



SEAMLESS TUBES FOR BOILER & HIGH TEMPERATURE SERVICE

1. Standards

DIN 17175, EN 10216-2, ASTM A 106, ASTM A179, NF A 49-211, ASTM A210

2. Used for

Construction for: boiler, pipe lines, pressure vessels, equipment for high temperature and pressure, equipment for heat-exchanger and condenser.

3. Dimensions

- Hot finished - ASSEL mill acc. Tab. 1;
- Hot finished - CPE mill acc. Tab. 2;
- Cold rolled - Tab. 3.

4. Tolerances

Standard	Outside Diameter	Wall Thickness	Weight
ASTM A 106 NF A 49-211	OD≤48.3; ±0.40mm 48.3<OD≤114.3; ±0.8mm 114.3<OD≤219.1; +1.6/-0.8mm	+12.5%	+10/-3.5% for any length of pipe
EN 10216-2 hot rolled	±1.0% or ±0.5mm (which is higher)	±12.5% or ±0.4mm (which is higher)	
DIN 17175 hot rolled	OD≤100 ± 0.75% (minimum±0.5mm) 100<OD≤320 ±0.9%	OD ≤130; WT≤ 2Sn; +15/-10% OD ≤130; 2Sn<WT≤4Sn; +12.5/-10% OD ≤130; WT>4Sn; ±9% 130<OD≤320; WT ≤0.05OD; +17.5/-12.5% 130<OD≤320; 0.05OD <WT≤0.11OD; ±12.5% 130<OD≤320; WT>0.11OD; ±10% Sn- Nominal wall thickness according to DIN 2448	+10/-8% for each tube ±7.5% for a lots over 10t
ASTM A210 hot rolled	OD≤101.6+0.4/-0.8mm 101.6<OD≤190.5+0.4/-1.2mm 190.50<OD≤228.6+0.4/-1.6mm	OD≤101.6 and WT≤2.4; +40%/0 OD≤101.6 and 2.4<WT≤3.8; +35%/0 OD≤101.6 and 3.8 <WT≤4.6; +33%/0 OD≤101.6 and WT>4.6; +28%/0 OD>101.6 and 2.4<WT≤3.8; +35%/0 OD>101.6 and 3.8 <WT≤4.6; +33%/0 OD>101.6 and WT>4.6; +28%/0	+16%/0
DIN 17175 cold rolled	OD≤120± 0.6%(minimum±0.25mm) OD>120±0.75%	OD ≤130; WT≤ 2Sn; +15/-10% OD ≤130; 2Sn<WT≤4Sn; +12.5/-10% OD ≤130; WT>4Sn; ±9% 130<OD≤320; WT ≤0.05OD; +17.5/-12.5% 130<OD≤320; 0.05OD <WT≤0.11OD; ±12.5% 130<OD≤320; WT>0.11OD; ±10% Sn - Nominal wall thickness according to DIN 2448	+10/-8% for each tube ±7.5% for a lots over 10t
EN 10216-2 cold rolled	±0.5% or ±0.3mm (which is higher)	±10% or ±0.2 mm (which is higher)	

Standard	Outside Diameter	Wall Thickness	Weight
ASTM A179 and ASTM A210 cold rolled	OD<25.4; ±0.10 25.4<=OD<=38.1; ±0.15 38.1<OD<50.8; ±0.20 50.8>=OD<63.5; ±0.25 63.5>=OD<76.2; ±0.30	OD<=38.1; +20% OD>38.1; +22%	OD<=38.1; +12% OD>38; +13%

