

LOW FINNED TUBES  
GEWA-K, GEWA-KS



## LOW FINNED TUBES GEWA-K, GEWA-KS



Wieland GEWA-K and GEWA-KS tubes are low finned tubes in copper and copper alloys as well as carbon steel, stainless steel and titanium. They are mainly used in the refrigeration and air-conditioning industry (refrigerant condenser and refrigerant evaporator), in machine and equipment industry (oil and gas cooler), in the process and power industry (cooler, preheater, condenser evaporator and reboiler).

GEWA-K tubes have a plain inner surface. GEWA-KS tubes have grooves on the inner surface for optimum heat transfer.

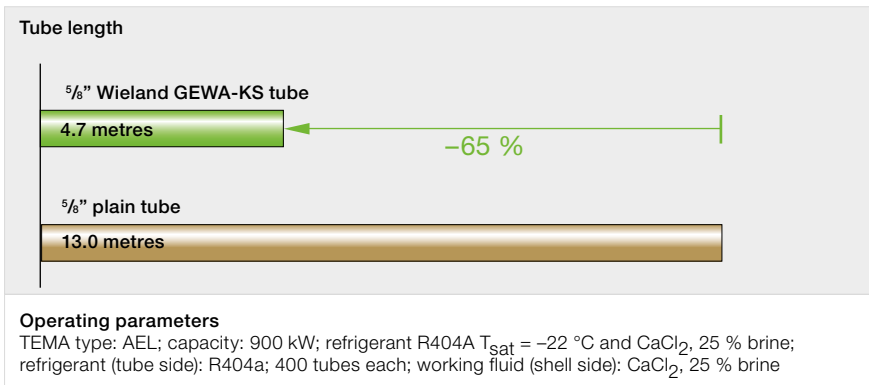
Interesting applications of copper and copper-alloy tubes include dry-expansion evaporators in the air-conditioning and refrigeration industry with tube-side evaporation of safety refrigerants such as R134a, R407C, R404A and shell-side cooling using water and water/glycol mixtures. Further applications are coaxial evaporators, compressed air driers and other heat exchangers (e.g. water/water, oil/water, etc.).



GEWA-K and GEWA-KS tubes in carbon steel and stainless steel are used for various applications in the oil and gas, including refining, petrochemical, chemical and gas-processing as well as power industry. Cost-effective solutions such as compact design, reduction of the number of heat exchangers per unit and process efficiency improvement can be developed for various projects ranging from individual heat exchanger replacement and capacity expansion of existing plants to new plant construction.

A version of the GEWA-K tube with a wide fin spacing of 11 fpi and a fin thickness of 0.95 mm is suitable for very robust solutions, particularly for operating conditions involving corrosion and fouling, e.g. in the refining industry.

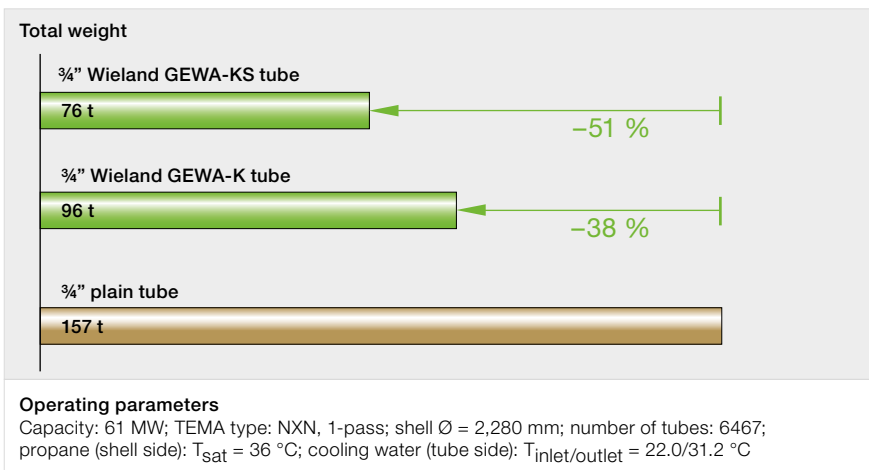
The following three typical applications demonstrate the savingpotential offered by low-finned and especially dual enhanced finned tubes. This cost reduction is multiplied by savings made in the overall design (for example refrigerant and process fluid charges, piping, racks, support structures and foundations).



### DRY-EXPANSION EVAPORATOR

#### Size reduction of dry-expansion evaporator by 65 % through the use of GEWA-KS tubes

Compared to plain tubes, the size of a dry-expansion evaporator can be reduced, at constant capacity, to about one third using Wieland GEWA-KS finned tubes at the operating conditions indicated.



### PROPANE-REFRIGERANT CONDENSER

#### Weight reduction of propane-refrigerant condenser for LNG plant by 50 %

In the construction of large heat-exchanger equipment the use of GEWA-K and GEWA-KS finned tubes, compared to plain tubes, makes it possible to meet the requirements regarding maximum unit size. This advantage is demonstrated for a typical large-scale project in the Persian Gulf where the total weight of the condenser could be halved.

