3,6	0,65
16.5/8.16			11,60	2,15	9,40			16	1,65		3,7	0,69
16.3/4.17	3/4"	19,00	15,00	2,00	12,80	15,80	18,80	17	1,50	0,13	3,3	0,83
16.3/4.16			14,70	2,15	12,50			16	1,65		3,4	0,88
16.3/4.14			14,00	2,50	11,60			14	2,10		3,6	1,03
16.7/8.17	7/8"	22,20	18,20	2,00	16,00	19,00	22,00	17	1,50	0,16	3,1	1,00
16.7/8.16			17,90	2,15	15,70			16	1,65		3,2	1,06
16.7/8.14			17,20	2,50	14,80			14	2,10		3,3	1,25
16.1.17	1"	25,40	21,40	2,00	19,20	22,20	25,20	17	1,50	0,18	3,0	1,18
16.1.16			21,10	2,15	18,90			16	1,65		3,1	1,25
16.1.14			20,40	2,50	18,00			14	2,10		3,2	1,49

19 FINS / INCH FIN PITCH M = 1.33

19.1/2.21	1/2"	12,70	10,30	1,20	7,90	9,50	12,50	21	0,80	0,10	4,0	0,32
19.1/2.20			10,10	1,30	7,70			20	0,90		4,1	0,34
19.1/2.19			9,90	1,40	7,50			19	1,00		4,2	0,38
19.1/2.18			9,50	1,60	7,00			18	1,25		4,5	0,42
19.5/8.21	5/8"	15,90	13,40	1,25	11,10	12,70	15,70	21	0,80	0,12	3,6	0,44
19.5/8.20			13,20	1,35	10,90			20	0,90		3,7	0,47
19.5/8.19			13,00	1,45	10,70			19	1,00		3,8	0,51
19.5/8.18			12,60	1,65	10,20			18	1,25		4,0	0,58
19.5/8.17			11,90	2,00	9,70			17	1,50		4,2	0,69
19.5/8.16			11,60	2,15	9,40			16	1,65		4,3	0,74
19.3/4.20	3/4"	19,00	16,30	1,35	14,00	15,80	18,80	20	0,90	0,15	3,5	0,61
19.3/4.19			16,10	1,45	13,80			19	1,00		3,6	0,63
19.3/4.18			15,70	1,65	13,30			18	1,25		3,7	0,72
19.3/4.17			15,00	2,00	12,80			17	1,50		3,8	0,83
19.3/4.16			14,80	2,10	12,50			16	1,65		3,9	0,88
19.3/4.14			14,10	2,45	11,60			14	2,10		4,2	1,03
19.7/8.19	7/8"	22,20	19,30	1,45	17,00	19,00	22,00	19	1,00	0,18	3,4	0,80
19.7/8.18			18,90	1,65	16,50			18	1,25		3,5	0,89
19.7/8.17			18,20	2,00	16,00			17	1,50		3,6	1,00
19.7/8.16			18,00	2,10	15,70			16	1,65		3,7	1,07
19.7/8.14			17,30	2,45	14,80			14	2,10		3,9	1,26
19.1.18	1"	25,40	22,10	1,65	19,70	22,20	25,20	18	1,25	0,21	3,4	1,05
19.1.17			21,40	2,00	19,20			17	1,50		3,5	1,19
19.1.16			21,10	2,15	18,90			16	1,65		3,6	1,27
19.1.14			20,50	2,45	18,00			14	2,10		3,7	1,50

26 FINS / INCH FIN PITCH M = 0.97

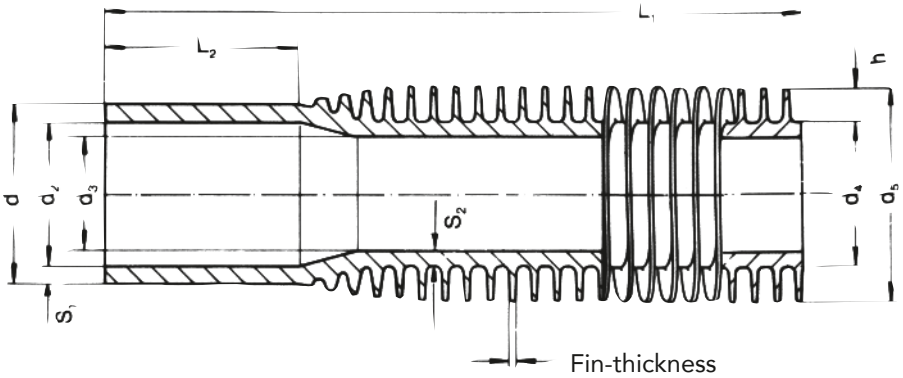
26.1/2.21	1/2"	12,70	10,30	1,20	7,90	9,50	12,50	21	0,80	0,12	5,0	0,34
26.1/2.19			9,90	1,40	7,50			19	1,00		5,3	0,40
26.1/2.18			9,50	1,60	7,00			18	1,25		5,8	0,45
26.5/8.21	5/8"	15,90	13,40	1,25	11,10	12,70	15,70	21	0,80	0,16	4,6	0,46
26.5/8.19			13,00	1,45	10,70			19	1,00		4,8	0,53
26.5/8.18			12,60	1,65	10,20			18	1,25		5,0	0,60
26.3/4.20	3/4"	19,00	16,30	1,35	14,00	15,80	18,80	20	0,90	0,20	4,5	0,63
26.3/4.19			16,10	1,45	13,80			19	1,00		4,6	0,67
26.3/4.18			15,70	1,65	13,30			18	1,25		4,8	0,77
26.7/8.19	7/8"	22,20	19,30	1,45	17,00	19,00	22,00	19	1,00	0,23	4,4	0,81
26.7/8.18			18,90	1,65	16,50			18	1,25		4,5	0,93
26.7/8.17			18,20	2,00	16,00			17	1,50		4,7	1,04
26.01.18	1"	25,40	22,10	1,65	19,70	22,20	25,20	18	1,25	0,27	4,4	1,09
26.01.17			21,40	2,00	19,20			17	1,50		4,5	1,23
26.01.16			21,10	2,15	18,90			16	1,65		4,6	1,31

Weights are based on SF-Cu Copper. For other materials please apply the following conversion factors: CuNi 70/30: 1.0, CuNi 90/10: 1.0, Aluminium Brass: 0.93, Admiralty Brass: 0.96, Aluminium: 0.31, Steel: 0.88

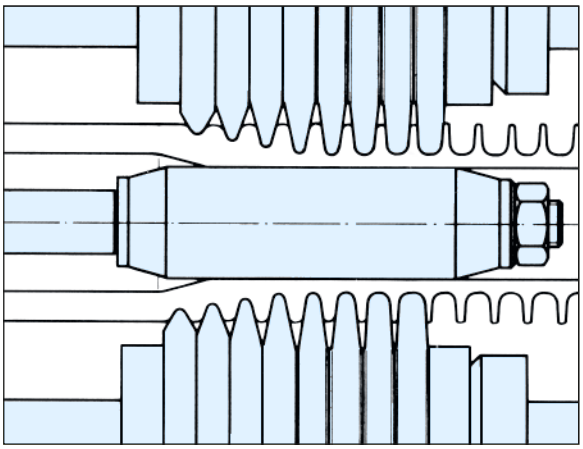
TECHNIFIN® TYPE „M“ (Medium-finned)

Fins per inch : 11 Fin-height: h=3,5 mm ± 0,35 mm Fin thickness ~ 0,3 mm Length max. 12,0 m

Plain section			Finned section							
External Ø	Int. Ø	Wall-thickn.	Root dia. Ø		Ext. Ø	Wall-thickn.		Ext. surface	Radio outs.to ins.	Weight
			Int.	Ext.						
d1	d2	S1	d3	d4	d5	BWG	S2	Aa	Aa/Ai	G Cu
mm	mm	mm	mm	mm	mm		mm	m²/m		ca. kg/m
13,00	9,40	1,80	7,90	9,50	16,50	21,00	0,80	0,16	6,50	0,50
13,00	9,00	2,00	7,50	9,50	16,50	19,00	1,00	0,16	6,70	0,53
16,00	12,40	1,80	10,90	12,50	19,50	21,00	0,80	0,19	5,60	0,61
16,00	12,00	2,00	10,50	12,50	19,50	19,00	1,00	0,19	5,80	0,67
18,00	14,00	2,00	12,50	14,50	21,50	19,00	1,00	0,21	5,40	0,77
18,00	13,50	2,25	12,00	14,50	21,50	18,00	1,25	0,21	5,60	0,85
22,00	18,00	2,00	16,50	18,50	25,50	19,00	1,00	0,27	5,20	0,96
22,00	17,50	2,25	16,00	18,50	25,50	18,00	1,25	0,27	5,40	1,06
28,00	23,50	2,25	22,00	24,50	31,50	18,00	1,25	0,34	4,90	1,45
28,00	23,00	2,50	21,50	24,50	31,50	17,00	1,50	0,34	5,10	1,60
Alloys:			SF-Cu	CuAsP	CuNi10Fe	Al 99,5	AlMn	AlMg 3		
Weight Conversion factor:			1,0	1,0	1,0	0,31	0,31	0,31		



d_1	d_3	d_4 stripped	S_1	S_2	L_2	L_1
+0 -0,2	± 0,13	+0 -0,2	± 10%	± 10%	+5 -0	up to 2000 mm + 2 mm 2000 - 8000 mm + 1 ‰, max. 5 mm over 8000 mm + 0,7 ‰



FIELDS OF APPLICATION

Water heating, solar technics, oil-cooling, heat-exchangers, condensers, evaporators.