5. Chemical Composition (%)

Steel Group	C	Si	Mn	P max	S max	Cr	Mo	Ni
Grade A, TU E275	max 0.25	min 0.10	0.27±0.93	0.035	0.035			
Grade B	max 0.30	min 0.10	0.29±1.06	0.035	0.035			
St35.8, TU E220	max 0.17	0.10±0.35	0.40±0.80	0.040	0.040			
St45.8, TU E250	max 0.21	0.10±0.35	0.40±1.20	0.040	0.040			
P195GH	max.0.13	max.0.35	max.0.70	0.025	0.020	max 0.30	max 0.08	max 0.30
P235GH	max.0.16	max.0.35	max.1.20	0.025	0.020	max 0.30	max 0.08	max 0.30
P265GH	max.0.20	max0.40	max.1.40	0.025	0.020	max 0.30	max 0.08	max 0.30
16Mo3	0.12±0.20	max0.35	0.40±0.90	0.025	0.020	max 0.30	0.25±0.35	max.0.30
13CrMo4-5	0.10±0.17	max0.35	0.40±0.70	0.025	0.020	0.70 ±1.15	0.40±0.60	max.0.30
ASTM A179	0.06±0.18	-	0.27±0.63	0.035	0.035			
Grade A-1	max0.27	min. 0.10	max. 0.93	0.035	0.035			

6. Mechanical Properties

Steel Group	Yield Strength, min.	Tensile Strength	Elongation	Impact	
	N/mm ²	N/mm ²	min. (%)	J	(°C)
Grade A, TU E275	205	min. 330	Calculation acc. to		
Grade B	240	min 415	the wall thickness		
St35.8, TU E220	235	360±480	25		
St45.8, TU E250	255	410±530	21		
P195GH	195	320±440	27	28	-10
P235GH	225	360±500	25	28	-10
P265GH	255	410±570	23	28	-10
16Mo3	270	450±600	22	40	20
13CrMo4-5	290	440±590	22	40	20
ASTM A179	180	325	36	HRB = max 72	
Grade A-1	255	415	30	HRB = max 79	

7. Lengths

- Random lengths: 5÷12m(16.4±39.8 ft);
- Fixed lengths within the random lengths range;
- Tubes under 5m (16.4 ft) will be delivered as multiple lengths;
- Tolerances: +100/-0mm (+3.94/-0 in).

8. Protection

- Unprotected;
- external varnished with black or clear lacquer;
- If required, the tubes can be delivered with plastic caps at both ends.

9. Marking

According to standard or per customer request.

10. Delivery

Bundles up to: - 2000 kg (4400 lbs) - cold drawn tubes;
- 4000 kg (8800 lbs) - hot rolled tubes.

11. Mill test report

Mill test reports are issued to customer requirements. Usually they comply with DIN 50049, EN 10204.

12. Quality certified:

LR, TUV, PED, GL, MLPTL.