Tube type		1" plain tube, carbon steel	1" GEWA-KS tube carbon steel
		2 heat exchangers (1,300 mm shell $\text{Ø}$ x 4.88 m tube length)	1 heat exchanger (1,500 mm shell $\text{Ø}$ x 6.1 m tube length)
Number of tubes	[pieces]	1,292	1,782
Tube length	[m]	4.8	6.1
Shell-side pressure drop	[kPa]	33.0	16.5
Tube-side pressure drop	[kPa]	63	24
Heat transfer coefficient h	[W/m <sup>2</sup> K]	243	455
<b>Operating parameters</b> Capacity: 2.0 MW; TEMA type: AES; crude oil (tube side): $T_{inlet/outlet} = 25\text{ }^{\circ}\text{C}/29\text{ }^{\circ}\text{C}$ ; Kerosine (shell side): $T_{inlet/outlet} = 47.8\text{ }^{\circ}\text{C}/29.0\text{ }^{\circ}\text{C}$			

### KEROSENE COOLER

#### Reduction of number of heat exchangers by 50 %

For preheating crude oil in a refinery, the number of heat exchangers could be reduced from two to one through the use of GEWA-KS tubes, while at the same time achieving a pressure drop reduction by 50 %.

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## PRODUCTION AND PROCESSING

The fins are obtained by roll forming the outer surface of a plain tube. This process results in an increase in strength of the finned sections, whereas the plain ends and lands remain soft. Soft annealing of the tubes is required if they have to be suitable for bending and coiling.

Tubes in alloys susceptible to stress corrosion cracking such as CuZn28Sn1 or CuZn20Al2 are thermally stress relieved after finning. Heat treatment is also possible for finned tubes made from all other materials for recrystallisation (normalisation) of the structure, GEWA-K finned tubes resist very high mechanical and thermal stress. The fin diameter does not exceed the maximum outside diameter of the plain tube sections at any single point.

## TECHNICAL SERVICE

Our Technical Marketing experts are available at any time as contact partners to work together with your experts from the very early product planning stages in order to obtain optimum results for the manufacturing stage and for your application.

Wieland offers in-house thermal design software for shell-and-tube dry-expansion evaporators with GEWA-KS finned tubes. For details please refer to [www.wieland-thermalsolutions.com](http://www.wieland-thermalsolutions.com).

In addition, tailor-made thermal designs are available from HTRI design software. In case of interest Wieland can provide heat transfer engineering service. Alternatively, for your own designs you may select the option "Wieland GEWA-KS tube" from the HTRI software.

## ADVANTAGES OF GEWA-K AND GEWA-KS TUBES

- Optimised inner to outer surface ratio
- Compact designs through high specific heat capacity
- Enhanced performance through inner structures (GEWA-KS)
- Flexible design possible as bent or coiled heat exchangers

## QUALITY ASSURANCE

To ensure consistent product quality, Wieland-Werke AG has a sophisticated quality control system according to DIN EN ISO 9001 which has been verified and certified by the independent certification company, KIWA International Cert. Since 30 December 2002, our test laboratories in the Central Laboratory and Development Services have been accredited to DIN EN ISO/IEC 17025 and DIN EN ISO 9001 as test and certification laboratories.

## TUBE DIMENSIONS AND SPECIFICATIONS

The tube code system is described in the table tube identification. Weight conversion if not stated otherwise is based on K21 Cu-DHP material. The weight of other copper alloys is weighted accordingly. In case of other materials such as carbon and stainless steel or titanium the reference weight is stated in the individual tables. All weights are approximate values. Actual values depend on the individual specification and the configuration of the tube with plain ends resp. plain lands.

Finned tube ASTM standards are given by B359 for copper and copper alloys, A1012 for austenitic, ferritic and duplex alloys) as well as B891 for titanium.

In case of stainless (austenitic, ferritic and duplex) and titanium tube materials tubes are available both in seamless and welded condition.

The overview of tube dimensions represents the current active portfolio. Other alloys and modifications of tube geometry are available upon request.

## Tube identification

K	26	15	12	080	00
GEWA-K	Number of fins per inch	Fin height in 1/10 mm	Nominal root diameter in mm	Root wall thickness in 1/100 mm	Code number for the inner structure (00 = plain inside surface)

