

# BOCCAR

STAHL TOTAL





**BOCAR GMBH**  
JOSEF BAUMAN-STR. 21  
44805 BOCHUM  
TEL.: +49 234/978 887 -0



# Fittings

ASTM- ASME- STANDARD

Standard	Classification	Materials	
Dimension: $\frac{1}{2}'' - 72''$ Thickness: SCH 5 – H XXS	Carbon Steel	ASTM A 234 - WPB / WPC	
<b>acc. to ANSI B 16.9 / B 16.25</b>  - Elbows - LR 45°; 90°; 180° - Tees - Red. Tees - Concentric Reducers - Eccentric Reducers - Caps - Stub Ends	Low Alloy Steel	ASTM A 234 - WP1 ASTM A 234 - WP5 ASTM A 234 - WP9 ASTM A 234 - WP11 ASTM A 234 - WP12 ASTM A 234 - WP22 ASTM A 234 - WP91	
	Steel for Low Temp. Service	ASTM A 420 - WPL 3 ASTM A 420 - WPL 6	
	<b>acc. to ANSI B 16.28</b>  - Elbows - SR 45°; 90°; 180°	Stainless Steel	ASTM A 403 - WP 304 / 304 L (H) ASTM A 403 - WP 316 / 316 L (H) ASTM A 403 - WP 310 S / 317 L ASTM A 403 - WP 321 / 321 H ASTM A 403 - WP 347 / 347 H ASTM A 403 - WP 904 L
		Duplex-Steel	ASTM A 815 - Duplex 2205 ASTM A 815 - Super Duplex Cr25
		Ni-Alloy Steel	ALLOY -20, -59, -200 MONEL - 400 INCONEL - 600, 601, 625 INCOLLOY - 800, 825

## Certificate:

Certification acc. to: EN 10204 - 3.1 and 3.2 third party inspection by

- Lloyd's Reg. of Shipping ( LRS )

- TÜV , - DNV , - GL

acc. to PED 97/23/EC

acc. to ASME - NACE MR 0175

EN\_04/v02



**BOCAR GMBH**

# Fittings

ASTM- ASME- STANDARD

Standard	Classification	Materials	
Dimension: $\frac{1}{2}$ " - 16" Thickness: SCH STD - XXS Class: 3000, 6000, 9000 lbs	Carbon Steel	ASTM A 105 N	
<b>Forged Steel Fittings</b> acc. to ASME / ANSI 16.11 MSS SP-79; -83; -95; -97 BS 3799	Low Alloy Steel	ASTM A 182 - F 5 ASTM A 182 - F 9 ASTM A 182 - F 11 ASTM A 182 - F 22 ASTM A 182 - F 91	
	Steel for Low Temp. Service	ASTM A 350 - LF 2	
	- Elbows 45°; 90° - Tees - Reducers - Caps - Crosses - Couplings - Half Couplings - Weldolets - Elbolets	Stainless Steel	ASTM A 182 - F 304 / F 304 L ASTM A 182 - F 309 ASTM A 182 - F 310 ASTM A 182 - F 316 / F 316 L ASTM A 182 - F 317 L ASTM A 182 - F 321 ASTM A 182 - F 347 ASTM A 182 - F 904 L
		Duplex Steel	ASTM A 182 - F51 (Duplex ) ASTM A 182 - F55 (SuperDuplex)
		Ni-Alloy Steel	ALLOY -20, -59, -200 MONEL - 400 INCONEL - 600, 601, 625 INCOLLOY - 800, 825
<b>Certificate:</b> Certification acc. to EN 10204 - 3.1 and 3.2 third party inspection by - Lloyd's Reg. of Shipping ( LRS ) - TÜV , - DNV , - GL acc. to PED 97/23/EC acc. to ASME - NACE MR 0175			



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# Flanges

ASTM- ASME- STANDARD

Standard	Classification	Materials
<b>Dimension:</b> ½" – 72" <b>Thickness:</b> Sch 5 - XXS <b>Class:</b> 150, .... , 2500 lbs	Carbon Steel	A 105 N
	Steel for Low Temp. Service	A 350 Grade LF 2 A 350 Grade LF 3
<b>ASTM - ANSI B 16.5</b> - ANSI B 16.47 - MSS SP-44 - API 605 - BS 2393	Low Alloy Steel	A 182 Grade F 5 A 182 Grade F 6 A 182 Grade F 9 A 182 Grade F 11 A 182 Grade F 12 A 182 Grade F 22 A 182 Grade F 91
- Welding Neck Flange - Blind Flange - Slip-On Flange - Socket Welding Flange - Long Welding Neck - Threaded Flange - Lap Joint Flange	High Yield Carbon Steel	ASTM A 694 F 42 ASTM A 694 F 44 ASTM A 694 F 52 ASTM A 694 F 65
<b>ASTM / ANSI B 16.36</b> - Orifice Flange	Stainless Steel	A 182 Grade F 304 / F 304 L A 182 Grade F 310 A 182 Grade F 316 / F 316 L A 182 Grade F 321 A 182 Grade F 347 A 182 Grade F 904 L
	Duplex Steel	A 182 F 51 (Duplex) A 182 F 53 / F 55 (Super-Duplex)
	Ni-Alloy Steel	ALLOY - 20 MONEL - 400 INCONEL – 600, 601, 625 INCOLLOY – 800, 825
<b>Certificate:</b> Certification acc. to EN 10204 - 3.1 and 3.2 third party inspection by <ul style="list-style-type: none"> <li>- Lloyd's Reg. of Shipping ( LRS )</li> <li>- TÜV , - DNV , - GL</li> <li>acc. to PED 97/23/EC</li> <li>acc. to ASME - NACE MR 0175</li> </ul>		