MANUFACTURING PROCESS

The fins are rolled out of the wall of the plain tube as type „N“, but higher fins. Fin tubes will be supplied in hard as finned / as finned condition.

ADVANTAGES

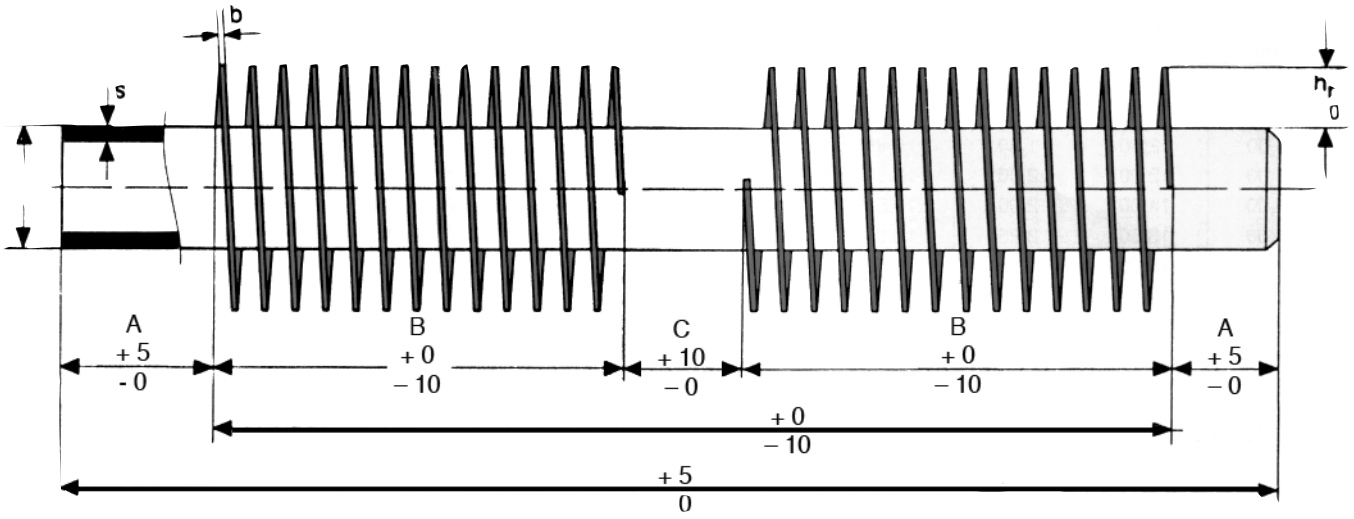
Economical solution of heat-exchange problems of media with different heat conduction abilities or different current conditions. High chemical-, thermal- and mechanical resistance, suitable for rough working conditions.

Alloy Table

Material	ASTM	DIN	German Mat.-No.	BS	Grade
Carbon Steel	A 179	ST 35.8/I	1.0305	3602/1	CFS 360
Carbon Steel	A 192 / A 161 Gr. LC	ST 35.8/I	1.0305	3059/2	CFS/HFS 360
Carbon Steel	A 210 Gr. A1	ST 45.8/I	1.0405	3602/1	CFS/HFS 410
Carbon Steel	A 210 Gr.C	17 Mn 4	1.0481	3602/1	CFS/HFS 460
Low Alloy Steel	A 209 T1	16 Mo 5	1.5423	3606	245
Low Alloy Steel	A 213 / A 199 T11/T12	13 CrMo 44	1.7335	3604	621
Low Alloy Steel	A 213 / A 199 T22	10 CrMo 910	1.7380	3059	622-440
Low Alloy Steel	A 213 / A 199 T5	12 CrMo 195	1.7362	3604	625
Low Alloy Steel	A 213 / A 199 T9	X12 CrMo 91	1.7386	3059/3604	629-470
Stainless Steel	A 213 / A 269 / A249 TP 304	X5 CrNi 189	1.4301	970	304 S 15
Stainless Steel	A 213 / A 269 / A249 TP 304L	X2 CrNi 189	1.4306	970	304 S 12
Stainless Steel	A 213 / A 269 / A249 TP 321	X10 CrNiTi 189	1.4541	970	321 S 12
Stainless Steel	A 213 / A 269 / A249 TP 316	X5 CrNiMo 1810	1.4401	970	315 S 16
Stainless Steel	A 213 / A 269 / A249 TP 316L	X2 CrNiMo 1810	1.4404	970	316 S 12
Stainless Steel	A 213 / A 269 / A249 TP 347	X10 CrNiNb 189	1.4550	970	347 S 17
Stainless Steel	A 213 / A 269 / A249 TP 316Tl	X10 CrNiMoTi 1810	1.4571	970	320 S 17
Stainless Steel	A 789 / A 790 UNS S 31803	X2 CrNiMo 11225	1.4462	—	
Stainless Steel	B 677 Alloy 904L	X2 NiCrMoCu 25205	1.4539	—	
Nickel	B 161 UNS No 2200	Ni 99,2	2.4066	3074	NA 11
Nickel	B 161 UNS No 2201	Ni 99,2	2.4068	3074	NA 12
Nickel-Copper	B 163 N 04400	NiCu30Fe	2.4360	3074	NA 13
Nickel-Chrom-Iron	B 163 6600	NiCr15Fe	2.4816	3074	NA 14
Nickel-Chrom-Iron	B 161 8825	NiCr21Mo	2.4858	3074	NA 16
Nickel-Chrom-Iron	B 468 08020	—	1.4876	—	NA 15
Nickel-Chrom-Iron	B 163 08800	X10 NiCrAlTi 3220		3074	
Copper Alloy	B 75 / B 111 UNS C12200	Sf-Cu	2.0090	2871	C 106
Copper Alloy	B 75 / B 111 UNS C14200	CuAsp	2.1491	2871	C 107
Copper Alloy	B 111 UNS C44300	CuZn28Sn1	2.0470	2871	CZ 111
Copper Alloy	B 111 UNS C68700	CuZn20Al2	2.0460	2871	CZ 110
Copper Alloy	B 111 UNS C60800	CuAl5AS	2.0918	—	
Copper Alloy	B 111 UNS C70600	CuNi10Fe1Mn	2.0872	2871	CN 102
Copper Alloy	B 111 UNS C71500	CuNi30Mn1Fe	2.0882	2871	CN 107
Aluminium Alloys	Alloy 1050 / 1050A	Al 99,5	3.0255	1050A (1B)	
Aluminium Alloys	Alloy 5754	AlMg3	3.3535	(N5)	
Aluminium Alloys	Alloy 3003	AlMnCu	3.0517	—	
Aluminium Alloys	Alloy 5083	AlMg4,5Mn	3.3547	5083 (N8)	
Titanium	B338 Gr. 2	Ti2	3.7035		

and other material grades on request.
Fin tubes will be supplied in hard as finned / as finned condition.

TECHNIFIN® TYPE „WO“ / „WOS“ (welded on / welded on serrated)



STANDARD SIZE RANGE

Please see pages 20 and 21. Other sizes on request.

FIELDS OF APPLICATION

Fired Heaters, Heat Exchangers, Boilers, Pre-Heaters, Coolers, Heat Pipes, Dryers, Heaters.

MANUFACTURING PROCESS

The fin strip is spirally wound onto the tube and welded continuously to the tube along the spiral foot.
Welding process: HF, SF, TIG, MIG, MAG
For type „WOS“ fins are serrated. Oxide scale caused by welding on the fins remain on the pipe.