## Weight conversion for copper alloys $G = G_{K21} \cdot f$

Material	f
S28	0.96
S76	0.93
L10, L30	1.00

## Length tolerances

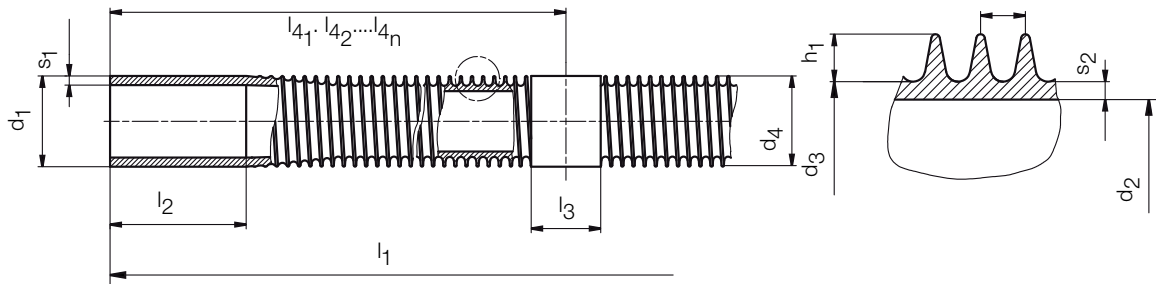
$l_1$	Length tolerance
< 2,000	+2 mm
2,000–8,000	+1 ‰
> 8,000	+0.7 ‰ (min. 8 mm)

## MATERIALS AND PROPERTIES

Material designations				Mechanical properties					Physical properties		
Europe		International		Wieland	Tensile strength, $R_m$	Yield strength, $R_{p0.2}$	Elongation, $A_5$	Hardness	Density	Thermal expansion coefficient	Thermal conductivity
EN Symbol	Standard	UNS / Grade	Standard		(min.)	(min.)					
Copper and copper alloys											
Cu-DHP	EN12452	C12200	ASTM B359	K21	220	40	40	min. 40	8.94	17.7	>310
CuZn28Sn1		C44300		S28	320	100	55	min. 60	8.56	20.0	110
CuZn20Al2		C68700		S76	340	120	55	min. 60	8.35	19.0	100
CuNi10Fe1Mn		C70600		L10	290	90	30	min. 70	8.92	17.0	45
CuNi30Mn1Fe		C71500		L30	370	12	35	min. 85	8.93	16.0	30
Carbon steel alloys											
P235GH	EN10216-2		ASTM A179		360–500	235	25	72 HRB	7.85	13.0	57
P255QL	EN10216-4	Gr. 1, 6	ASTM A334		360–490	255	23	163 HB	7.85	13.0	57
13CrMo4-5	EN10216-2	T11	ASTM A213		430–580	290	22		7.85	18.5	42
X12CrMo5+I	EN10216-2	T5	ASTM A213		440–590	175	20	89 HRB	7.80	19.0	28
Austenitic stainless steel alloys											
1.4306	EN10216-5 EN10217-7	TP304L	ASTM A213 A249		460–680	180	40	90 HRB	7.90	17.0	15
1.4404		TP316L			490–690	190	40	90 HRB	7.98	17.5	15
1.4541		TP321			500–730	200	35	90 HRB	7.90	17.0	15
1.4571		TP316Ti			490–690	190	35	90 HRB	8.00	18.0	15
Ferritic and duplex stainless steel alloys											
1.4510	EN10296-2	TP439	ASTM A268		415	205	20	90 HRB	7.75	10.1	21
1.4462	EN10216-5 EN10217-7	S32205	ASTM A789		665	485	25	290 HBW	7.80	15.0	15
1.4162	EN10216-5 EN10217-7	S32101	ASTM A789		700	530	30	30 HRC	7.80	15.0	15
Titanium											
3.7035	DIN17850	Gr. 2	ASTM B338		345	275–450	20		4.51	9.2	17

Other alloys on request.

# GEWA-K



## SYMBOLS

$A_a$	Outside surface	$l_1$	Overall tube length
$A_i$	Inside surface	$l_2$	Length of plain end
$A_a/A_i$	Surface area ratio (outside to inside surface area within finned section)	$l_3$	Length of plain land
$d_1$	Outside diameter of plain section	$l_4$	Distance between land centre and tube end
$d_2$	Inside diameter of finned section	$l_{41} \cdot l_{42} \dots l_{4n}$	Distance between centre of lands and one and the same tube end
$d_3$	Root diameter	$m$	Fin pitch
$d_4$	Diameter over fins $\leq d_1$	$s_1$	Wall thickness of plain end and plain lands
$h_1$	Fin height outside	$s_2$	Root wall thickness

GEWA-K 11 fins/inch		Fin pitch $m = 2.20$ mm Fin height $h = 1.50$ mm					Average fin thickness $\bar{\delta}_R \approx 0.95$ mm Production length 18 m (max.)				
Tube No.	Material			Plain section			Finned section				Weight (approx.)
	A179	A334	A213 T11 / T5	$d_1$		$s_1$	$d_3$	$s_2$	$A_a$	$A_a/A_i$	$G_{CS}$
				inch	mm	mm	mm	mm	m <sup>2</sup> /m	-	kg/m
K-1115.12150-00	•	•	•	5/8	15.88	2.11	12.70	1.50	0.091	3.00	0.653
K-1115.15150-00	•	•	•	3/4	19.05	2.11	15.90	1.50	0.111	2.74	0.825
K-1115.22220-00	•	•	•	1	25.40	2.77	22.20	2.20	0.152	2.72	1.480
K-1115.22245-00	•	•	•	1	25.40	3.05	22.20	2.45	0.152	2.80	1.590