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# Pipes & Tubes

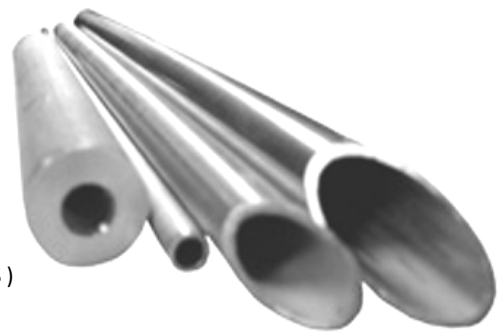
## ASTM- ASME- STANDARD

Standard	Classification	Materials
Dimension: $\frac{1}{2}'' - 72''$ Thickness: Sch 5 - XXS	Carbon Steel	ASTM A 106 Grade B / C
acc. to <b>ANSI B36.10 / B36.19</b> <b>ASTM A 312 / A 269</b> <b>ASTM A 530 / A 999</b>	Low Alloy Steel	ASTM A 335 - P1 ASTM A 335 - P5 ASTM A 335 - P9 ASTM A 335 - P11 ASTM A 335 - P12 ASTM A 335 - P22 ASTM A 335 - P91
	Steel for Low Temp. Service	ASTM A 333 Grade 6
- seamless - welded	Stainless Steel	ASTM A 312 - TP 304 , 304 L ASTM A 312 - TP 316 , 316 L ASTM A 312 - TP 310 S ASTM A 312 - TP 317 L ASTM A 312 - TP 321 ASTM A 312 - TP 347 ASTM A 312 - TP 904 L
	Duplex Steel	A 790 Duplex 2205 / 1.4462 A 790 SuperDuplex Cr25/ 1.4501
	Ni-Alloy Steel	ALLOY -20, -59, -200 MONEL – 400 INCONEL – 600, 601, 625 INCOLLOY – 800, 825

### Certificate:

Certification acc. to: EN 10204 - 3.1 and 3.2 third party inspection by  
 - Lloyd's Reg. of Shipping ( LRS )  
 - TÜV , - DNV , -GL  
 acc. to PED 97/23/EC  
 acc. to ASME - NACE MR 0175