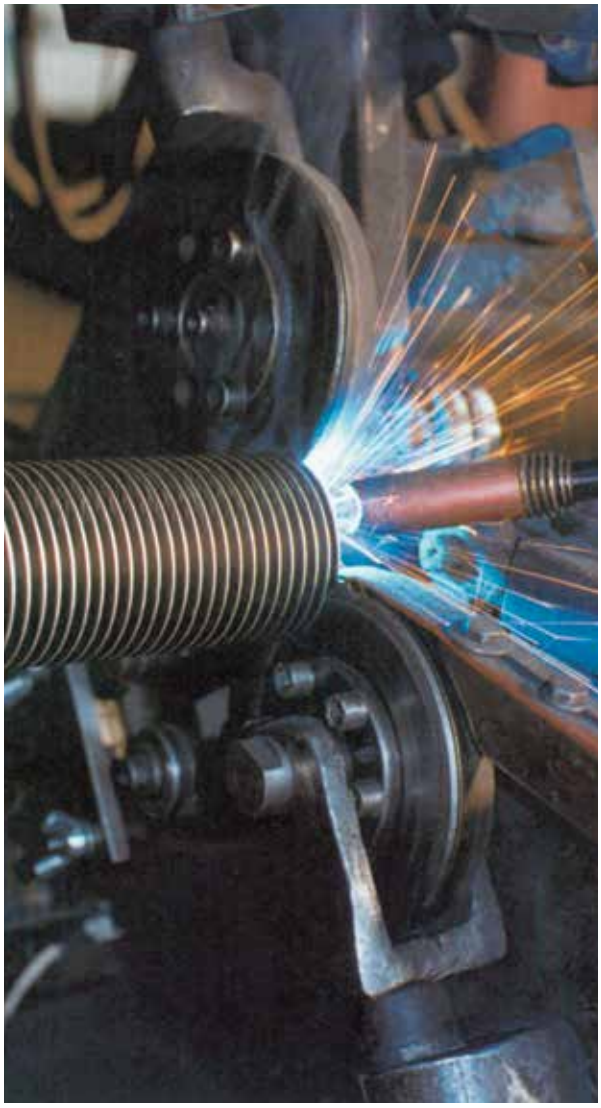
ADVANTAGE

TYPE „WO“

Strong connection between fin and base tube, prevents loosening of fin due to heat stress, oxydization, corrosion etc. Use at very high temperatures possible.

TYPE „WOS“

As per Type „WO“, but fins are serrated. Therefore higher heat transfer coefficient, for the same pressure drop compared with „WO“-fin.



MATERIALS

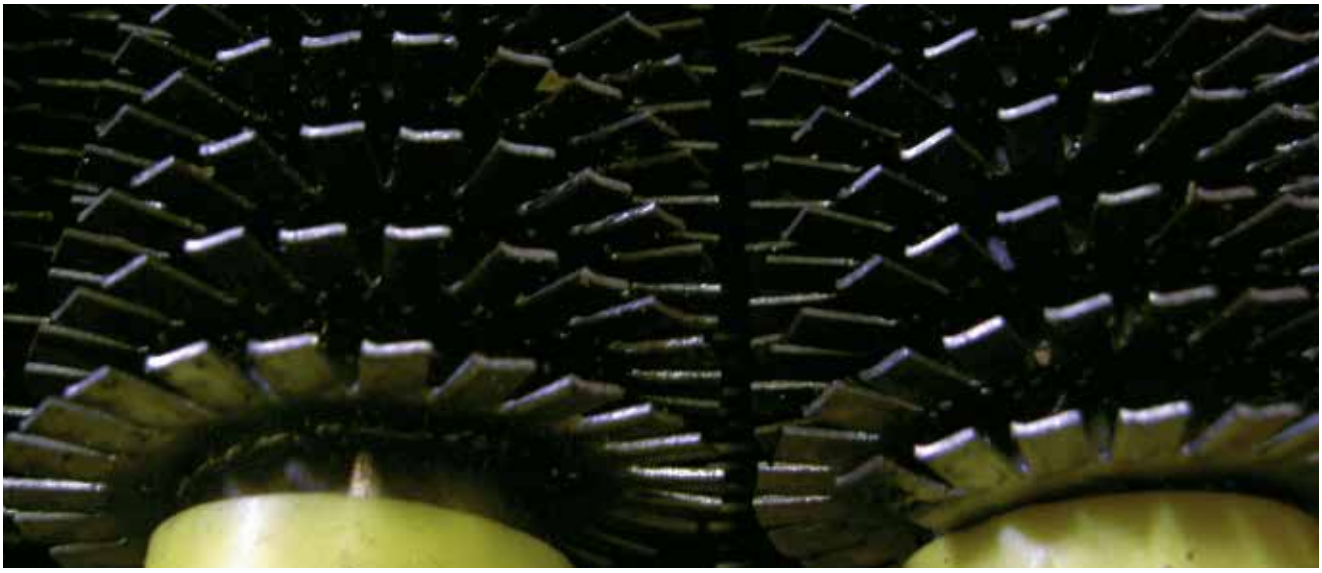
Base tube
- Carbon Steel
- Low Alloy Steel
- Stainless Steel
- Nickel Alloys

Fins
- Carbon Steel
- Low Alloy Steel
- Ferritic Stainless Steel
- Austenitic Stainless Steel
- Nickel Alloys

Heat transfer surface to be calculated al follows:

$$HTS = \frac{\pi}{10^6}\left[10^3 \cdot da + 2N \cdot HR\,(HR + da) + N \cdot 2HR \cdot b\right]$$

HTS = Heat Transfer Surface in m²/m
da = Outside Diameter of the Bare Tubes in mm
HR = Fin height in mm
b = Fin Thickness in mm
N = Number of Fins per Mtr



Standard Range

Core Tubes				Number of fins N		Fin height x fin thickness (HR x b) Fin tube surface area / fin tube weight									
						10 x 1,3		13 x 1,3		15 x 1,3		19 x 1,5		25 x 1,5	
O.D. da mm	Wall thickn s mm	Surface area F´k m²/m	Weight G´k kg/m	per m	per inch	m²/m	kg/m	m²/m	kg/m	m²/m	kg/m	m²/m	kg/m	m²/m	kg/m
16	1,8	0,05	0,63	250	6,35	0,48	2,72								
				200	5	0,39	2,30								
				150	3,8	0,31	1,88								
				118	3	0,25	1,64								
				100	2,5	0,22	1,47								
21,3	2	0,07	0,95	250	6,35	0,58	3,46								
				200	5	0,48	2,96								
				150	3,8	0,37	2,46								
				118	3	0,31	2,14								
				100	2,5	0,27	1,96								
25	2	0,08	1,13	250	6,35	0,65	3,94	0,88	5,09						
				200	5	0,53	3,38	0,72	4,30						
				150	3,8	0,42	2,82	0,56	3,51						
				118	3	0,35	2,46	0,46	3,01						
				100	2,5	0,31	2,26	0,40	2,72						
31,8	2,6	0,10	1,87	200	5	0,64	4,55	0,85	5,61	1,01	6,37				
				150	3,8	0,51	3,88	0,66	4,67	0,78	5,25				
				118	3	0,42	3,46	0,54	4,08	0,63	4,53				
				100	2,5	0,37	3,22	0,48	3,74	0,55	4,13				
				80	2	0,32	2,95	0,40	3,37	0,46	3,68				
38	3,2	0,12	2,75	200	5	0,74	5,82	0,97	7,00	1,14	7,84	1,52	10,8		
				150	3,8	0,58	5,05	0,76	5,93	0,89	6,57	1,17	8,76		
				118	3	0,48	4,56	0,62	5,26	0,72	5,76	0,94	7,48		
				100	2,5	0,43	4,29	0,55	4,87	0,63	5,30	0,82	6,76		
				80	2	0,37	3,98	0,46	4,45	0,53	4,79	0,68	5,96		
48,3	3,2	0,15	3,56	200	5	0,90	7,30	1,17	8,67	1,37	9,64	1,79	13,0		
				150	3,8	0,71	6,36	0,92	7,39	1,06	8,12	1,38	10,7		
				118	3	0,59	5,76	0,76	6,57	0,87	7,15	1,12	9,14		
				100	2,5	0,53	5,43	0,66	6,11	0,76	6,60	0,97	8,29		
				80	2	0,45	5,06	0,56	5,61	0,64	6,00	0,81	7,35		
51	3,2	0,16	3,77	200	5	0,94	7,68	1,23	9,10	1,43	10,1	1,87	13,6	2,59	17,8
				150	3,8	0,75	6,70	0,96	7,77	1,11	8,53	1,44	11,2	1,99	14,3
				118	3	0,62	6,08	0,79	6,92	0,91	7,52	1,17	9,58	1,60	12,1
				100	2,5	0,55	5,73	0,69	6,44	0,79	6,95	1,01	8,69	1,38	10,8
				80	2	0,47	5,34	0,59	5,91	0,67	6,31	0,84	7,71	1,13	9,4
57	3,2	0,18	4,24	200	5	1,04	8,54	1,34	10,1	1,56	11,2	2,03	14,9	2,80	19,4
				150	3,8	0,82	7,47	1,05	8,62	1,22	9,44	1,57	12,3	2,15	15,6
				118	3	0,69	6,78	0,87	7,69	0,99	8,33	1,27	10,6	1,73	13,2
				100	2,5	0,61	6,39	0,76	7,16	0,87	7,71	1,10	9,59	1,49	11,8
				80	2	0,52	5,96	0,64	6,58	0,73	7,02	0,92	8,52	1,23	10,3
60,3	3,2	0,19	4,5	200	5	1,09	9,01	1,41	10,6	1,63	11,7	2,12	15,7	2,92	20,3
				150	3,8	0,86	7,88	1,10	9,09	1,27	9,94	1,64	12,9	2,23	16,3
				118	3	0,72	7,16	0,91	8,11	1,04	8,78	1,33	11,1	1,80	13,8
				100	2,5	0,64	6,76	0,80	7,56	0,91	8,13	1,15	10,1	1,55	12,4
				80	2	0,55	6,31	0,68	6,95	0,77	7,40	0,96	8,97	1,28	10,8