GEWA-K 19 fins/inch		Fin pitch $m = 1.35$ mm Fin height $h = 1.50$ mm					Average fin thickness $\bar{\delta}_R \approx 0.30$ mm Production length 18 m (max.)						
Tube No.	Material					Plain section			Finned section				Weight (approx.)
	K21	L10	L30	S28	S76	$d_1$		$s_1$	$d_3$	$s_2$	$A_a$	$A_a/A_i$	$G_{K21}$
						inch	mm	mm	mm	mm	m <sup>2</sup> /m	-	kg/m
K-1915.09080-00	•	•				1/2	12.70	1.20	9.50	0.80	0.103	4.15	0.407
K-1915.09090-00	•	•				1/2	12.70	1.30	9.50	0.90	0.103	4.26	0.429
K-1915.09100-00	•	•	•	•	•	1/2	12.70	1.40	9.50	1.00	0.103	4.37	0.450
K-1915.09125-00	•	•	•	•	•	1/2	12.70	1.65	9.50	1.25	0.103	4.68	0.501
K-1915.09150-00	•	•	•	•	•	1/2	12.70	1.90	9.50	1.50	0.103	5.04	0.549
K-1915.12070-00	•					5/8	15.88	1.10	12.70	0.70	0.131	3.69	0.417
K-1915.12080-00	•	•				5/8	15.88	1.20	12.70	0.80	0.131	3.76	0.448
K-1915.12090-00	•	•				5/8	15.88	1.30	12.70	0.90	0.131	3.83	0.479
K-1915.12100-00	•	•	•	•	•	5/8	15.88	1.40	12.70	1.00	0.131	3.90	0.510
K-1915.12110-00	•	•	•	•	•	5/8	15.88	1.50	12.70	1.10	0.131	3.97	0.539
K-1915.12120-00	•	•	•	•	•	5/8	15.88	1.60	12.70	1.20	0.126	3.89	0.561
K-1915.12170-00	•	•	•	•	•	5/8	15.88	2.10	12.70	1.70	0.126	4.31	0.699

GEWA-K 19 fins/inch		Fin pitch $m = 1.35$ mm Fin height $h = 1.50$ mm				Average fin thickness $\delta_R \approx 0.30$ mm Production length 18 m (max.)						Weight (approx.)	
Tube No.	Material					Plain section			Finned section				Weight (approx.) kg/m
	K21	L10	L30	S28	S76	$d_1$		$s_1$	$d_3$	$s_2$	$A_a$	$A_a/A_i$	
						inch	mm	mm	mm	mm	m <sup>2</sup> /m	-	
K-1915.15070-00	•					3/4	19.05	1.20	15.80	0.70	0.154	3.38	0.554
K-1915.15080-00	•					3/4	19.05	1.30	15.80	0.80	0.154	3.43	0.594
K-1915.15090-00	•	•				3/4	19.05	1.35	15.80	0.90	0.154	3.48	0.633
K-1915.15100-00	•	•	•	•	•	3/4	19.05	1.45	15.80	1.00	0.154	3.53	0.673
K-1915.15125-00	•	•	•	•	•	3/4	19.05	1.75	15.80	1.25	0.154	3.66	0.768
K-1915.15140-00	•	•	•	•	•	3/4	19.05	1.90	15.80	1.40	0.154	3.75	0.823
K-1915.15150-00	•	•	•	•	•	3/4	19.05	2.00	15.80	1.50	0.154	3.83	0.814
K-1915.15235-00	•	•	•	•	•	3/4	19.05	2.85	15.80	2.35	0.154	4.42	1.099
K-1915.19100-00	•	•				7/8	22.22	1.50	19.00	1.00	0.183	3.41	0.810
K-1915.19125-00	•	•	•	•	•	7/8	22.22	1.75	19.00	1.25	0.183	3.51	0.927
K-1915.19150-00	•	•	•	•	•	7/8	22.22	2.00	19.00	1.50	0.183	3.62	1.042
K-1915.19170-00	•	•	•	•	•	7/8	22.22	2.20	19.00	1.70	0.183	3.71	1.130
K-1915.19180-00	•	•	•	•	•	7/8	22.22	2.30	19.00	1.80	0.183	3.78	1.120
K-1915.19250-00	•	•	•	•	•	7/8	22.22	3.00	19.00	2.50	0.183	4.16	1.409
K-1915.22125-00	•	•				1	25.40	1.75	22.20	1.25	0.212	3.41	1.087
K-1915.22165-00	•	•	•	•	•	1	25.40	2.15	22.20	1.65	0.212	3.55	1.304
K-1915.22210-00	•	•	•	•	•	1	25.40	2.60	22.20	2.10	0.212	3.75	1.476
K-1915.22250-00	•	•	•	•	•	1	25.40	3.00	22.20	2.50	0.212	3.92	1.673