EN\_07/v02



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# Rohre

Maßstabelle gemäß ASTM


Nominal Pipe Size	Outside Diameter	Schedule 10	Schedule 20	Schedule 30	STD	Schedule 40	Schedule 60	Schedule XS	Schedule 80	Schedule 100	Schedule 120	Schedule 140	Schedule 160	Schedule XXS	Schedule 5S	Schedule 10S	Schedule 40S	Schedule 80S																						
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm																					
		kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m	kg/m																					
1/4"	13.7				2.24	0.63	2.24	0.63		3.02	0.80	3.02	0.80			1.65	0.49	2.24	0.63	3.02	0.80																			
3/8"	17.1				2.31	0.84	2.31	0.84		3.20	1.10	3.20	1.10			1.65	0.63	2.31	0.84	3.20	1.10																			
1/2"	21.3				2.77	1.27	2.77	1.27		3.73	1.62	3.73	1.62			4.78	1.95	7.47	2.55	1.65	0.80	2.11	1.00	2.77	1.27	3.73	1.62													
3/4"	26.7				2.87	1.69	2.87	1.69		3.91	2.20	3.91	2.20			5.56	2.90	7.82	3.64	1.65	1.03	2.11	1.28	2.87	1.69	3.91	2.20													
1"	33.4				3.38	2.50	3.38	2.50		4.55	3.24	4.55	3.24			6.35	4.24	9.09	5.45	1.65	1.29	2.77	2.08	3.38	2.50	4.55	3.24													
1 1/4"	42.2				3.56	3.39	3.56	3.39		4.85	4.47	4.85	4.47			6.35	5.61	9.70	7.77	1.65	1.65	2.77	2.70	3.56	3.39	4.85	4.47													
1 1/2"	48.3				3.68	4.05	3.68	4.05		5.08	5.41	5.08	5.41			7.14	7.25	10.15	9.56	1.65	1.90	2.77	3.11	3.68	4.05	5.08	5.41													
2"	60.3				3.91	5.44	3.91	5.44		5.54	7.48	5.54	7.48			8.74	11.11	11.07	13.44	1.65	2.40	2.77	3.93	3.91	5.44	5.54	7.48													
2 1/2"	73				5.16	8.63	5.16	8.63		7.01	11.41	7.01	11.41			9.53	14.92	14.02	20.39	2.11	3.70	3.05	5.26	5.16	8.63	7.01	11.41													
3"	88.9				5.49	11.29	5.49	11.29		7.62	15.27	7.62	15.27			11.13	21.35	15.24	27.68	2.11	4.50	3.05	6.45	5.49	11.29	7.62	15.27													
3 1/2"	101.6				5.74	13.57	5.74	13.57		8.08	18.63	8.08	18.63							2.11	5.20	3.05	7.40	5.74	13.57	8.08	18.63													
4"	114.3				6.02	16.07	6.02	16.07		8.56	22.32	8.56	22.32			13.49	33.54	17.12	41.03	2.11	5.84	3.05	8.36	6.02	16.07	8.56	22.32													
5"	141.3				6.55	21.77	6.55	21.77		9.53	30.97	9.53	30.97			15.88	49.11	19.05	57.43	2.77	9.47	3.40	11.57	6.55	21.77	9.53	30.97													
6"	168.3				7.11	28.26	7.11	28.26		10.97	42.56	10.97	42.56			18.26	67.56	21.95	79.22	2.77	11.32	3.40	13.84	7.11	28.26	10.97	42.56													
8"	219.1				6.35	33.3	7.04	36.8	8.18	42.55	8.18	42.55	10.31	53.08	12.70	64.64	12.70	64.64	15.09	75.92	18.26	90.44	20.62	100.9	23.01	111.20	22.23	107.90												
10"	273				6.35	41.8	7.80	51	9.27	60.31	9.27	60.31	12.70	81.55	12.70	81.55	15.09	96.01	18.26	114.7	21.44	133.00	25.40	155.1	28.58	172.30	25.40	155.10	3.40	22.63	4.19	27.78	9.27	60.31	12.70	81.55				
12"	323.8				6.35	49.7	8.38	65.20	9.53	73.88	10.31	79.73	14.27	108.90	12.70	97.46	17.48	132.00	21.44	159.9	25.4	186.90	28.58	208.1	33.32	238.70	25.40	186.90	3.96	31.25	4.57	36.00	9.53	73.88	12.70	97.46				
14"	355.6				6.35	54.7	7.92	67.90	9.53	81.3	11.13	94.55	15.09	126.70	12.70	107.30	19.05	158.10	23.83	194.9	27.79	224.60	31.75	253.5	35.71	281.70			3.96	34.36	4.78	41.30	9.53	81.33	12.70	107.30				
16"	406.4				6.35	62.6	7.92	77.8	9.53	93.3	9.53	93.27	12.7	123.30	16.66	160.10	12.70	133.30	21.44	203.50	26.19	245.5	30.96	286.60	36.53	333.1	40.49	365.30	4.19	41.56	4.78	47.30	9.53	93.27	12.70	123.30				
18"	457.2				6.35	70.6	7.92	87.71	11.1	122.30	9.53	105.10	14.27	155.80	19.05	205.70	12.70	139.10	23.83	254.50	29.36	309.6	34.93	363.50	36.67	408.2	45.24	459.30	4.78	46.81	4.78	53.26	9.53	105.10	12.70	139.10				
20"	508				6.35	78.6	9.53	117.10	12.70	155.10	9.53	117.10	15.09	183.40	20.62	247.80	12.70	155.10	26.19	311.10	32.54	381.5	38.1	441.40	44.45	508.1	50.01	564.80	4.78	59.25	5.54	68.60	9.53	117.10	12.70	155.10				
22"	558.8				6.35	86.5	9.53	129.10	12.70	171.00	9.53	129.10			22.23	294.20	12.70	171.00	29.58	373.80	34.93	451.40	41.28	527.00	47.63	600.6	53.90	672.20	4.78	65.24	5.54	75.53	9.53	129.10	12.70	171.00				
24"	609.6				6.35	94.5	9.53	141.10	14.3	209.60	9.53	141.10	17.48	255.40	24.61	355.20	12.70	187.00	30.96	442.00	38.89	547.70	46.02	640.00	52.37	720.1	59.54	808.20	5.54	82.47	6.35	94.53	9.53	141.10	12.70	187.00				
26"	660				7.92	127.30	12.70	202.70		9.53	152.80					12.70	202.70														9.53	152.80	12.70	202.70						
28"	711				7.92	137.30	12.70	218.60	15.9	271.20	9.53	164.80				12.70	218.60														9.53	164.80	12.70	218.60						
30"	762				7.92	147.20	12.70	234.60	15.9	291.10	9.53	176.80				12.70	234.60													6.35	118.30	7.92	147.20	14.70	234.60					
32"	813				7.92	157.20	12.70	250.60	15.9	312.10	9.53	188.80	17.48	342.90			12.70	250.60												9.53	188.80	12.70	250.60							
34"	864				7.92	167.20	12.70	266.60	15.9	332.10	9.53	200.30	17.48	364.90			12.70	266.60												9.53	200.30	12.70	266.60							
36"	914				7.92	176.90	12.70	282.20	15.9	351.70	9.53	212.50	19.05	420.40			12.70	282.20												9.53	212.50	12.70	282.20							

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# Fastening

## ANSI- ASME- STANDARD

Standard	Classification	Materials
Dimension: $\frac{1}{2}'' - 5''$ Thread acc. to Class - 2A	<b>Steel for High Temp. Service</b>	ASTM A 193 Grade B5 ASTM A 193 Grade B6 ASTM A 193 Grade B7 ASTM A 193 Grade B7M ASTM A 193 Grade B8 , B8C ASTM A 193 Grade B8M , B8T ASTM A 193 Grade B16
<b>ANSI B 16.5</b> Bolts , Stud bolts		
<b>ANSI B 18.2.1</b> Hexagon heads bolts		ASTM A 194 Grade 2H , 2HM ASTM A 194 Grade 4 ASTM A 194 Grade 7 , 7M ASTM A 194 Grade 8
<b>ANSI B 18.2.2</b> Hexagon Nuts		
<b>ANSI B 18.3</b> Socket Cap,Shoulder, Screws Hex and Spline Keys	<b>Steel for Low Temp. Service</b>	ASTM A 320 Grade L7 , L7A ASTM A 320 Grade L7B ASTM A 320 Grade LC7 ASTM A 320 Grade L43 ASTM A 320 Grade B8 , B8C ASTM A 320 Grade B8T , B8F ASTM A 320 Grade B8M
	<b>Others.....</b>	A 182 Duplex 2205 / 1.4462 A 182 SuperDuplex Cr25/ 1.4501 ALLOY 20 MONEL – 400 INCONEL – 600, 601, 625 INCOLLOY – 800, 825 TITAN Grade II
<b>Coating:</b> - PTFE ( Xylan ) - Hot Dip Galv - CADMIUM - Zine	<b>Corrosion</b> 3000 hur 370 hur 240 hur 150 hur	
<b>Certificate:</b> Certification acc. to EN 10204 - 3.1 and 3.2 third party inspection by - Lloyd's Reg. of Shipping ( LRS ) - TÜV , - DNV , - GL acc. to PED 97/23/EC acc. to ASME - NACE MR 0175		