Formula for Calculation of Fin Tube Weight: – Carbon Steel –

$$kg/m = \frac{7{,}85 \cdot \pi}{10^6} \left[1000 \cdot s\,(da - s) + b \cdot N \cdot HR\,(HR + da)\right]$$

da = bare pipe O.D. (mm)
s = bare pipe wallthickness (mm)
b = fin thickness (mm)
N = fins per meter
HR = fin height (mm)

This is a simplified formula and should be used as estimation only, since manufacturing tolerances are not considered
Factor other than Carbon Steel:
Type 304/310/316/321 : 1.024 Techalloy 200 : 1.133
Techalloy 600/625 : 1.073 Techalloy 825 : 1.038

Standard Range

Core Tubes				Number of fins N		Fin height x fin thickness (HR x b) Fin tube surface area / fin tube weight									
						10 x 1,3		13 x 1,3		15 x 1,3		19 x 1,5		25 x 1,5	
O.D. da mm	Wall thickn s mm	Surface area F´k m²/m	Weight G´k kg/m	per m	per inch	m²/m	kg/m	m²/m	kg/m	m²/m	kg/m	m²/m	kg/m	m²/m	kg/m
76,1	3,2	0,24	5,75	200	5	1,34	11,3	1,72	13,2	1,98	14,5	2,55	19,1	3,46	24,4
				150	3,8	1,06	9,89	1,35	11,3	1,55	12,3	1,97	15,8	2,66	19,8
				118	3	0,89	9,01	1,11	10,1	1,27	10,9	1,6	13,6	2,14	16,8
				100	2,5	0,79	8,51	0,98	9,46	1,11	10,1	1,39	12,4	1,85	15,1
				80	2	0,68	7,96	0,83	8,72	0,94	9,26	1,16	11,1	1,53	13,2
88,9	3,2	0,28	6,76	200	5	1,54	13,1	1,97	15,3	2,26	16,8	2,89	21,9	3,9	27,8
				150	3,8	1,22	11,5	1,54	13,1	1,77	14,3	2,24	18,1	3	22,6
				118	3	1,02	10,5	1,27	11,8	1,45	12,7	1,82	15,7	2,42	19,2
				100	2,5	0,91	9,93	1,12	11	1,27	11,8	1,59	14,3	2,09	17,3
				80	2	0,78	9,3	0,95	10,2	1,07	10,8	1,32	12,8	1,73	15,2
101,6	3,6	0,32	8,7	200	5	1,74	15,9	2,21	18,3	2,54	19,9	3,23	25,6	4,34	32,1
				150	3,8	1,38	14,1	1,74	15,9	1,99	17,1	2,51	21,4	3,34	26,3
				118	3	1,16	12,9	1,44	14,3	1,63	15,3	2,04	18,7	2,69	22,5
				100	2,5	1,03	12,3	1,27	13,5	1,43	14,3	1,78	17,2	2,33	20,4
				80	2	0,89	11,6	1,08	12,5	1,21	13,2	1,49	15,5	1,93	18,1
114,3	3,6	0,36	9,82	200	5			2,46	20,4	2,82	22,3	3,58	28,6	4,78	35,6
				150	3,8			1,93	17,8	2,21	19,2	2,77	23,9	3,68	29,1
				118	3			1,6	16,1	1,81	17,2	2,26	20,9	2,97	25
				100	2,5			1,41	15,1	1,59	16	1,97	19,2	2,57	22,7
				80	2			1,2	14,1	1,34	14,8	1,65	17,3	2,13	20,1
141,3	4	0,44	13,5	200	5			2,99	26,4	3,41	28,6	4,3	36,1	5,72	44,3
				150	3,8			2,35	23,2	2,67	24,8	3,34	30,4	4,4	36,6
				118	3			1,94	21,1	2,2	22,4	2,72	26,8	3,55	31,7
				100	2,5			1,71	19	1,93	21,1	2,38	24,8	3,08	28,9
				80	2			1,46	18,7	1,63	19,6	1,99	22,6	2,55	25,8
159	4,5	0,5	17,14	200	5			3,33	31,5	3,8	33,9	4,79	42,2	6,33	51,2
				150	3,8			2,62	27,9	2,98	29,7	3,71	35,9	4,87	42,7
				118	3			2,17	25,6	2,45	27	3,03	31,9	3,94	37,2
				100	2,5			1,92	24,3	2,15	25,5	2,64	29,6	3,41	34,2
				80	2			1,63	22,9	1,82	23,8	2,21	27,1	2,83	30,8
168,3	4,5	0,53	18,17	200	5			3,51	33,3	4,01	35,8	5,04	44,5	6,65	53,9
				150	3,8			2,77	29,5	3,14	31,4	3,91	37,9	5,12	45
				118	3			2,29	27,1	2,58	28,6	3,19	33,7	4,14	39,3
				100	2,5			2,02	25,7	2,27	27	2,78	31,3	3,59	36
				80	2			1,72	24,2	1,92	25,2	2,33	28,7	2,98	32,5
193,7	5,4	0,61	25,06	200	5			4,01	42,3	4,57	45,1	5,72	55	7,53	65,5
				150	3,8			3,16	38	3,58	40,1	4,44	47,5	5,8	55,4
				118	3			2,61	35,2	2,94	36,9	3,63	42,7	4,69	48,9
				100	2,5			2,31	33,7	2,59	35,1	3,17	40	4,07	45,3
				80	2			1,97	32	2,19	33,1	2,65	37	3,38	41,2
219,1	5,9	0,69	31,01	200	5			4,5	50,3	5,13	53,2	6,41	64,5	8,4	76,1
				150	3,8			3,55	45,5	4,02	47,9	4,98	56,1	6,48	64,9
				118	3			2,94	42,4	3,31	44,3	4,06	50,7	5,24	57,6
				100	2,5			2,59	40,7	2,91	42,3	3,55	47,7	4,55	53,6
				80	2			2,21	38,7	2,46	40	2,98	44,4	3,77	49,1

Many other sizes upon request!

Dimensions

Core tubes: to DIN 2448,2458 or ANSI B 36.10 from 16 to 219.1 mm O.D. (other dimensions upon request)

Fins: 50 to 250 fins per meter finned tube or more on request
Height: up to 50 mm
Thickness: 0.9 to 6.0 mm
Number of fins and dimensions depend upon core tube diameter.
For dimensions not listed in the above table, please give your detailed enquiry.