GEWA-K 19 fins/inch		Fin pitch $m = 1.35$ mm Fin height $h = 1.42$ mm				Average fin thickness $\delta_R \approx 0.30$ mm Production length 18 m (max.)						Weight (approx.)
Tube No.	Material		Plain section			Finned section				Weight (approx.) kg/m		
	A179	A334	$d_1$		$s_1$	$d_3$	$s_2$	$A_a$	$A_a/A_i$			
			inch	mm	mm	mm	mm	m <sup>2</sup> /m	-			
K-1914.12125-00	•	•	5/8	15.88	1.65	12.90	1.25	0.121	3.70	0.507		
K-1914.12165-00	•	•	5/8	15.88	2.10	12.90	1.65	0.121	4.01	0.594		
K-1914.16125-00	•	•	3/4	19.05	1.75	16.00	1.25	0.148	3.49	0.635		
K-1914.16138-00			3/4	19.05	1.80	16.00	1.38	0.148	3.53	0.690		
K-1914.16165-00	•	•	3/4	19.05	2.10	16.00	1.65	0.148	3.71	0.764		
K-1914.16210-00	•	•	3/4	19.05	2.50	16.00	2.10	0.148	3.99	0.900		
K-1914.16235-00	•	•	3/4	19.05	2.75	16.00	2.35	0.148	4.21	0.985		
K-1914.19165-00	•	•	7/8	22.22	2.10	19.20	1.65	0.175	3.50	0.927		
K-1914.19210-00	•	•	7/8	22.22	2.50	19.20	2.10	0.175	3.71	1.099		
K-1914.19240-00	•	•	7/8	22.22	2.80	19.20	2.40	0.175	3.87	1.208		
K-1914.22210-00	•	•	1	25.40	2.50	22.40	2.10	0.203	3.55	1.298		
K-1914.22240-00	•	•	1	25.40	2.80	22.40	2.40	0.203	3.67	1.430		
K-1914.22275-00	•	•	1	25.40	3.15	22.40	2.75	0.203	3.82	1.579		

GEWA-K 26 fins/inch		Fin pitch m = 1.00 mm Fin height h = 1.50 mm				Average fin thickness $\delta_R \approx 0.30$ mm Production length 18 m (max.)							
Tube No.	Material					Plain section			Finned section				Weight (approx.)
	K21	L10	L30	S28	S76	d <sub>1</sub>		s <sub>1</sub>	d <sub>3</sub>	s <sub>2</sub>	A <sub>a</sub>	A <sub>a</sub> /A <sub>i</sub>	G <sub>K21</sub>
						inch	mm	mm	mm	mm	m <sup>2</sup> /m	-	kg/m
K-2615.09080-00	•	•				1/2	12.70	1.20	9.50	0.80	0.129	5.20	0.329
K-2615.09090-00	•	•				1/2	12.70	1.30	9.50	0.90	0.129	5.33	0.351
K-2615.09100-00	•	•	•	•	•	1/2	12.70	1.40	9.50	1.00	0.129	5.47	0.372
K-2615.09125-00	•	•	•	•	•	1/2	12.70	1.65	9.50	1.25	0.129	5.87	0.423
K-2615.09150-00	•	•	•	•	•	1/2	12.70	1.90	9.50	1.50	0.129	6.32	0.471
K-2615.12070-00	•					5/8	15.88	1.10	12.70	0.70	0.167	4.70	0.408
K-2615.12080-00	•	•				5/8	15.88	1.20	12.70	0.80	0.167	4.79	0.440
K-2615.12090-00	•	•				5/8	15.88	1.30	12.70	0.90	0.167	4.88	0.471
K-2615.12100-00	•	•	•	•	•	5/8	15.88	1.40	12.70	1.00	0.167	4.97	0.501
K-2615.12110-00	•	•	•	•	•	5/8	15.88	1.50	12.70	1.10	0.167	5.06	0.531
K-2615.12120-00	•	•	•	•	•	5/8	15.88	1.60	12.70	1.20	0.167	5.04	0.582
K-2615.12170-00	•	•	•	•	•	5/8	15.88	2.10	12.70	1.70	0.167	5.58	0.720
K-2615.15070-00	•					3/4	19.05	1.20	15.80	0.70	0.204	4.51	0.507
K-2615.15080-00	•					3/4	19.05	1.35	15.80	0.80	0.204	4.57	0.547
K-2615.15090-00	•	•				3/4	19.05	1.45	15.80	0.90	0.204	4.64	0.587
K-2615.15100-00	•	•	•			3/4	19.05	1.50	15.80	1.00	0.204	4.71	0.626
K-2615.15150-00	•	•	•	•	•	3/4	19.05	2.00	15.80	1.50	0.204	4.95	0.839
K-2615.15235-00	•	•	•	•	•	3/4	19.05	2.85	15.80	2.35	0.204	5.71	1.125
K-2615.19100-00	•	•				7/8	22.22	1.50	19.00	1.00	0.242	4.53	0.755
K-2615.19125-00	•	•	•	•		7/8	22.22	1.75	19.00	1.25	0.242	4.67	0.872
K-2615.19165-00	•	•	•	•	•	7/8	22.22	2.15	19.00	1.65	0.242	4.91	1.003
K-2615.19180-00	•	•	•	•	•	7/8	22.22	2.30	19.00	1.80	0.242	4.88	1.150
K-2615.19250-00	•	•	•	•	•	7/8	22.22	3.00	19.00	2.50	0.242	5.37	1.439
K-2615.22125-00	•	•				1	25.40	1.75	22.20	1.25	0.281	4.54	1.023
K-2615.22165-00	•	•	•	•	•	1	25.40	2.15	22.20	1.65	0.281	4.73	1.240
K-2615.22210-00	•	•	•	•	•	1	25.40	2.60	22.20	2.10	0.281	4.85	1.510
K-2615.22250-00	•	•	•	•	•	1	25.40	3.00	22.20	2.50	0.281	5.07	1.708