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# Examination

## ASTM - STANDARD

Tests	Standard	
<b>Leak Test: (LT)</b>	<b>ASTM E 432</b>	Selection of Leak Testing Method
	<b>ASTM E 515</b>	Standard Test Method for Leaks Using Bubble Emission Techniques (Dichtheitsprüfung mit Blasenaustrittsverfahren)
	<b>ASTM E 1003</b>	Standard Test Method for Hydrostatic Leak Testing (Dichtheitsprüfung mit Wasser)
<b>Radiographic Examination: (RT)</b>	<b>ASTM E 94</b>	Standard Guide for Radiographic Examination
<b>Liquid Penetrant Examination: (ET)</b>	<b>ASTM E 165</b>	Standard Test Method for Liquid Penetrant Examination (Farbeindringprüfung)
<b>Hardness Test:</b>	<b>ASTM E 10</b>	Test Method for Brinell Hardness of Metallic Materials
	<b>ASTM E 18</b>	Test Method for Rockwell Hardness of Metallic Materials
	<b>ASTM E 92</b>	Test Method for Vickers Hardness of Metallic Materials

# Corrosion-Resistant Alloys (CRA)

Alloy Designation	ASTM	BS	BS Material Wst. Nr.	DIN Designation	Trade Name
Nickel 200	UNS N02200	3074 / NA 11	2.4066	Ni 99.2	
Nickel 201	UNS N02201	3074 / NA 12	2.4068	LC-Ni 99	
Alloy 400	UNS N04400	3074 / NA 13	2.4360	NiCu 30 Fe	MONEL 400
Alloy 600	UNS N06600	3074 / NA 14	2.4816	NiCr 15 Fe	INCONEL 600
Alloy 800	UNS N08810	3074 / NA 15	1.4876	X 10 Ni-Cr-ALTi 32 20	INCOLOY 800
Alloy 825	UNS N08825	3074 / NA 16	2.4858	NiCr 21 Mo	INCOLOY 825
Alloy DS (330)	UNS N08330	3074 / NA 17	1.4864	X 12 NiCr-Si 36 16	
Alloy K-500	UNS N05500	3074 / NA 18	2.4375	NiCu 30 Al	MONEL K-500
Alloy 75	UNS N06601		2.4951	NiCr 20 Ti	
Alloy 601	UNS N06601		2.4851	NiCr 23 Fe	INCONEL 601
Alloy 625	UNS N06625		2.4856	Ni Cr 22 Mo 8 Nb	INCONEL 625
904L	UNS N08904		1.4539	X1 Ni-Cr-MoCuN 25	CRONIFER 1925 LC
Alloy C-276	UNS N10276		2.4819	NiMo 16Cr15W	HASTELLOY C-276
Alloy C-22	UNS N06022		2.4602	Ni-Cr 21Mo 14 W	HASTELLOY C-22
Alloy C-4	UNS N06455		2.4610	Ni Mo 16 Cr 16 Ti	HASTELLOY C-4
Alloy B-2	UNS N10665		2.4617	Ni Mo 28	B-2
Alloy G-3	UNS N06985		2.4619	Ni Cr 22 Mo 7 Cu	G-3
Titan Gr. 1			3.7025		TITANIUM GR-1
Titan Gr. 2			3.7035		TITANIUM GR-2
Alloy 2205	UNS S31803		1.4462		DUPLEX STEEL
	UNS S32750				SUPER DUPLEX STEEL
	UNS S32760				SUPER DUPLEX STEEL
	UNS S31250				250 SMO
	UNS S31254				254 SMO
	UNS S31256				256 SMO
	UNS S34565		1.4565		REMANIT 45655

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# Examination

## ASTM - STANDARD

Tests	Standard
<b>Corrosion Test:</b>	<b>ASTM G 48</b> Standard Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution
	<b>ASTM G 36</b> Standard Practice for Evaluating Stress-Corrosion-Cracking Resistance of Metals and Alloys in a Boiling Magnesium Chloride Solution
	<b>ASTM G 35</b> Standard Practice for Determining the Susceptibility of Stainless Steels and Related Nickel-Chromium-Iron Alloys to Stress-Corrosion Cracking in Polythionic Acids
	<b>ASTM B 117</b> Standard Practice for Operating Salt Spray (Fog) Apparatus
	<b>ASTM A 262 - A</b> Intergranular Corrosion Test - Oxalic Acid Test, Practice A (Oxalic Acid Etch)
	<b>ASTM A 262 - B</b> Intergranular Corrosion Test - Ferric Sulfate-Sulfuric Acid, Practice B (Streicher Test)
	<b>ASTM A 262 - C</b> Intergranular Corrosion Test - Nitric Acid, Practice C (Huey Test)
	<b>ASTM E 381</b> Macro corrosion test
<b>Impact Test:</b>	<b>ASTM E 19</b> Charpy impact test method for metallic materials
	<b>ASTM E 23</b> Test Methods for Notched Bar Impact Testing of Metallic Materials