Lengths: Limited only by transportation facilities or availability of core tube

Dimensional tolerances:

Core tube: to respective core tube specification
Fin height: ± 1 mm
Number of fins: + 5%/-2%
Free ends: + 5mm
Free sections: + 10 mm

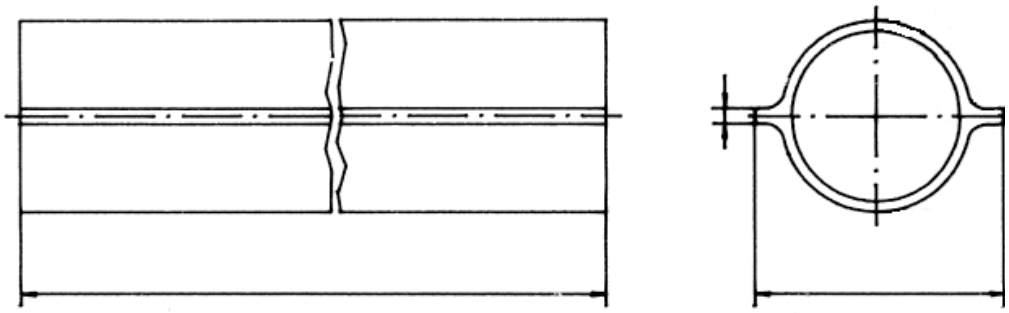
Fin design

free ends, free sections on the core tube

End shapes

plain, calibrated
bevelled for welding to DIN 2559 - ANSI B 16.25

TECHNIFIN® TYPE „LFS“



Standard Size Range

Inside diameter:	29 - 110 mm
Wall thickness:	3.2 - 20 mm
W.T. ratio:	approx 10% O.D.
Length:	std. 11 - 12 meter, longer on request
Fin dia:	max. 200 mm

Eccentricity:	max. 10%
Max. torsion:	up to 6 mtr-L = 1,5 mm
	6 - 8 mm-L = 2.25 mm
	8 mtr and longer-L = 3.0 mm
Straightness:	max. 0,2% on total length

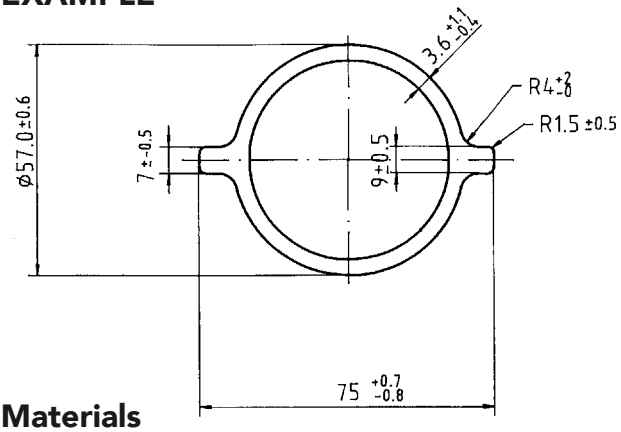
Field of application

Boiler water wall constructions
Water power plants
Steam generators
Gas recuperators
Flue tube boilers
Fuel element coils

Advantages

– The fin tube is seamless and manufactured out in single piece construction.
– Compared to standard boilerwall constructions no strip required, only one weld nessersary to connect 2 tubes.

EXAMPLE



Materials

Mainly Carbon Steels, Ferritic Alloy and Austenitic Stainless Steel, Nickel Alloy

Manufacturing Process

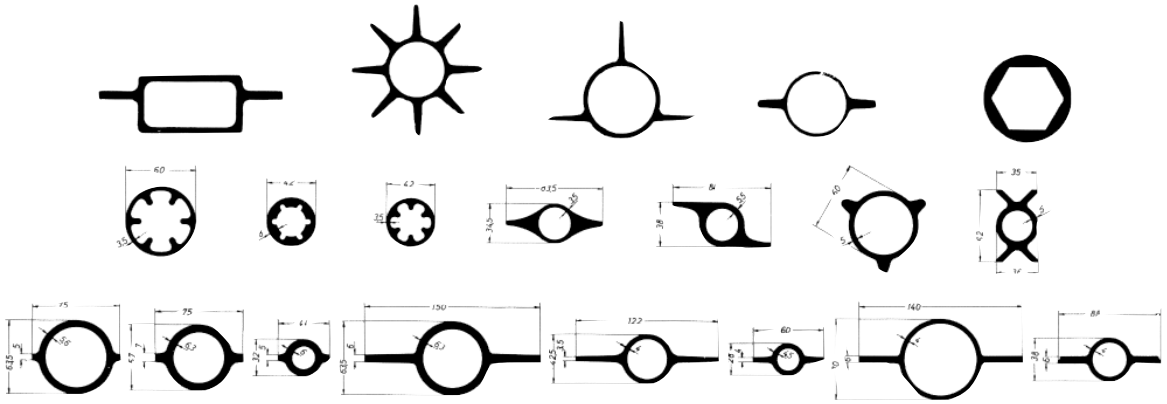
Hot-extrusion process or
Cold drawn process

Standard Size Range

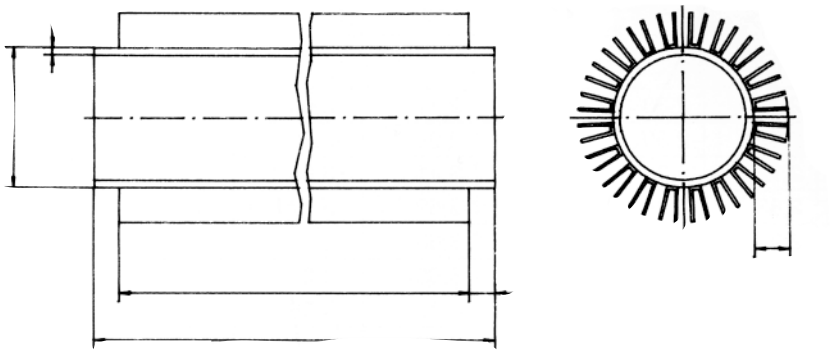
Tube	Width of profile	Typical wall thicknesses							Fin thickness		
		3,2	3,6	4	4,5	5	5,6	6,2	b1	b2	r
d	e	Weight kg/m									
25,0	36,0	2,15	2,33	2,50	2,71	2,90			4,5	5,5	5
26,9	37,5	2,39	2,59	2,78	2,98	3,20	3,44	3,71	5,0	6,0	5
30,0	42,5 45,0 47,5	2,72	2,95	3,17	3,41	3,66	3,95	4,28	5,0	6,0	5
		2,83	3,06	3,28	3,52	3,77	4,06	4,39			
		2,94	3,17	3,39	3,63	3,88	4,17	4,50			
31,8	45,0 47,5 50,0	2,90	3,16	3,39	3,65	3,93	4,23	4,60	5,5	6,5	5
		3,02	3,27	3,51	3,77	4,05	4,35	4,72			
		3,13	3,38	3,62	3,88	4,16	4,46	4,83			
33,7	45,0 47,5 50,0	2,88	3,15	3,41	3,69	4,00	4,33	4,73	6,0	7,0	5
		3,14	3,41	3,67	3,95	4,26	4,59	4,99			
		3,26	3,53	3,79	4,07	4,38	4,71	5,11			
38,0	50,0 52,5 57,5	3,55	3,86	4,16	4,49	4,85	5,25	5,37	6,0	8,0	6
		3,69	4,00	4,30	4,63	4,99	5,39	5,51			
		3,97	4,28	4,58	4,91	5,27	5,67	5,79			
42,4	52,5 57,5 60,0		4,15	4,49	4,87	5,29	5,75	6,30	6,0	8,0	6
			4,42	4,76	5,14	5,56	6,02	6,57			
			4,56	4,90	5,28	5,70	6,16	6,81			
44,5	60,0 65,0		4,69	5,06	5,46	5,91	6,39	6,99	6,5	8,5	6
			4,98	5,35	5,75	6,20	6,68	7,28			
48,3	65,0 70,0		5,11	5,52	5,96	6,45	7,00	7,66	6,5	8,5	6
			5,40	5,81	6,25	6,74	7,39	7,95			
51,0	65,0 70,0		5,23	5,66	6,13	6,67	7,24	7,95	7,0	9,0	6
			5,55	5,98	6,45	6,98	7,56	8,27			
57,0	70,0 75,0			6,21	6,75	7,35	8,02	8,85	7,0	9,0	6
				6,52	7,06	7,66	8,33	9,16			
60,3	75,0 80,0			6,64	7,22	7,87	8,68	9,47	7,0	9,0	6
				6,95	7,53	8,18	8,89	9,78			
63,5	80,0 85,0			7,07	7,68	8,37	9,13	10,07	7,0	9,0	6
				7,38	7,99	8,68	9,44	10,38			
70,0	85,0 90,0			7,73	8,42	9,19	10,03	11,10	7,5	9,5	7
				8,07	8,76	9,53	10,37	11,44			
76,1	90,0 95,0			8,28	9,03	9,88	10,82	12,01	7,5	9,5	7
				8,61	9,36	10,21	11,15	12,34			

Other sizes on request.

In addition to longitudinal fin tubes, sections of many shapes can be produced by hot extrusion with two or more internal and/or external fins in the size range mentioned on the left page.



