Hollow bar

Grades

Sandvik	AISI (UNS)	W.-Nr./EN	Chemical composition, % C	Cr	Ni	Mo	Others
Sanmac 4305	303	1.4305	≤0.035	18	9	–	–
Sanmac 304/304L	304/304L	1.4301/1.4307	≤0.030	18.5	9.5	–	–
Sanmac 316/316L	316/316L	1.4401/1.4404	≤0.030	16.5	11	2.1	–
Sanmac 4435	316/316L	1.4436/1.4435	≤0.030	17.5	12.5	2.6	–
Sanmac 4571	(316Ti)	1.4571	0.03	17	11	2.1	Ti
Sanmac SAF 2205	S31803	1.4462	≤0.030	22	5.5	3.2	N

Tolerances

OD	ID	Straightness
+2/-0 % but min. +1/-0 mm	+0/-2 % but min. +0/-1 mm ID 230 and 300 mm: +0.5/-0 mm	Straightness 1.5 mm/m

Standards

Test certification for hollow bar in stock

Sanmac 304/304L, EN 1.4301/1.4307
Sanmac 316/316L, EN 1.4401/1.4404
OD 32-250 mm
DIN 17456 [1)], DIN 17458 TC1 [1)]
NFA 49-317
PED 97/23/EC
EN 10216-5 TC1, EN 10294-2 [2)]
IC-test EN ISO 3651-2A in delivery condition
NACE MR-0175/ISO 15156

OD 275 mm and larger
ASTM A479, ASTM A276
ASME SA479
EN 10088-3, EN 10294-2 [2)]
NACE MR 0175/ISO 15156
IC-test ASTM A262 Pr. E

Sanmac 4571, EN 1.4571
DIN 17456 [2)], DIN 17458 TC1 [1)]
NFA 49-317
PED 97/23/EC
EN 10216-5 TC1, EN 10294-2 [2)]
IC-test EN ISO 3651-2A in delivery condition

Sanmac SAF 2205, EN 1.4462
Heat analysis and mechanical properties
acc. to Sandvik data sheet.
EN 10294-2 [2)]
Corrosion test acc to ASTM G 48, Method A.
Impact test (t ≥6 mm)
Micrographic test (400X)
NACE MR 0175/ISO 15156

IC = Intergranular Corrosion.

1) The leakage test is deferred to the finished component.
2) The European standard for hollow bar expected to be implemented during 2010.

Hollow bar

Order example:

THB-Sanmac304L-32-20

THB

● = Stock size

○ = Produced to order

OD	ID	Average weight	Guaranteed component sizes [1] Chucked true to the OD Max. OD	Chucked true to the OD Min. ID	Chucked true to the ID Max. OD	Chucked true to the ID Min. ID	EN 1.4305 Sanmac 4305	EN 1.4301/4307 Sanmac 304L	EN 1.4404 Sanmac 316L	EN 1.4435 Sanmac 4435	EN 1.4571 Sanmac 4571	EN 1.4462 Sanmac SAF 2205
mm	mm	kg/m	mm	mm	mm	mm						
32	20	4.2	31.0	21.9	30.1	21.0	○	●	●	○	●	○
32	16	5.1	31.0	18.0	30.0	17.0	○	●	●	○	●	○
36	25	4.5	35.0	26.9	34.1	26.0	○	●	●	○	●	○
36	20	5.9	35.0	22.0	34.0	21.0	○	●	●	○	●	○
36	16	6.8	35.0	18.1	33.9	17.0	○	●	●	○	●	○
40	28	5.5	39.0	29.9	38.1	29.0	○	●	●	○	●	○
40	25	6.5	39.0	27.0	38.0	26.0	○	●	●	○	●	○
40	20	7.8	39.0	22.1	37.9	21.0	○	●	●	○	●	○
45	32	6.7	44.0	33.9	43.1	33.0	○	●	●	○	●	○
45	28	8.2	44.0	30.0	43.0	29.0	○	●	●	○	●	●
45	20	10.5	44.0	22.2	42.8	21.0	○	●	●	○	●	○
50	36	8.0	49.0	38.0	48.0	37.0	○	●	●	○	●	○
50	32	9.7	49.0	34.1	47.9	33.0	○	●	●	○	●	○
50	25	12.1	49.0	27.2	47.8	26.0	○	●	●	○	●	●
56	40	10.2	55.0	42.0	54.0	41.0	○	●	●	○	●	○
56	36	12.1	55.0	38.1	53.9	37.0	○	●	●	○	●	○
56	28	15.2	55.0	30.3	53.7	29.0	○	●	●	○	●	●
60	40	13.2	58.8	42.3	57.7	41.0	○	○	○	○	●	○
63	50	9.9	62.0	51.9	61.1	51.0	○	●	●	○	●	○
63	45	12.2	62.0	47.0	61.0	46.0	○	●	●	○	●	○
63	40	15.4	62.0	42.2	60.8	41.0	○	●	●	○	●	●
63	36	17.3	62.0	38.3	60.7	37.0	○	●	●	○	●	○
63	32	19.0	62.0	34.4	60.6	33.0	○	●	●	○	●	●
71	56	12.9	69.9	58.0	68.9	57.0	○	●	●	○	●	○
71	45	19.6	69.9	47.3	68.6	46.0	○	●	●	○	●	●
71	40	22.3	69.9	42.4	68.5	41.0	○	●	●	○	●	○
71	36	24.1	69.9	38.5	68.4	37.0	○	●	●	○	●	●
75	60	13.7	73.8	62.0	72.8	61.0	○	●	●	○	○	○
75	50	21.1	73.8	52.2	72.6	51.0	○	●	●	○	○	○
75	40	26.0	73.8	42.5	72.3	41.0	○	●	●	○	●	●
80	63	16.4	78.8	65.0	77.8	64.0	○	●	●	○	●	○
80	50	25.3	78.8	52.4	77.4	51.0	○	●	●	○	●	●
80	45	28.3	78.8	47.5	77.3	46.0	○	●	●	○	●	○
80	40	30.9	78.8	42.6	77.2	41.0	○	●	●	○	●	●
85	67	18.5	83.7	69.1	82.6	68.0	○	●	●	○	○	○
85	55	26.8	83.7	57.4	82.3	56.0	○	●	●	○	○	○
85	45	33.5	83.7	47.6	82.1	46.0	○	●	●	○	●	○
90	71	20.6	88.6	73.1	87.6	72.1	○	●	●	○	●	○
90	63	27.1	88.6	65.3	87.3	64.0	○	●	●	○	●	●
90	56	32.3	88.6	58.5	87.1	57.0	○	●	●	○	●	○
90	50	36.1	88.6	52.6	87.0	51.0	○	●	●	○	●	●
95	75	23.0	93.5	77.3	92.4	76.2	○	●	●	○	○	○
95	67	29.9	93.5	69.3	92.2	68.0	○	●	●	○	○	○
95	50	42.1	93.5	52.7	91.8	51.0	○	●	●	○	●	●
100	80	24.4	98.5	82.3	97.4	81.2	○	●	●	○	●	○
100	71	32.7	98.5	73.4	97.2	72.1	○	●	●	○	●	●
100	63	39.2	98.5	65.5	97.0	64.0	○	●	●	○	●	●
100	56	42.3	98.5	58.7	96.8	57.0	○	●	●	○	●	○

[1] The values indicated are valid for lengths less than 2.5 times the outside diameter.

Cont.