Tab. 2.1 HOT ROLLED MECHANICAL TUBES acc. EUROPEAN NORMS - ASSEL MILL

WT	6.3	7.1	8.0	8.8	10.0	11.0	12.5	14.2	16.0	17.5	20.0	22.2	25.0	28.0	30.0	32.0	35.0	36.0	40.0	45.0	50.0	55.0	60
OD	Min-max Length (m)																						
60.3					9-11	9-11	9-11	8-10	7.5-10														
63.5					9.5-11	9-11	8-11	7.2-10	7-10														
70.0					9-10.5	9-11	7-11	6.5-11	6-10	6-10	6-9												
73.0					8-10	7.5-10	7-10.5	6.5-10.5	6-10	5.6-10	5.6-9												
76.1					8-10	7-10	6.5-10	5.8-10.5	5.5-10.5	5.5-10	5.5-9												
82.5					6.9-10.5	6.5-10	5.9-10	5.6-10	5.4-10	5.3-10	4.5-9	5.2-9	5.5-9										
88.9					6.3-10	5.8-10	5.6-10	5.4-10	5.2-10	5.0-10	4.9-9	4.9	4.5-9										
95.0					5.8-10	5.6-10	5.3-10	5.2-9	5.0-9.0	4.8-9.0	4.0-9.0	4.0-9.0	4.0-9.0										
101.6					5.5-7	5-7	4.5-7	4.3-8.0	4.2-8.0	4.0-7.0	4.0-7.0	4.0-7.0	4.0-7.0										
108.0					5.5-7	4.8-7	4.7-7	4.4-8.0	4.1-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.0	4.0-7.0								
114.3					5.5-7	5.0-7	5.0-7.0	4.2-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.0	4.0-7.0	4.0-7.0							
121.0	10-11	9.5-11	9-11	8.5-11	5.5-7.0	5.0-7.0	4.3-7.0	4.2-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.0	4.0-7.0	4.0-7.0	4.0-6.5	4.0-6.5				
127.0	9.5-11	9.0-11	8.5-11	8-11	7.5-11	5.0-7.0	4.5-7.0	4.3-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4-7.5	4.0-7.0	4.0-7.0	4.0-6.5	4.0-6.5				
133.0	9.5-11	9.0-11	8.5-11	8-11	7.5-11	5.0-7.0	4.3-7.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.5					
139.7	9.5-11	9.0-11	8.5-11	8-11	7.5-11	6-9.0	5.0-7.0	4.5-8.0	4.2-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.0	4.0-7.0	4.0-6.5	4.0-6.5				
146.0	9-11	8.5-11	8.0-11	7.5-11	7.5-11	7.0-11	5-7.0	4.5-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.5				
152.4	9-11	8.5-11	8.0-11	7.5-11	7.0-11	6.6-11	4.5-7.0	4.5-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.3				
159.0	9-11	8.0-11	7.5-11	7.5-11	7.0-11	6.5-11	4.5-7.0	4.5-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.5	4.0-6.3			
165.1	9-11	8.6-11	8.0-11	7.5-11	7.0-11	6.7-11	6.4-11	4.5-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.3			
168.3		8.5-11	8.0-11	7.5-11	7.0-11.5	6.5-11.5	6.2-11.5	4.5-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5			
177.8		8.5-11	7.5-11	7.5-11	7.0-11.5	6.5-11.5	6.2-11.5	4.5-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.2		
193.7			8.5-11	7.5-11	7.0-11.5	6.5-11.5	6.2-11	6-10	4.2-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.9	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6	4.0-5.7	
203.0			8.0-11	7.5-11	7.0-11.5	6.5-11.5	6.2-11	6-10	4.2-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.0	
216.0			8.0-11	7.5-11	7.0-11.5	6.5-11	6.2-11	6-10	7-9.0	4.2-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.9	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.3	4.0-5.9
219.1			8.0-11	7.5-11	7.0-11.5	6.5-11	5.8-10.8	6-10	7-9.0	4.2-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.8	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.5	4.0-6.0	4.0-5.7
224.0											4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.0	4.0-7.0	4.0-6.5	4.0-6.0	4.0-5.6
229.0											4.0-8.0	4.0-8.0	4.0-8.0	4.0-8.0	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.5	4.0-7.0	4.0-6.7	4.0-6.2	4.0-5.7	4.0-5.4
244.5														4.5-7.5	4.5-7.5	4.5-7.0	4.5-7	4.5-7	4.0-6.5	4.5-6.5	4.5-6.2	4.5-5.7	4.5-5.4

category H1-OD/WT>12.5 and Mannesmann ASSEL mill;

category H2-OD>=60 and reducing mill;

polygonal appearance

category H4-OD/WT<4 and calibrating mill;

category H3- 4<OD/WT<12.5 and calibrating mill;

Notes:

1. Intermediate sizes are available as follow:

- for OD<82,5 and OD/WT<12.5, any time
- for OD<82,5 or OD/WT>12.5, subject of agreement before ordering