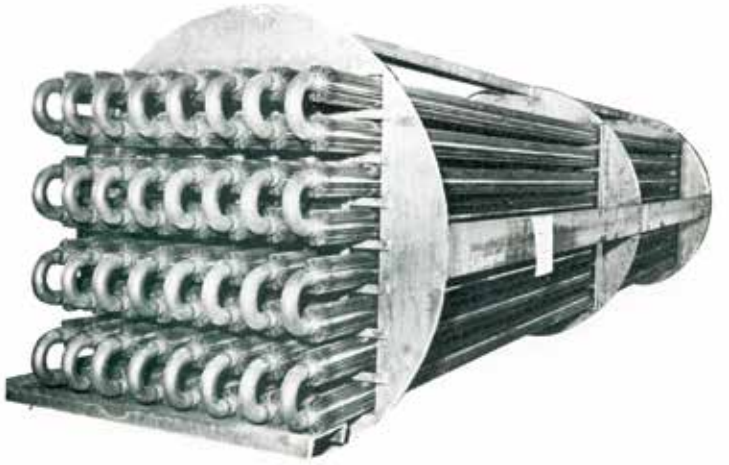
TECHNIFIN® TYPE „LFW“



Size Range
As per opposite page, other sizes on request

Fields of application
Chemical-, Petrochemical-, Oil-, Power Industry
Heat-Exchangers
Fired Heaters
Gas Coolers and Heaters
Tank Heaters

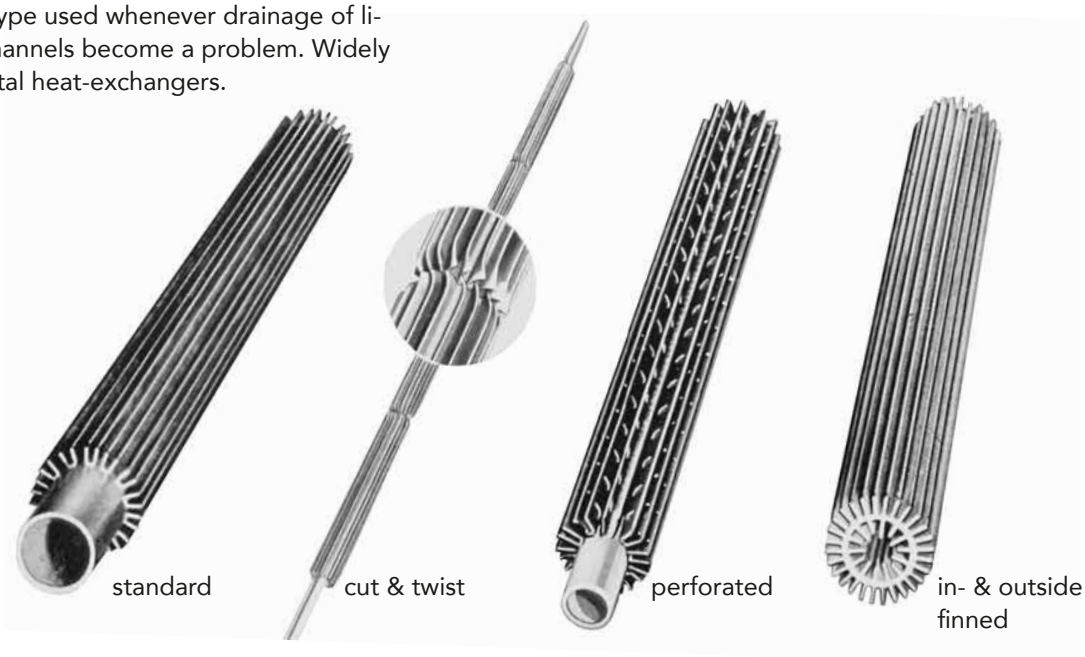
Manufacturing process
The longitudinal I/L or U fins are welded onto the base tubes by resistance welding or welding with filler metal. U-Bend tubes with „LFW“ Fins also possible. Oxide scale caused by welding on the fins remain on the pipe/tube.



Longitudinal fintube coils for steel company

Advantage
Increase of heat transfer rates for viscous liquids. Perforated fin type used whenever drainage of liquid from fin channels become a problem. Widely used in horizontal heat-exchangers.

Materials
Carbon Steels
Alloy Steels
Stainless Steels
Nickel Alloys
and others.



standard | cut & twist | perforated | in- & outside finned

Standard Size Range

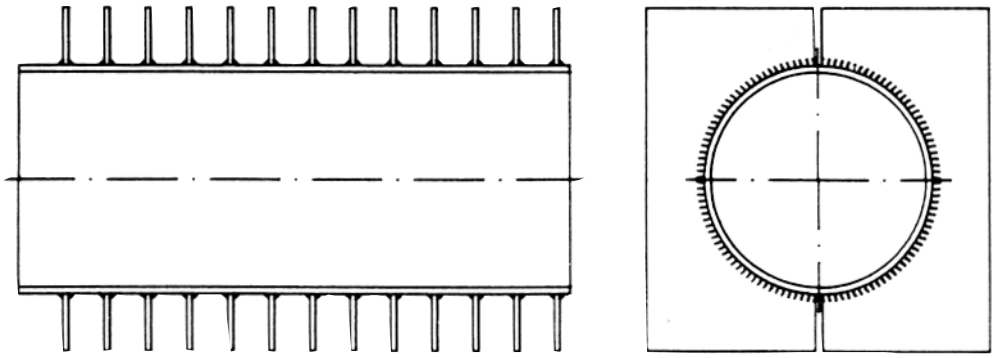
FINNED TUBE AND PIPE SURFACES square feet per foot of finned length					No. of Fins	FINNED TUBE AND PIPE SURFACES m²/meter of finned length				
O.D. or Nominal Pipe Size	Fin Height					Fin Height - mm	O.D. or Nominal	No. of Fins	Fin Height - mm	O.D. or Nominal
	1/4"	1/2"	3/4"	1"		6.35	12.7	19.05	25.4	Pipe Size
3/4" O.D.	0.863	1.529	2.196	2.863	16	0.2627	0.4654	0.6685	0.8715	19.05 mm
7/8" O.D.	0.895	1.562	2.229	2.896	16	0.2724	0.4755	0.6785	0.8816	22.22 mm
	1.062	1.895	2.729	3.562	20	0.3233	0.5768	0.8307	1.0843	
1" O.D.	0.928	1.595	2.262	2.928	16	0.2825	0.4855	0.6886	0.8913	25.4 mm
	1.095	1.928	2.762	3.595	20	0.3333	0.5869	0.8408	1.0944	
	1.262	2.262	3.262	4.262	24	0.3842	0.6886	0.9930	1.2974	
3/4" I.P.S.	0.941	1.608	2.275	2.942	16	0.2865	0.4895	0.6925	0.8956	3/4" I.P.S.
1.05" O.D.	1.108	1.941	2.775	3.608	20	0.3373	0.5909	0.8447	1.0983	26.67 mm
	1.275	2.275	3.275	4.275	24	0.3881	0.6925	0.9970	1.3014	
1 1/2" I.P.S.	1.497	2.497	3.497	4.497	24	0.4557	0.7601	1.0645	1.3689	1 1/2" I.P.S.
1.9" O.D.	1.830	3.163	4.497	5.830	32	0.5571	0.9629	1.3689	1.7747	48.26 mm
	2.163	3.830	5.497	7.163	40	0.6584	1.1659	1.6734	2.1805	
2" I.P.S.	1.955	3.288	4.622	5.956	32	0.5951	1.0009	1.4070	1.8131	2" I.P.S.
2.375" O.D.	2.288	3.955	5.622	7.288	40	0.6965	1.2040	1.7114	2.2186	60.32 mm

OBSTRUCTION square inches					No. of Fins	OBSTRUCTION mm²				
O.D. or Nominal Pipe Size	Fin Height					Fin Height - mm	O.D. or Nominal	No. of Fins	Fin Height - mm	O.D. or Nominal
	1/4"	1/2"	3/4"	1"		6.35	12.7	19.05	25.4	Pipe Size
3/4" O.D.	0.6215	0.7791	0.9367	1.0943	16	400.97	502.64	604.32	706.00	19.05 mm
7/8" O.D.	0.7810	0.9386	1.0962	1.2538	16	503.87	605.55	707.22	808.90	22.22 mm
	0.8259	1.0229	1.2199	1.4169	20	532.84	659.93	787.03	914.13	
1" O.D.	0.9651	1.1227	1.2803	1.4379	16	622.64	724.32	826.00	927.68	25.4 mm
	1.0100	1.2070	1.4040	1.6010	20	651.61	778.71	905.80	1032.90	
	1.0549	1.2913	1.5277	1.7641	24	680.58	833.10	985.61	1138.13	
3/4" I.P.S.	1.0456	1.2032	1.3608	1.5184	16	674.58	776.26	877.93	979.61	3/4" I.P.S.
1.05" O.D.	1.0905	1.2875	1.4845	1.6815	20	703.55	830.64	957.74	1084.84	26.67 mm
	1.1354	1.3718	1.6082	1.8446	24	732.51	885.03	1037.55	1190.06	
1 1/2" I.P.S.	3.1048	3.3412	3.5776	3.8140	24	2003.09	2155.61	2308.12	2460.64	1 1/2" I.P.S.
1.9" O.D.	3.1946	3.5098	3.8250	4.1402	32	2061.03	2264.38	2467.74	2671.09	48.26 mm
	3.2845	3.6785	4.0725	4.4665	40	2119.03	2373.22	2627.41	2882.61	
2" I.P.S.	4.7894	5.1046	5.4198	5.7350	32	3089.93	3293.28	3496.64	3699.99	2" I.P.S.
2.375" O.D.	4.8793	5.2733	5.6673	6.0613	40	3147.93	3402.12	3656.31	3910.51	60.32 mm