Hollow bar

Order example:
THB-Sanmac304L-32-20

● = Stock size
○ = Produced to order

THB

OD	ID	Average weight	Guaranteed component sizes 1) Chucked true to the OD		Chucked true to the ID		EN 1.4305 Sanmac 4305	EN 1.4301/4307 Sanmac 304L	EN 1.4404 Sanmac 316L	EN 1.4435 Sanmac 4435	EN 1.4571 Sanmac 4571	EN 1.4462 Sanmac SAF 2205
			Max. OD	Min. ID	Max. OD	Min. ID						
mm	mm	kg/m	mm	mm	mm	mm						
106	80	32.3	104.4	82.5	103.1	81.2	○	●	●	○	●	●
106	71	40.6	104.4	73.5	103.0	72.1	○	●	●	○	●	●
106	63	47.1	104.4	65.7	102.7	64.0	○	●	●	○	●	○
106	56	52.1	104.4	58.9	102.5	57.0	○	●	●	○	●	●
112	90	30.2	110.3	92.5	109.2	91.4	○	●	●	○	●	○
112	80	40.6	110.3	82.6	108.9	81.2	○	●	●	○	●	●
112	71	48.8	110.3	73.7	108.7	72.1	○	●	●	○	●	○
112	63	55.3	110.3	65.8	108.5	64.0	○	●	●	○	●	●
118	90	39.0	116.2	92.7	114.9	91.4	○	●	●	○	●	●
118	80	49.4	116.2	82.8	114.6	81.2	○	●	●	○	●	●
118	71	57.6	116.2	73.8	114.5	72.1	○	●	●	○	●	○
118	63	64.2	116.2	66.0	114.2	64.0	○	●	●	○	●	○
125	100	38.3	123.1	102.7	121.9	101.5	○	●	●	○	●	○
125	90	49.8	123.1	92.8	121.7	91.4	○	●	●	○	●	●
125	80	60.2	123.1	82.9	121.4	81.2	○	●	●	○	●	○
125	71	68.5	123.1	74.0	121.2	72.1	○	●	●	○	●	●
132	106	42.0	130.0	108.8	128.8	107.6	○	●	●	○	●	●
132	90	61.1	130.0	93.0	128.4	91.4	○	●	●	○	●	●
132	80	71.5	130.0	83.1	128.1	81.2	○	●	●	○	●	○
132	71	79.7	130.0	74.2	127.9	72.1	○	●	●	○	●	○
140	112	47.8	137.9	115.0	136.6	113.7	○	●	●	○	●	●
140	100	63.3	137.9	103.1	136.3	101.5	○	●	●	○	●	●
140	90	74.9	137.9	93.2	136.1	91.4	○	●	●	○	●	○
140	80	85.2	137.9	83.3	135.8	81.2	○	●	●	○	●	○
150	125	47.4	147.7	128.1	146.5	126.9	○	●	●	○	●	○
150	106	74.2	147.7	109.3	146.0	107.6	○	●	●	○	●	●
150	95	87.7	147.7	98.4	145.7	96.4	○	●	●	○	●	○
150	80	103.3	147.7	83.6	145.3	81.2	○	●	●	○	●	●
160	132	56.2	157.6	135.3	156.3	134.0	○	●	●	○	●	○
160	122	71.6	157.6	125.4	156.0	123.8	○	●	●	○	●	○
160	112	85.8	157.6	115.5	155.8	113.7	○	●	●	○	●	●
160	90	112.9	157.6	94.0	155.2	91.4	○	●	●	○	○	●
170	140	63.8	167.4	143.5	166.0	142.1	○	●	●	○	●	●
170	130	80.2	167.4	133.6	165.8	132.0	○	●	●	○	●	○
170	128	80.8	167.4	131.6	165.7	130.0	○	○	○	○	○	●
170	118	98.4	167.4	121.7	165.5	119.8	○	●	●	○	●	○
170	106	114.7	167.4	109.8	165.2	107.6	○	●	●	○	●	○
170	100	122.3	167.4	103.9	165.0	101.5	○	●	●	○	○	○
180	150	68.4	177.3	153.6	176.0	152.3	○	●	●	○	●	○
180	140	86.1	177.3	143.7	175.7	142.1	○	●	●	○	○	○
180	125	110.0	177.3	128.9	175.3	126.9	○	●	●	○	●	●
180	100	144.4	177.3	104.1	174.7	101.5	○	●	●	○	○	○
190	160	73.0	187.1	163.8	185.7	162.4	○	●	●	○	●	●
190	150	91.9	187.1	153.9	185.5	152.3	○	●	●	○	●	○
190	140	109.9	187.1	144.0	185.3	142.1	○	○	○		●	○
190	132	123.0	187.1	136.0	185.1	134.0	○	●	●	○	●	●

1) The values indicated are valid for lengths less than 2.5 times the outside diameter.

Cont.

Hollow bar

Order example:

THB-Sanmac316L-275-200

● = Stock size

○ = Produced to order

THB

OD	ID	Average weight	Guaranteed component sizes [1] Chucked true to the OD Max. OD	Min. ID	Chucked true to the ID Max. OD	Min. ID	EN 1.4305 Sanmac 4305	EN 1.4301/4307 Sanmac 304L	EN 1.4404 Sanmac 316L	EN 1.4435 Sanmac 4435	EN 1.4571 Sanmac 4571	EN 1.4462 Sanmac SAF 2205
mm	mm	kg/m	mm	mm	mm	mm						
200	170	77.6	197.0	173.9	195.6	172.6	○	●	●	○	○	○
200	160	97.6	197.0	164.0	195.4	162.4	○	●	●	○	●	●
200	150	117.0	197.0	154.1	195.2	152.3	○	●	●	○	○	○
200	140	134.0	197.0	144.2	194.9	142.1	○	●	●	○	●	○
212	170	109.0	208.8	174.2	207.2	172.6	○	●	●	○	●	●
212	150	148.0	208.8	154.4	206.6	152.3	○	●	●	○	○	○
212	130	182.0	208.8	134.6	206.2	132.0	○	●	●	○	●	●
224	180	121.0	220.6	184.4	218.9	182.7	○	●	●	○	●	○
224	140	199.0	220.6	144.8	217.9	142.1	○	●	●	○	●	○
236	190	133.0	232.4	194.6	230.7	192.9	○	●	●	○	●	○
236	150	216.0	232.4	155.0	229.7	152.3	○	●	●	○	●	●
250	200	153.0	246.2	204.9	244.3	203.0	○	●	●	○	●	●
275	200	247	270.6	205.5	268.4	203.1	○	○	●	○	○	○
300	200	340	295.5	206.1	292.4	203.1	○	○	●	○	○	○
340	200	507	334.9	207.1	330.8	203.1	○	○	●	○	○	○
380	230	609	374.3	237.8	369.5	233.5	○	○	●	○	○	○
400	300	478	394.0	307.6	390.9	304.5	○	○	●	○	○	○
420	300	585	413.7	308.6	410.1	304.5	○	○	●	○	○	○

[1] The values indicated are valid for lengths less than 2.5 times the outside diameter.
Other dimensions >420 mm OD but max 485 mm OD are produced to order.