2. Weight: $We=10.68 (OD-WT) \times WT$ [lbs/ft]
 $We=0.0246615 \times (OD-WT) \times WT$ [kg/m]

Tab. 2.2 HOT ROLLED MECHANICAL TUBES acc. EUROPEAN NORMS - CPE MILL

WT	mm	2.3	2.6	2.77	2.87	2.9	3.2	3.6	3.91	4	4.5	5	5.5	6.02	6.3	7.1	7.62	8.0	8.56	8.8	9.5	10.0	11.0	11.13	
	in	0.091	0.102	0.109	0.113	0.114	0.126	0.142	0.154	0.157	0.177	0.197	0.217	0.237	0.248	0.280	0.300	0.315	0.337	0.346	0.375	0.394	0.433	0.438	
OD		Min-max. Length (m)																							
mm	in																								
21.3	0.839	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12																
26.7	1.051	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12															
26.9	1.059	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12															
30.0	1.181		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12														
31.8	1.252		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12													
33.4	1.315		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12													
33.7	1.327		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12												
38.0	1.496		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12											
42.2	1.661		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12										
42.4	1.669		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12									
48.3	1.902		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12								
51.0	2.008		6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12							
54.0	2.126					6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12					
57.0	2.244					6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12				
60.3	2.374					6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12
63.5	2.500					6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12
70.0	2.756					6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12
73.0	2.874					7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13
76.1	2.996					7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13
82.5	3.248						7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13
88.9	3.500						6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12
95.0	3.740							7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13
101.6	4.000							7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13
108.0	4.252							7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13
114.3	4.500							7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13	7÷13
121.0	4.760														6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12	6÷12

HP1	-rolling R1 (OD<33.7)
HP2	- rolling R1 or R2 (OD>=33.7, WT<3)
HP3	- rolling R1 or R2 (OD>=33.7 and OD/WT>=10)
HP4	- rolling R1 or R2 (OD>=33.7 and OD/WT<10)

 Polygonal appearance

Tab.3 Dimensions and Tolerances – Precision tubes acc.DIN 2391 & EN 10305 & ASTM A179

WT			mm	1.5	1.8	2.0	2.2	2.5	2.8	3.0	3.5	4.0	4.5
			in	0.059	0.071	0.079	0.087	0.098	0.110	0.118	0.138	0.157	0.177
OD			ID										
mm	in	toler.											
15.88	0.625	±.08	12.88±.08	12.28±.15	11.88±.15	11.48±.15	10.88±.15						
17.1	0.673	±.08	14.1±.08	13.5±.08	13.1±.08	12.7±.15	12.1±.15						
19.05	0.750	±.08	16.05±.08	15.45±.08	15.05±.08	14.65±.15	14.05±.15	13.45±.15					
20	0.787	±.08	17±.08	16.4±.08	16±.08	15.6±.08	15±.15	14.4±.15	14±.15	13±.15	12±.15	11±.15	
22	0.866	±.08	19±.08	18.4±.08	18±.08	17.6±.08	17±.08	16.4±.15	16±.15	15±.15	14±.15	13±.15	
25.4	1.000	±.08	22.4±.08	21.8±.08	21.4±.08	21±.08	20.4±.08	19.8±.15	19.4±.15	18.4±.15	17.4±.15	16.4±.15	
28	1.102	±.08	25±.08	24.4±.08	24±.08	23.6±.08	23±.08	22.4±.08	22±.15	21±.15	20±.15	19±.15	
30	1.181	±.08	27±.08	26.4±.08	26±.08	25.6±.08	25±.08	24.4±.08	24±.15	23±.15	22±.15	21±.15	
32	1.260	±.15		28.4±.15	28±.15	27.6±.15	27±.15	26.4±.15	26±.15	25±.15	24±.15	23±.15	
35	1.378	±.15			31±.15	30.6±.15	30±.15	29.4±.15	29±.15	28±.15	27±.15	26±.15	
38	1.496	±.15						32.4±.15	32±.15	31±.15	30±.15	29±.15	
40	1.575	±.15							34±.15	33±.15	32±.15	31±.15	
42	1.654	±.20							36±.20	35±.20	34±.20	33±.20	
45	1.772	±.20							39±.20	38±.20	37±.20	36±.20	
48	1.890	±.20							42±.20	41±.20	40±.20	39±.20	
50	1.969	±.20							44±.20	43±.20	42±.20	41±.20	
55	2.165	±.25							49±.25	48±.25	47±.25	46±.25	
60	2.362	±.25									52±.25	51±.25	
65	2.559	±.30									57±.30	56±.30	
70	2.756	±.30									62±.30	61±.30	