GEWA-K 28 fins/inch		Fin pitch = 0.91 mm Fin height h = 1.245 mm				Average fin thickness $\delta_R \approx 0.30$ mm Production length 18 m (max.)				
Tube No.	Material	Plain section			Finned section				Weight (approx.)	
		TP 439	d <sub>1</sub>		s <sub>1</sub>	d <sub>3</sub>	s <sub>2</sub>	A <sub>a</sub>	A <sub>a</sub> /A <sub>i</sub>	G
	inch		mm	mm	mm	mm	mm	m <sup>2</sup> /m	-	kg/m
K-2813.16125-00	•	3/4	19.05	1.83	16.51	1.25	0.186	4.23	0.636	
K-2813.19125-00	•	7/8	22.22	1.83	19.68	1.25	0.218	4.04	0.763	
K-2813.22125-00	•	1	25.40	1.83	22.86	1.25	0.252	3.94	0.891	



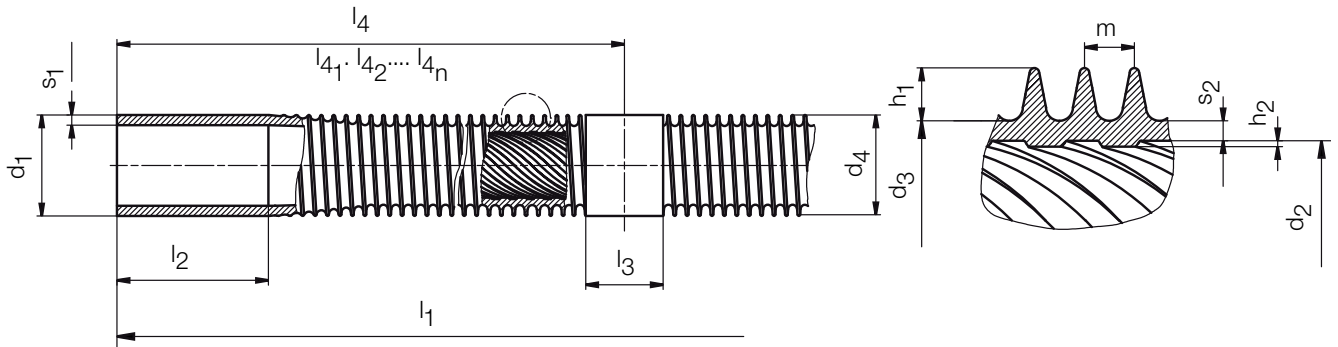
GEWA-K 26 fins/inch		Fin pitch $m = 1.00$ mm Fin height $h = 1.42$ mm				Average fin thickness $\bar{\delta}_R \approx 0.30$ mm Production length 18 m (max.)				
Tube No.	Material		Plain section			Finned section				Weight (approx.)
	A179	A334	$d_1$		$s_1$	$d_3$	$s_2$	$A_a$	$A_a/A_i$	$G_{CS}$
			inch	mm	mm	mm	mm	m <sup>2</sup> /m	-	kg/m
K-2614.09100-00			1/2	12.70	1.40	9.70	1.00	0.118	4.80	0.343
K-2614.12125-00	•	•	5/8	15.88	1.65	12.90	1.25	0.155	4.74	0.525
K-2614.12165-00	•	•	5/8	15.88	2.10	12.90	1.65	0.155	5.09	0.612
K-2614.16125-00			3/4	19.05	1.75	16.00	1.25	0.193	4.60	0.632
K-2614.16165-00	•	•	3/4	19.05	2.10	16.00	1.65	0.193	4.76	0.786
K-2614.16210-00	•	•	3/4	19.05	2.50	16.00	2.10	0.193	5.13	0.922
K-2614.19125-00	•	•	7/8	22.22	1.85	19.20	1.25	0.228	4.40	0.763
K-2614.19200-00	•	•	7/8	22.22	2.40	19.20	2.00	0.228	4.71	1.087
K-2614.19240-00	•	•	7/8	22.22	2.80	19.20	2.40	0.228	4.97	1.233
K-2614.22165-00	•	•	1	25.40	2.10	22.40	1.65	0.263	4.45	1.087
K-2614.22210-00	•	•	1	25.40	2.50	22.40	2.10	0.263	4.55	1.327
K-2614.22240-00	•	•	1	25.40	2.80	22.40	2.40	0.263	4.70	1.460