Key to tables:

- A tube of 1" O.D. with 24 fins 1/2" high as a total surface area of 0.079 + 0.610 = 0.689 m²/m
- A tube of 3/4" I.P.S. with 24 fins 1" high has a total surface area of 0.083 + 1.218 = 1.301 m²/m
- A tube of 2" I.P.S. with 40 fins 1/2" high has a total surface area of 0.189 + 1.016 = 1.205 m²/m

TECHNIFIN® TYPE „S“



Standard Size Range Type „S“

Base Tube O.D.:	31.8	-	57 mm
Fin Size:	60	-	145 mm
Fin Pitch:	12.5	-	50 mm
Tube Length:	1	-	10 mm
Fin Thickness:	2	-	3 mm

Field of application

Economisers, Biolers, Heat Exchangers.

Often used in non-corrosive gas streams, minimal resistance to gas flow and the straight gas paths inhibit fouling and ease cleaning.

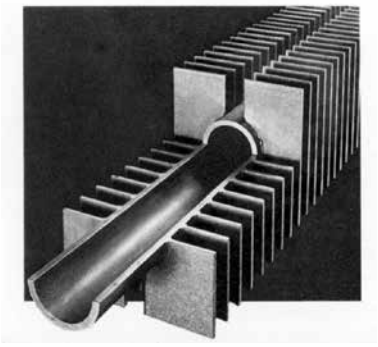
Manufacturing Process

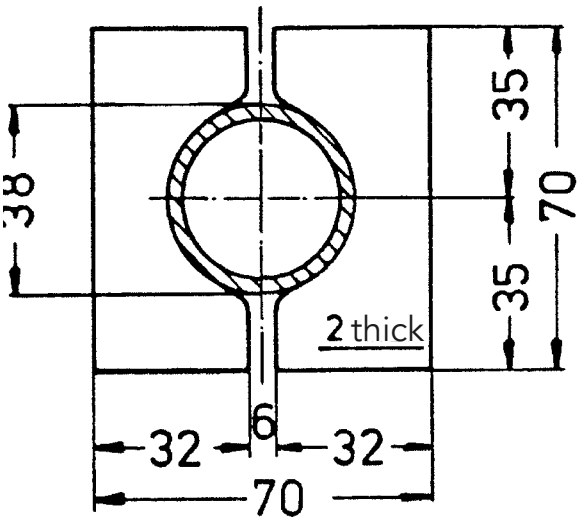
Square or rectangular fins are welded on a steel base tube.
Oxide scale caused by welding on the fins remain on the pipe

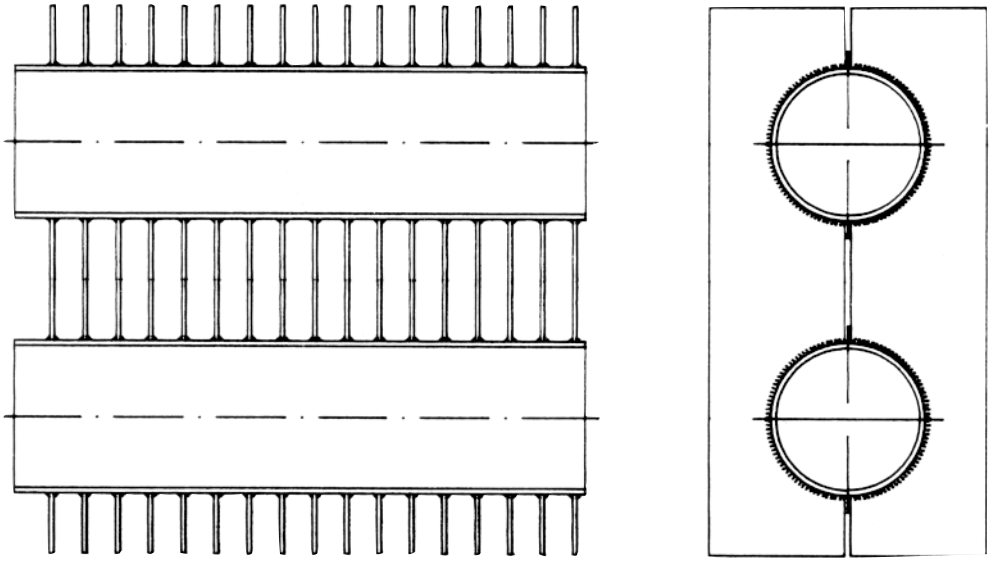
Advantages

High efficiency / Minimum power loss / easy cleaning

EXAMPLE







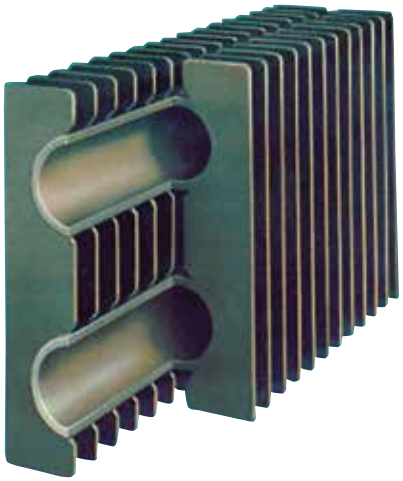
Standard Size Range Type „Double S“

Base Tube O.D.:	31.8	-	57 mm
Fin Size:	60	-	175 mm
Fin Pitch:	10	-	30 mm
Tube Length:	1	-	10 mm
Fin Thickness:	2	-	3 mm

Field of application

Economisers, Boilers, Heat Exchangers.

Often used in non-corrosive gas streams, minimal resistance to gas flow and the straight gas paths inhibit fouling and ease cleaning.



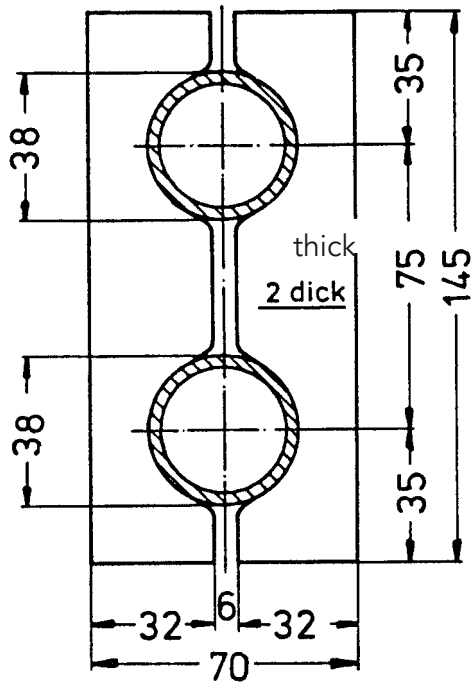
Manufacturing Process

Square or rectangular fins are welded on two steel base tubes.