WT			mm	5	5.5	6	7	8	9	10	12	14
			in	0.197	0.217	0.236	0.276	0.315	0.354	0.394	0.472	0.551
OD			ID									
mm	in	toler.										
20	0.787	±.08	10±.15									
22	0.866	±.08	12±.15									
25.4	1.000	±.08	15.4±.15	14.4±.15	13.4±.15							
26	1.024	±.08	16±.15	15±.15	14±.15	12±.15						
28	1.102	±.08	18±.15	17±.15	16±.15	14±.15	12±.15					
30	1.181	±.08	20±.15	19±.15	18±.15	16±.15	14±.15					
32	1.260	±.15	22±.15	21±.15	20±.15	18±.15	16±.15					
35	1.378	±.15	25±.15	24±.15	23±.15	21±.15	19±.15	17±.15	15±.15			
38	1.496	±.15	28±.15	27±.15	26±.15	24±.15	22±.15	20±.15	18±.15			
40	1.575	±.15	30±.15	29±.15	28±.15	26±.15	24±.15	22±.15	20±.15			
42	1.654	±.20	32±.20	31±.20	30±.20	28±.20	26±.20	24±.20	22±.20			
45	1.772	±.20	35±.20	34±.20	33±.20	31±.20	29±.20	27±.20	25±.20			
48	1.890	±.20	38±.20	37±.20	36±.20	34±.20	32±.20	30±.20	28±.20			
50	1.969	±.20	40±.20	39±.20	38±.20	36±.20	34±.20	32±.20	30±.20			
55	2.165	±.25	45±.25	44±.25	43±.25	41±.25	39±.25	37±.25	35±.25	31±.30		
60	2.362	±.25	50±.25	49±.25	48±.25	46±.25	44±.25	42±.25	40±.25	36±.30		
65	2.559	±.30	55±.30	54±.30	53±.30	51±.30	49±.30	47±.30	45±.30	41±.30		
70	2.756	±.30	60±.30	59±.30	58±.30	56±.30	54±.30	52±.30	50±.30	46±.30		
75	2.953	±.35	65±.35	64±.35	63±.35	61±.35	59±.35	57±.35	55±.35	51±.35		
80	3.150	±.35	70±.35	69±.35	68±.35	66±.35	64±.35	62±.35	60±.35	56±.35	52±.35	
85	3.346	±.40	75±.40	74±.40	73±.40	71±.40	69±.40	67±.40	65±.40	61±.40	57±.40	
90	3.543	±.40	80±.40	79±.40	78±.40	76±.40	74±.40	72±.40	70±.40	66±.40	62±.40	
95	3.740	±.45			83±.45	81±.45	79±.45	77±.45	75±.45	71±.45	67±.45	
100	3.937	±.45			88±.45	86±.45	84±.45	82±.45	80±.45	76±.45	72±.45	
110	4.331	±.50				96±.50	94±.50	92±.50	90±.50	86±.50	82±.50	

WT		mm	7	8	9	10	12	14	16	18	20
		in	.079	.087	.098	.110	.118	.138	.157	.177	.197
OD			ID								
mm	in	toler.									
120	4.724	±.50	106±.50	104±.50	102±.50	100±.50	96±.50	92±.50	88±.50	84±.50	
130	5.118	±.70	116±.70	114±.70	112±.70	110±.70	106±.70	102±.70	98±.70	94±.70	
140	5.512	±.70	126±.70	124±.70	122±.70	120±.70	116±.70	112±.70	108±.70	104±.70	
150	5.906	±.80		134±.80	132±.80	130±.80	126±.80	122±.80	118±.80	114±.80	
160	6.299	±.80				140±.80	136±.80	132±.80	128±.80	124±.80	120±.80
170	6.693	±.90				150±.90	146±.90	142±.90	138±.90	134±.90	130±.90
180	7.087	±.90				160±.90	156±.90	152±.90	148±.90	144±.90	140±.90
190	7.480	±1.0				170±1.0	166±1.0	162±1.0	158±1.0	154±1.0	150±1.0
200	7.874	±1.0					176±1.0	172±1.0	168±1.0	164±1.0	160±1.0
210	8.268	±1.2							178±1.2	174±1.2	170±1.2

- Notes:**
1. Tolerances from above table are available on by in BK, BK+S condition.
 2. Intermediate sizes can be produced subject of agreement before ordering.