GEWA-K 28 fins/inch		Fin pitch = 0.91 mm Fin height $h = 0.90$ mm				Average fin thickness $\bar{\delta}_R \approx 0.30$ mm Production length 18 m (max.)				
Tube No.	Material		Plain section			Finned section				Weight (approx.)
	Lean-Duplex 2101	Duplex 2205	$d_1$		$s_1$	$d_3$	$s_2$	$A_a$	$A_a/A_i$	$G$
			inch	mm	mm	mm	mm	m <sup>2</sup> /m	-	kg/m
K-2809.17107-00	•	•	3/4	19.05	1.65	17.25	1.07	0.148	3.12	0.566
K-2809.17125-00	•	•	3/4	19.05	1.83	17.25	1.25	0.148	3.19	0.633
K-2809.17165-00	•	•	3/4	19.05	2.11	17.25	1.65	0.148	3.38	0.774
K-2809.20107-00	•	•	7/8	22.22	1.65	20.43	1.07	0.174	3.03	0.675
K-2809.20125-00	•	•	7/8	22.22	1.83	20.43	1.25	0.174	3.09	0.755
K-2809.20165-00	•	•	7/8	22.22	2.11	20.43	1.65	0.174	3.23	0.927
K-2809.23107-00	•	•	1	25.40	1.65	23.60	1.07	0.198	2.94	0.783
K-2809.23125-00	•	•	1	25.40	1.83	23.60	1.25	0.198	2.99	0.877
K-2809.23165-00	•	•	1	25.40	2.11	23.60	1.65	0.198	3.10	1.080
K-2809.23183-00	•	•	1	25.40	2.41	23.60	1.83	0.198	3.16	1.168

GEWA-K 30 fins/inch		Fin pitch = 0.85 mm Fin height h = 0.90 mm					Average fin thickness $\delta_R \approx 0.30$ mm Production length 18 m (max.)					Weight (approx.)		
Tube No.	Material						Plain section			Finned section				GCS kg/m
	A179	A334	TP 304 L	TP 316 L	TP 316 Ti	Ti Gr. 2	d <sub>1</sub>		s <sub>1</sub>	d <sub>3</sub>	s <sub>2</sub>	A <sub>a</sub>	A <sub>a</sub> /A <sub>l</sub>	
							inch	mm						
K-3009.10125-00			•	•	•		1/2	12.70	1.65	10.90	1.25	0.100	3.79	0.523
K-3009.14107-00	•	•	•	•	•		5/8	15.88	1.65	14.08	1.07	0.127	3.39	0.523
K-3009.14125-00	•	•	•	•	•		5/8	15.88	1.83	14.08	1.25	0.127	3.49	0.580
K-3009.14165-00	•	•	•	•	•		5/8	15.88	2.11	14.08	1.65	0.127	3.75	0.634
K-3009.17107-00			•	•	•		3/4	19.05	1.65	17.25	1.07	0.152	3.20	0.648
K-3009.17125-00			•	•	•		3/4	19.05	1.83	17.25	1.25	0.152	3.28	0.720
K-3009.17165-00	•	•	•	•	•		3/4	19.05	2.11	17.25	1.65	0.152	3.47	0.799
K-3009.17183-00	•	•	•	•	•		3/4	19.05	2.41	17.25	1.83	0.152	3.56	0.909
K-3009.20125-00			•	•	•		7/8	22.22	1.83	20.42	1.25	0.181	3.22	0.860
K-3009.20165-00			•	•	•		7/8	22.22	2.11	20.42	1.65	0.181	3.37	0.946
K-3009.20183-00			•	•	•		7/8	22.22	2.41	20.42	1.83	0.181	3.44	1.090
K-3009.23125-00			•	•	•		1	25.40	1.83	23.60	1.25	0.208	3.14	1.002
K-3009.23165-00			•	•	•		1	25.40	2.11	23.60	1.65	0.208	3.26	1.104
K-3009.23183-00	•	•	•	•	•		1	25.40	2.41	23.60	1.83	0.208	3.32	1.277
K-3009.23211-00	•	•	•	•	•		1	25.40	2.77	23.60	2.11	0.208	3.42	1.468
GEWA-K 30 fins/inch		Fin pitch = 0.850 mm Fin height h = 0.813 mm					Average fin thickness $\delta_R \approx 0.30$ mm Production length max. 18 m					Weight (approx.)		
K-3008.17071-00						•	3/4	19.05	1.25	17.42	0.71	0.144	2.86	0.297
K-3008.23107-00						•	1	25.40	1.65	23.77	1.07	0.194	2.85	0.540