# Examination

## ASTM - STANDARD

Tests	Standard
<b>Magnetic Particle Test:</b>	
	<b>ASTM E 709</b> Standard Guide for Magnetic Particle Testing
<b>Ultrasonic Test: (UT)</b>	
	<b>ASTM E 213</b> Standard Practice for Ultrasonic Examination of Metal Pipe and Tubing
	<b>ASTM A 435</b> Standard Specification for Straight-Beam Ultrasonic Examination of Steel Plates
	<b>ASTM A 388</b> Ultrasonic Examination of Heavy Steel Forgings
<b>Eddy Current Examination:</b>	
	<b>ASTM E 309</b> Standard Practice for Eddy-Current Examination of Steel Tubular Products Using Magnetic Saturation
	<b>ASTM E 426</b> Standard Practice for Electromagnetic Examination of Seamless and Welded Tubular Products, Austenitic Stainless Steel and Similar Alloys
<b>Tensile Test:</b>	
	<b>ASTM E 8</b> Test Methods for Tension Testing of Metallic Materials
	<b>ASTM E 21</b> Standard Test Methods for Elevated Temperature Tension Tests of Metallic Materials
<b>Mechanical Test:</b>	
	<b>ASTM E 112</b> These test methods cover the measurement of average grain size

# Fittings

## DIN- EN- ISO- STANDARD

Standard	DIN - Materials	EN - Materials
Dimension: <b>10 - 3500 mm</b> Thickness: 1 - 80 mm	<b>DIN 17175</b> St 35.8 I + III	<b>EN 10216-2</b> P235 GH – TC 1, TC2, TR1 P265 GH - TC1, TC2 16Mo3 – TC1 +N , TC2 +N 10CrMo 9-10 – TC2 +N 13CrMo4-5 – TC2 +N
<b>DIN 2605</b> - Elbows 45°, 90°; 180°	15Mo3 10CrMo 910 13CrMo44	
<b>DIN2615</b> - Tees	<b>DIN 17175</b> X10CrMoVNb9-1 X20CrMoV12-1	X20CrMoV11-1 X20CrMoNiV11-1
<b>DIN 2616</b> - Concentric Reducers - Eccentric Reducers		<b>EN 10216-3</b> P275 NL1 , NL2 P355 N , NH , NL1 P460 N
<b>DIN 2617</b> - Caps		
<b>DIN 2618</b> - Saddles	<b>DIN 17177</b> TTSt 35N / 1.1101  10Ni14 / 1.5637  Duplex 2205 / 1.4462 SuperDuplex Cr25 / 1.4501 ALLOY 20 MONEL – 400 INCONEL – 600, 601, 625 INCOLLOY – 800, 825 TITAN Gr. II	<b>EN 10216-4</b> P215 NL / 1.0451 P265 NL / 1.0453 12Ni14 / 1.5637

### Certificate:

Certification acc. to EN 10204 - 3.1 and 3.2 third party inspection by

- Lloyd's Reg. of Shipping ( LRS )
- TÜV , - DNV , - GL
- acc. to PED 97/23/EC
- acc. to ASME - NACE MR 0175

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# Flanges

## DIN- EN- ISO- STANDARD

### Standard

### DIN - Materials

### EN - Materials

#### Dimension:

DN 10 – DN2000

**DIN 17243**

C 22.8 / 1.0460

#### Carbon and low alloy steel

**EN 10222-2**

P250 GH / 1.0460

P280 GH / 1.0426

#### Pressure rating:

PN 6 – PN 250

15Mo3 / 1.5415

13CrMo44 / 1.7335

16Mo3 / 1.5415

13CrMo4-5 / 1.7335

11CrMo 9-10 / 1.7383

X10CrMoVNb9-1 / 1.4903

X20CrMoV11-1 / 1.4922

#### DIN – Flanges:

DIN 2527

DIN 2566

DIN 2573

DIN 2576

DIN 2632

DIN 2633

DIN 2634

DIN 2635

#### Carbon and low alloy steel for high & low temp. service

**DIN 17103**

TStE 355 / 1.0546

**EN 10222-4**

P285 NH / 1.0477

**DIN 17102**

WStE 355 / 1.0565

P285 QH / 1.0478

P355 NH / 1.0565

P355 QH / 1.0571

#### Stainless Steel

#### EN – Flanges:

EN 1092-1

**EN 10222-5**

1.4301 / 1.4306

1.4541 / 1.4547

1.4404

1.4571

1.4435 / 1.4436

1.4462 / Duplex

1.4410 / SuperDuplex

1.4529 / 1.4539

#### ISO – Flanges:

ISO 7005-1

#### Ni- Alloy Steel

ALLOY 20

MONEL – 400

INCONEL – 600, 601, 625

INCOLLOY – 800, 825

TITAN Grade II

#### Heat- and acid- resistant

1.4876 / DIN SEW 470

1.4828

1.4841

#### Certifikate:

Certification acc. to EN 10204 - 3.1 and 3.2 third party inspection by:

- Lloyd's Reg. of Shipping ( LRS )

- TÜV , - DNV , - GL

acc. to PED 97/23/EC

acc. to ASME - NACE MR 0175

EN\_21/v02



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# Pipes & Tubes

## DIN- EN- ISO- STANDARD

### Standard

### DIN - Materials

### EN - Materials

Dimension: 10 - 2000 mm  
 Thickness: 1 - 80 mm

Seamless acc. to standards  
 - DIN 17458  
 - EN 10216  
 - ISO 1127

Welded acc. to standards  
 - DIN 17457  
 - EN 10217  
 - ISO 1127

#### Carbon & low alloy steel boiler tubes

**DIN 17175**

St 35.8 I - III

ST 45.8

15 Mo 3

10CrMo 910

13CrMo44

X10CrMoVNb9-1

X20CrMoV12-1

**EN 10216-2**

P 235 GH

P 265 GH

16 Mo 3

10CrMo9-10

13CrMo4-5

X20CrMoV11-1

X20CrMoNiV11-1

**EN 10216-3**

P 275 NL1, NL2

P 355 N, NH, NL1

P460 N

#### Carbon & low alloy steel boiler tubes for low temp. service

**DIN 17177**

TTSt 35 N / 1.1101

10Ni14 / 1.5637

**EN 10216-4**

P 215 NL / 1.0451

P 265 NL / 1.0453

12Ni14 / 1.5637

#### Others.....

Duplex 2205 / 1.4462

Super Duplex Cr25 / 1.4501

ALLOY 20

MONEL – 400

INCONEL – 600, 601, 625

INCOLLOY – 800, 825

TITAN Gr. II

#### Certificate:

Certification acc. to: EN 10204 - 3.1 and 3.2 third party inspection by:

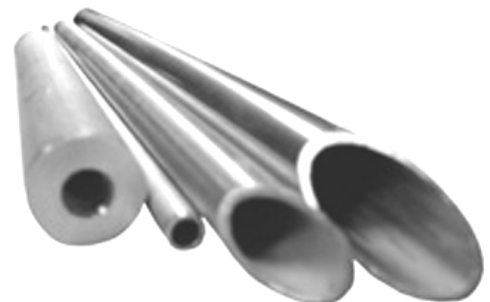
- Lloyd's Reg. of Shipping ( LRS )

- TÜV , - DNV , - GL

acc. to PED 97/23/EC

acc. to ASME - NACE MR 0175

EN\_22/v02



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# Screws

DIN- EN- ISO- STANDARD

Standard	Classification	Material
Dimension: <b>M 6 – M 140</b>	<b>DIN EN 10269</b>	1.1181 C 35 E
	Application at extreme Temp.	1.1191 C 45 E
		1.7218 25CrMo4
DIN 444 Eye Bolts		1.7709 21CrMoV5-7
DIN 582 Lifting Eye Nuts		1.7711 40CrMoV4-7
DIN 797 Anchor Bolts		1.4923 X22CrMoV12-1
DIN 912 Cylinder Bolts		1.4986 X7CrNiMoBNb16-16
DIN 931 Hexagon Bolts		2.4952 NiCr20TiAl
DIN 933 Hexagon Bolts		1.5680 12Ni 5
DIN 938 Studs		
DIN 975 Threaded Bolts		
DIN 976 Threaded Stud Bolts		
DIN 2510 Double End Studs	<b>DIN EN 10083</b>	1.7225 42CrMo4
EN 24014 Hexagon Screws	Heat-treatable steel	1.6580 30CrNiMo8
		1.6582 34CrNiMo6
DIN 934 Hexagon Nuts H=0,8D		
DIN 980 Lock Nuts		
DIN 1804 Nuts		
DIN 2510 Hexagon Nuts H=D	<b>DIN EN 10088</b>	1.4301 X5CrNi18-10
EN 24032 Hexagon Nuts	Stainless steel	1.4401 X5CrNiMo17-12-2
EN 24033 Hexagon Nuts		1.4541 X6CrNiTi18-10
EN 24034 Hexagon Nuts		1.4571 X6CrNiMoTi17-12-2
EN 27035 Castle Nuts		A2, A4 Grade 50 and 70
DIN 125 Flat Washers		
EN 21234 Split Pins		
EN 22339 Pin		
etc....		

**Certificate:**

Certification acc. to EN 10204 - 3.1 and 3.2 third party inspection by

- Lloyd's Reg. of Shipping ( LRS )
- TÜV , - DNV , - GL
- acc. to PED 97/23/EC
- acc. to ASME - NACE MR 0175

EN\_23/v02



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# Screws

DIN / EN / ISO - STANDARD

## Specification

High temperature resistant steel for Nickel- and Cobalt Alloys acc. to DIN EN 10302

Special material and NE - Metals Titanium, Brass, Aluminium etc.

Harmonized Materials acc. to Pressure Equipment Directive PED 97/23/ EC  
DIN EN 10269, 10272, DIN ISO 898.

(Ductile Materials with min. 14% elongation and 27 J at working temperature)

### Surface treatment:

- Galvanize Coating
- Zinc - Chromatisation
- Hot-Dip Galvanizing
- DACROMET – Coating
- Delta Tone
- Teflon Coating
- Zinc–Ferric resp. Manganese-Ferric-Phosphating
- Chemical nickelisation
- Hard chromium plating
- Painting, Spraying
- Coating for screw protection



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# Cast Iron

## DIN- EN- ISO- STANDARD

Standard	Classification	Material
<b>Dimension:</b>	<b>Heat- and corrosion resistant steels</b>	W 1.4828, W 1.4878
Maximum Diameter: 1.500 mm	Austenitic alloys without Mo Austenitic alloys with 2-3 % Mo	W 1.4308, W 1.4552 W 1.4408, W 1.4581
Maximum Weight / Piece: 300 – 3.300 kg	Austenitic alloys with 3-4 % Mo Austenitic alloys with 4-6 % Mo Austenitic alloys with raised Si Fullaustenitic Special Alloy	W 1.4412  np. Nitronic 60 W 1.4446, W 1.4584 W 1.4588
<b>Production forms:</b>	<b>Duplex steels</b>	Lean-Duplex Duplex High-Carbon-Duplex Super-Duplex
- Rods / Bars - Bushes - Pipes - Rings	<b>Nickel-based alloys</b>	Alloy -20, -59 Monel -400 Inconel -600, -601, -625 Incolloy -800, -825
	<b>Titanium alloys</b>	Titan Grade 2 Titan Grade 5
<b>Test method:</b>		
Impact Test at room temperature or low temperature acc to DIN EN 10045-2		
Tensile test acc to DIN EN 10002-1		
Hot tensile test until 900°C acc to DIN EN 10002-5		
Hardness Test acc. to Brinell and DIN EN ISO 6506-1		
Testing of Intercrystalline Corrosion acc to DIN EN ISO 3651-2, SEP 1877		
Huey-Test acc. to DIN EN ISO 3651-1		
<b>Certificate:</b>		
Certificate acc. to EN 10204 - 3.1 and 3.2 from independent organization:		
	- Lloyd's Reg. of Shipping ( LRS ) - TÜV , - DNV , - GL acc. to PED 97/23/EC acc to ASME - NACE MR 0175	