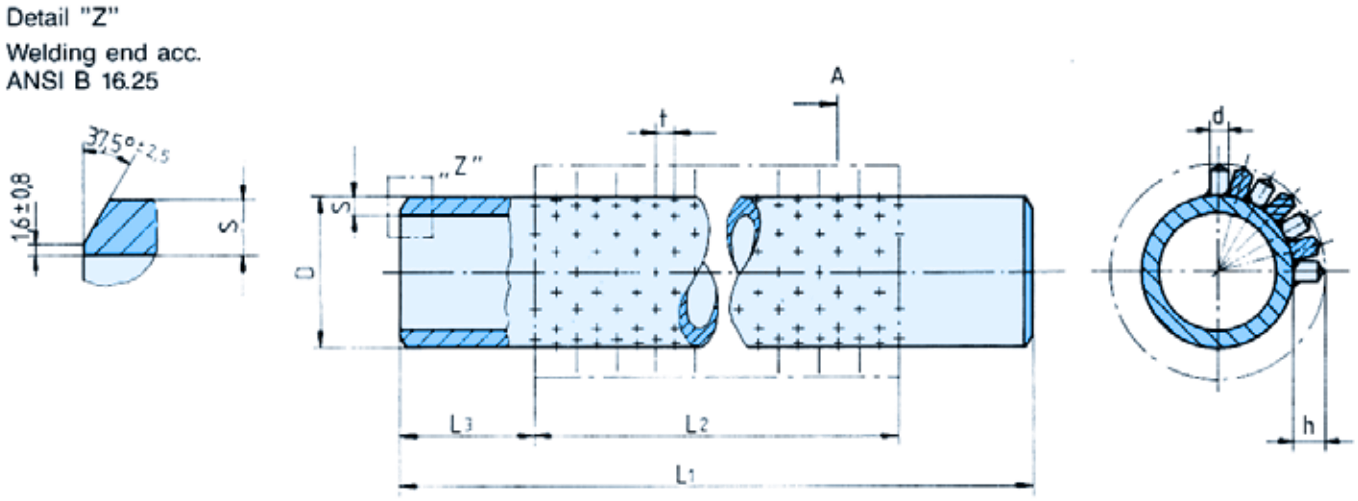
Advantages

High efficiency / Minimum power loss / easy cleaning

EXAMPLE



TECHNISTUD® – STUDDED TUBES



L_1 = max. 24 000 mm
L_2 = max. (L_1 - 2 x L_3 min.)
L_3 = min. 20 mm
h = 12,7 - 63,5 mm
d = 8 - 12,7 mm
t Std. = 15,87 mm ≠ $\frac{63 \text{ Rows}}{1 \text{ Meter}}$ (staggered)

Fa = Studded Outer Tube Surface Area
Fi = Interior Tube Area
Da = Outside Diameter of Tube

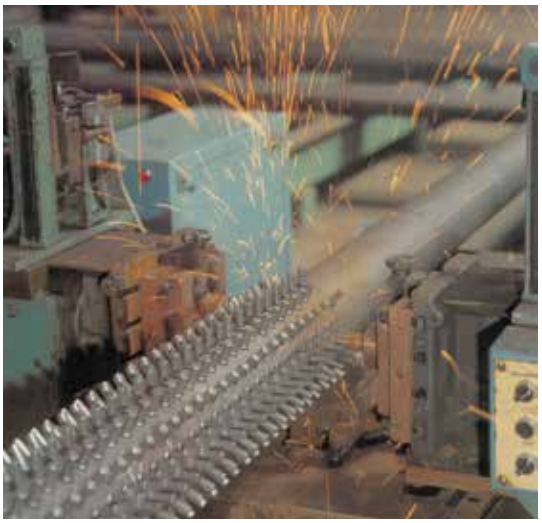
Di = Inside Diameter of Tube
NB = No. of Studs per Row
NRm = No. of Stud Rows per Meter

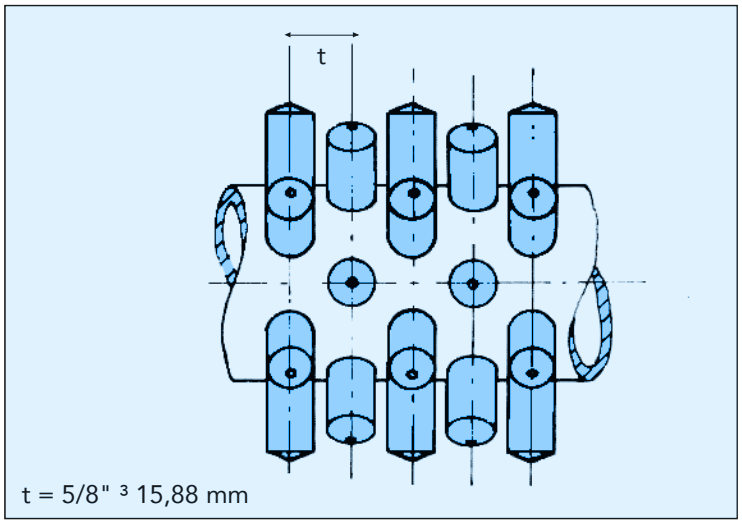
Standard Size Range
See opposite page

Fields of Application
Furnaces-, Chemical-, Petrochemical-Industry, Power stations etc. where liquid media under high pressure are to be heated or cooled.

Advantages
Due to their high rigidity, studded tubes can be used even under extreme temperature and pressure conditions.

Manufacturing Process
Studs are fully automatically welded onto the tube by resistance welding. Oxide scale caused by welding on the studs remain on the pipe.





Standard Size Range

Standard Tube Dimensions*

Outside Diameter		Wallthickness		Max. Number of Studs per Row		Fi	Aspect Ratio** at: NB (max.), T = Stand. d (max.), h (max.)
mm	in.	mm	in.	d = 8 mm	d = 12,7 mm	m²/m	Fi
60,3	2.375	3,9	0.154	9	7	0,165	7,92
73,0	2.875	5,2	0.203	10	8	0,197	7,66
88,9	3.500	5,5	0.216	13	10	0,245	7,66
101,6	4.000	5,7	0.226	15	12	0,283	7,88
114,3	4.500	6,0	0.237	17	13	0,321	7,57
127,0	5.000	4,0	0.156	18	15	0,374	7,47
141,3	5.563	6,6	0.258	21	17	0,402	7,84
152,4	6.000	4,5	0.179	22	18	0,451	7,44
159,0	6.260	4,5	0.179	23	19	0,471	7,49
168,3	6.625	7,1	0.281	25	20	0,484	7,68
219,1	8.625	8,2	0.322	32	26	0,637	7,60

* The Standard Tube Dimensions given in the above table are taken from typical orders. 0f course, we produce studded tubes also with other base tube dimensions in the range 60,3 up to 219,1 mm Outside Diameter.

** Calculation of Aspect Ratio: $\frac{Fi = d \times h \times NB \times NRm + Da}{Di}$

Materials
Base Tube & Studs
Carbon Steels
Low Alloy Steels
Stainless Steels

Length
Up to 24 meters. If necessary with circumferential weld, 100% x-rayed. If required pressure tested.

Studs
Standard Stud row spacing 5/8“ (15,88 mm) = 63 Stud rows per meter, other spacings on request

Type of Studs
Cylindrical, elliptical or lens type

Also exotic material combinations or sizes are possible on request!

TESTING AND PACKING

TESTING AND DOCUMENTATION

Material testing:
- acc. to DIN / EN
- acc. to ASME / ASTM
- other international standards or customer specifications on request

Material documentation:
- acc. to EN 10204/3.1 or EN 10204/3.2

Third Party Inspection:
Material inspection through any independent inspection company like
- TÜV
- Lloyd's Register EMEA
- Germanischer Lloyd
- Bureau Veritas
- SGS Germany

and other customer specified National and International Inspection Authorities

RUST PROTECTION AND PACKING SERVICES

Rust protection: (surface protection for carbon steel and alloy steel)
- dipped in oil
- dipped in dewatering-fluid
- outside varnished

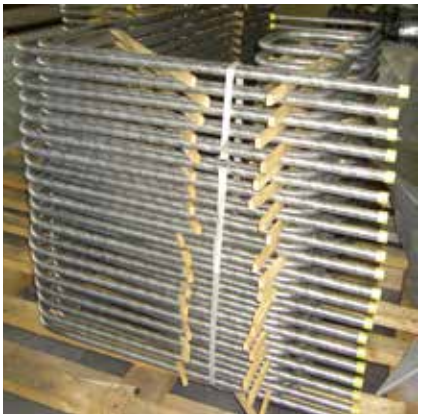
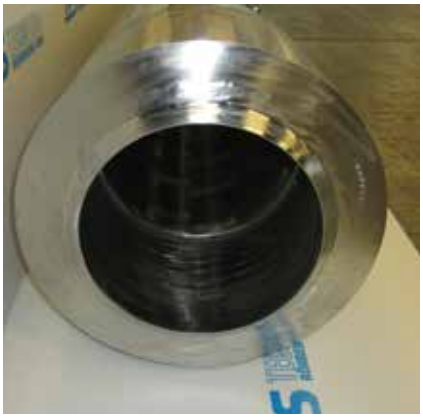
Packing:
- bundled
- wrapped in foil
- ends with plugs or caps on request
- crates
- wooden cases (all wood is ISPM 15 treated)

PIPE ASSEMBLY/SEMI ASSEMBLIES LIKE

- Headers
- Pigtails
- Flanged Pipes
- Longitudinal finned Pipes and Tubes
- Finned Tubes
- Special Forgings
- Special designed parts acc. to drawing
- Welding together possible

IN ALL KIND OF MATERIAL AND COMBINATIONS POSSIBLE:

- Carbon Steel
- Alloy Steel
- Stainless Steel
- Duplex and Superduplex
- Nickel and Nickel Alloys
- Titanium
- Copper Nickel
- Admiralty Brass
- Aluminium Brass




Headquarter


Project Office


Mill 1


Mill 2

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