GEWA-K 36 fins/inch		Fin pitch m = 0.705 mm Fin height h = 0.66 mm				Average fin thickness $\delta_R \approx 0.30$ mm Production length 18 m (max.)				Weight (approx.)
Tube No.	Material	Plain section			Finned section					G kg/m
		Ti Gr. 2	d <sub>1</sub>		s <sub>1</sub>	d <sub>3</sub>	s <sub>2</sub>	A <sub>a</sub>	A <sub>a</sub> /A <sub>l</sub>	
			inch	mm						
K-3607.17071-00	•		3/4	19.05	1.25	17.73	0.71	0.145	2.83	0.288
K-3607.24071-00	•		1	25.40	1.25	24.08	0.71	0.195	2.74	0.376
K-3607.24090-00	•		1	25.40	1.47	24.08	0.90	0.195	2.79	0.468
K-3607.24107-00	•		1	25.40	1.65	24.08	1.07	0.195	2.83	0.515

GEWA-K 40 fins/inch		Fin pitch m = 0.64 mm Fin height h = 0.90 mm				Average fin thickness $\delta_R \approx 0.30$ mm Production length 15 m (max.)				Weight (approx.)
Tube No.	Material		Plain section			Finned section				G kg/m
	K21	L10	d <sub>1</sub>		s <sub>1</sub>	d <sub>3</sub>	s <sub>2</sub>	A <sub>a</sub>	A <sub>a</sub> /A <sub>l</sub>	
			inch	mm						
K-4009.17070-00	•	•	3/4	19.00	1.12	17.00	0.70	0.194	3.96	0.495
K-4009.17090-00	•	•	3/4	19.00	1.35	17.00	0.90	0.194	4.06	0.600



NOMENCLATURE

$A_a$	Outside surface	$h_2$	Fin height inside
$A_i$	Inside surface	$l_1$	Overall tube length
$A_a/A_i$	Surface area ratio (outside to inside surface area within finned section)	$l_2$	Length of plain end
$d_1$	Outside diameter of plain section	$l_3$	Length of plain land
$d_2$	Inside diameter of finned section	$l_4$	Distance between land centre and tube end
$d_3$	Root diameter	$l_{41}, l_{42}, \dots, l_{4n}$	Distance between centre of lands and one and the same tube end
$d_4$	Diameter over fins $\leq d_1$	$m$	Fin pitch
$h_1$	Fin height outside	$s_1$	Wall thickness of plain end and plain lands
		$s_2$	Root wall thickness

GEWA-KS		Production length 8 m max. (K21) and 18 m max. (steel)																					
Tube No.	Material			Plain section			Finned section						Weight (approx.)										
	K21	A179 / A334	TP 304L / TP316L / TP316Ti	$d_1$	$s_1$	$h_1$	$d_3$	$s_2$	$h_2$	$A_a$	$A_a/A_i$	G											
													inch	mm	mm	mm	mm	mm	m <sup>2</sup> /m	-	kg/m		
<b>19 fpi</b>																							
K-1908.14070-22	•			5/8	15.88	1.30	0.80	14.1	0.70	0.45	0.091	1.36	0.460										
K-1908.17070-24	•			3/4	19.05	1.35	0.80	17.2	0.70	0.50	0.107	1.28	0.570										
K-1914.16140-53		•		3/4	19.05	2.11	1.40	16.1	1.40	0.20	0.149	2.91	0.785										
K-1915.22240-53		•		1	25.40	3.05	1.50	22.2	2.40	0.35	0.212	2.73	1.470										
<b>30 fpi</b>																							
K-3009.14080-59			•	5/8	15.88	1.47	0.90	14.08	0.80	0.35	0.127	3.24	0.436										
K-3009.14100-59			•	5/8	15.88	1.65	0.90	14.08	1.00	0.35	0.127	3.35	0.497										
K-3009.14120-59			•	5/8	15.88	1.83	0.90	14.08	1.20	0.35	0.127	3.46	0.556										
K-3009.17140-48		•		3/4	19.05	2.11	0.90	17.1	1.40	0.40	0.162	2.81	0.780										
K-3009.17080-59			•	3/4	19.05	1.47	0.90	17.25	0.90	0.35	0.154	3.17	0.525										
K-3009.17107-59			•	3/4	19.05	1.65	0.90	17.25	1.07	0.35	0.154	3.24	0.602										
K-3009.17125-59			•	3/4	19.05	1.83	0.90	17.25	1.25	0.35	0.154	3.32	0.658										
K-3009.23220-48		•		1	25.40	2.80	0.90	23.4	2.20	0.40	0.212	2.71	1.450										

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