EN\_28/v01

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# Heads

DIN- ASME- STANDARD

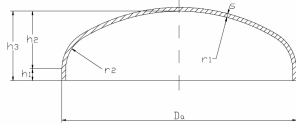
Standard	Classification	Material
<b>Dimension:</b>	<b>Carbon steel</b>	P265-GH, 16Mo3, 15NiCuMoNb5
Diameter (OD): 21,3- 13.500 mm	CrMo(V) Alloy steel	10CrMo9-10 , 13CrMo4-5 ASME SA 387 Gr.11, Gr.12, Gr.91
Wall thickness (s): 2 – 250 mm		P355-GH, -NH, -NL1, -NL2 ASME SA 516 Gr.60 , Gr.70
<b>Typical forms:</b>	<b>Stainless steel</b>	1.4301 / ASME SA240- 304 1.4307 / ASME SA240- 304L 1.4404 / ASME SA240- 316, 316L 1.4541 / ASME SA240- 321, 321H 1.4571 / ASME SA240- 316Ti 1.4539 / ASTM SA240- 904 L
- Torispherical head DIN 28011		
- Semi ellipsoidal head DIN28013		
- Ellipsoidal heads		
- Hemispherical heads		
- Standard/Flat dished heads		
- Flat heads	Duplex and Super Duplex	1.4462 / ASTM Duplex 2205 1.4501 / ASTM SuperDuplexCr25
- Convex discs		
- Plate type heads		
- Diffuser heads	<b>Nickel alloys</b>	Alloy20, Alloy59, Alloy200 MONEL – 400 INCONEL – 600, 601, 625 INCOLLOY – 800, 825
- Bulk & Tank vehicle heads		
- Cone		
- Weld construction		
- Special pressed parts	and other	Copper, Titanium, Aluminium cadded material combinations
<b>Test method:</b>		
Impact Test at room temperature or low temperature acc to DIN EN 10045-2		
Tensile test acc to DIN EN 10002-1, Hot tensile test until 900°C acc. to EN 10002-5		
Hardness Test acc. to Brinell and DIN EN ISO 6506-1		
Testing of Intercrystalline Corrosion acc to DIN EN ISO 3651-2, SEP 1877		
100% X-Ray-Examination, 100% US-Examination		
<b>Production Code:</b>		
AD 2000-HP 0 , EN 13445 , PD5500 and PED 97/23/EC		
ASME VIII, Div. 1 und Div. 2 , U-Stamp, U2-Stamp Authorization und NACE MR 0175		
<b>Certificate:</b>		
Certificate acc. to EN 10204 - 3.1 and 3.2 from independent organization		
	- Lloyd's Reg. of Shipping ( LRS )	
	- TÜV , - DNV , - GL	
EN_29/v01		

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# Heads

## Shapes

### Semi ellipsoidal head DIN 28013

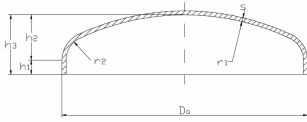


$$r_1 = D_a \quad h_1 \geq 3,5 \times s$$

$$r_2 = 0,1 \times D_a \quad h_2 = 0,1935 \times D_a - 0,455 \times s$$

$$h_3 = h_1 + h_2$$

### Torispherical head DIN 28011

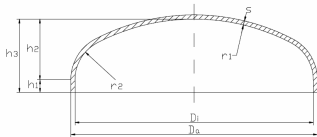


$$r_1 = 0,8 \times D_a \quad h_1 = 3 \times s$$

$$r_2 = 0,154 \times D_a \quad h_2 = 0,255 \times D_a - 0,635 \times s$$

$$h_3 = h_1 + h_2$$

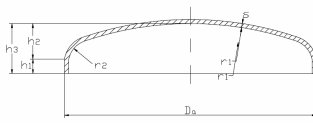
### Ellipsoidal head



**Shape 2:1**  
 $D_i = D_a - 2 \times s$   
 $r_1 = 0,9 \times D_i$   
 $r_2 = 0,17 \times D_i$   
 $h_1 = \text{acc. specification}$   
 $h_2 = 0,25 \times D_i$   
 $h_3 = h_1 + h_2$

**Shape 1,9:1**  
 $D_i = D_a - 2 \times s$   
 $r_1 = D_i / 1,16$   
 $r_2 = D_i / 5,39$   
 $h_1 = \text{acc. NF E81-103}$   
 $h_2 = D_i / 3,8$   
 $h_3 = h_1 + h_2$

### Standard-type / flat dished head



$$r_1 = D_a \text{ (standard-type head)}$$

$$r_1 = 1,3 \times D_a \text{ (flat dished head)}$$

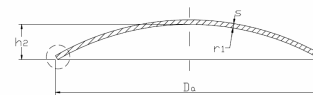
$$r_2 = \text{depending on size (15 - 50 mm)}$$

$$h_1 \geq 3,5 \times s$$

$$h_2 = \text{dished height}$$

$$h_3 = h_1 + h_2$$

### Convex disc

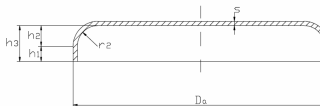


**Shape  $r_1 = D_a$**   
 $h_2 = 0,134 \times D_a$

**Shape  $r_1 = 0,8 \times D_a$**   
 $h_2 = 0,176 \times D_a$

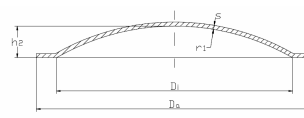
**Shape  $r_1$  acc. to cust. requirements**  
 $h_2 = r_1 - \sqrt{r_1^2 - (D_a/2)^2}$

### Flat head



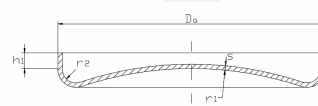
$$h_1 \geq 3,5 \times s \quad h_2 = r_2 \quad h_3 = h_1 + h_2$$

### Plate-type head



$$r_1 = D_i \quad h_2 = 0,134 \times D_i$$

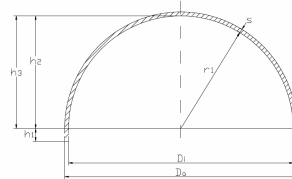
### Diffuser head



$$r_1 \geq 1,3 \times D_a \quad h_1 \geq 3,5 \times s$$

$$r_2 = 15 - 50 \text{ mm depending on size}$$

### Hemispherical head



$$D_i = D_a - 2 \times s$$

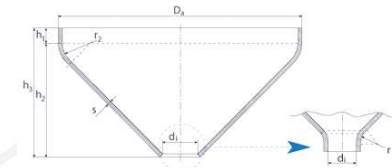
$$r_1 = 0,5 \times D_i$$

$$h_1 = \text{acc. to customers requirements}$$

$$h_2 = r_1$$

$$h_3 = h_1 + h_2$$

### Cone



$$h_3 = h_1 + h_2$$

Neck at the narrow end is also possible

### Special pressed parts



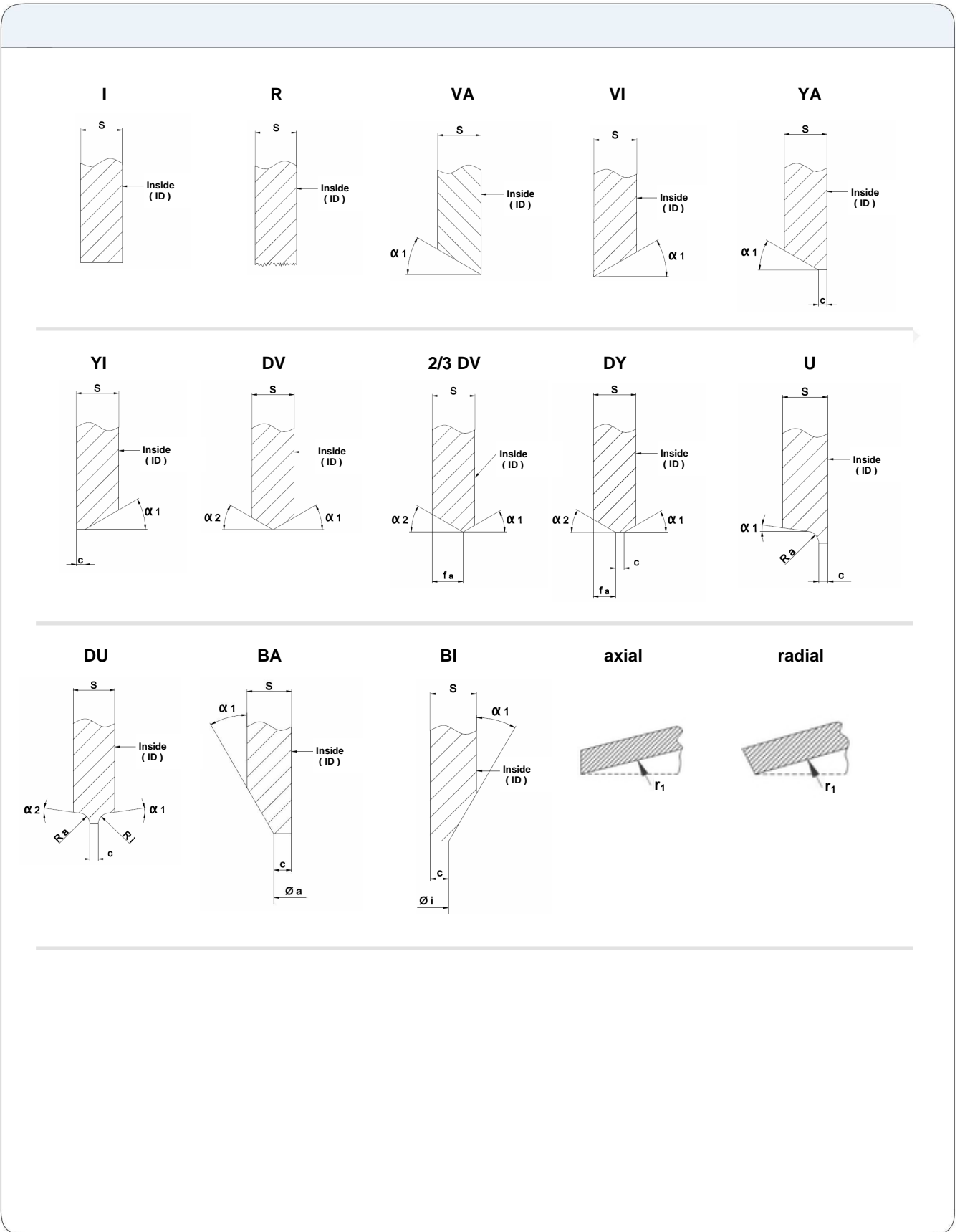
Dimensions and forms acc. to customers requirements

**Legend:**  
 $s$  = wall thickness,  $D_a$  = outside diameter,  $D_i$  = inside diameter,  
 $h_1$  = straight flange height,  $h_2$  = dished height,  $h_3$  = total height  
inside,  $r_1$  = crown radius,  $r_2$  = knuckle radius

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# Heads

## Edge preparation of heads



**BOCAR GmbH**