

Dodatak

Grupe materijala prema EN Standardima

Standardi

Tabela I.1.1

EN standard	Naziv materijala	Broj materijala	Grupa materijala
10025	S235JR	1.0037	1E0
10025	S235JRG2	1.0038	1E1
10028-2	P265GH	1.0425	3E0
10028-2	P295GH	1.0481	3E1
10028-2	16Mo3	1.5415	4E0
10028-2	13CrMo4-5	1.7335	5E0
10028-2	10CrMo9-10	1.7380	6E0
10213-2	GP240GR	1.0621	2E0
10213-2	GP240GH	1.0619	3E0
10213-2	G20Mo5	1.5419	4E0
10213-2	G17CrMo5-5	1.7357	5E0
10213-2	G17CrMo9-10	1.7379	6E0
10213-2	GX15CrMo5	1.7365	6E1
10213-3	G17Mn5	1.1131	7E0
10222-2	P245GH	1.0352	3E0
10222-2	P280GH	1.0487	3E1
10222-2	16Mo3	1.5415	4E0
10222-2	13CrMo4-5	1.7335	5E0
10222-2	11CrMo9-10	1.7383	6E0
10222-2	X16CrMo5-1	1.7366	6E1
10222-5	X5CrNi18-10	1.4301	11E0
10222-5	X5CrNiMo17-12-2	1.4401	14E0
10222-5	X6CrNiMoTi17-12-2	1.4571	15E0
10222-5	X10CrMoVNb9-1	1.4903	1C15
10213-4	GX5CrNi19-10	1.4308	11E0
10213-4	GX5CrNiNb19-11	1.4552	12E0
10213-4	GX5CrNiMo19-11-2	1.4408	14E0

DODATNI MATERIJALI

Prema EN 1092-1, Prilog D mogu se koristiti sledeći materijali:

Tabela D.1: Dodatni materijali

Tabela I.1.2

Naziv materijala	Broj materijala	Grupa materijala
C21 ¹⁾	1.0432	1E0
C22.8 ²⁾	1.0460	3E0

¹⁾ prema DIN 2528 ²⁾ prema DIN 17243

Grupe materijala prema ASTM standardima

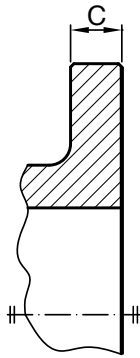
Lista materijala prema ASTM standardima
Tabela I.1.3

Grupe materijala		Forme proizvoda								
Br. grupe materijala	Nazivno označavanje čelika	otkovci			odlivci			ploče		
		Spec.Br.	Grade	Napomena	Spec.Br.	Grade	Napomena	Spec.Br.	Grade	Napomena
1.1	C-Si	A 105	-	(1) (2)	A 216	WCB	(1)	A 515	70	(1)
	C-Mn-Si	A 350	LF2	(1)	-	-	-	A 516	70	(1)(3)
1.2	C-Mn-Si	-	-	-	A 216	WCC	(5)	-	-	-
		-	-	-	A 352	LCC	(4)	-	-	-
	2½ Ni	-	-	-	A 352	LC2	(4)	A 203	B	(5)
1.3	C-Si	-	-	-	A 352	LCB	(4)	A 515	65	(1)
	C-½ Mo	-	-	-	A 217	WC1	(6) (7)	-	-	-
-		-	-	A 352	LC1	(4)	-	-	-	-
1.4	C-Si	-	-	-	-	-	-	A 515	60	(1)(3)
1.5	C-½ Mo	A 182	F1	(6)	-	-	-	A 204	A	(6)
1.7	½ Cr - ½ Mo	A 182	F2	(8)	-	-	-	-	-	-
	Ni-½ Cr-½ Mo	-	-	-	A 217	WC4	(8) (7)	-	-	-
	¾ Ni-Mo- ¼ Cr	-	-	-	A 217	WC5	(7)	-	-	-
1.9	1 Cr- ½ Mo	A 182	F11 Cl.2	(7) (9)	-	-	-	A 387	11 Cl. 2	(9)
	1¼Cr-½ Mo	-	-	-	A 217	WC6	(7) (10)	-	-	-
1.10	2 ¼ Cr-1 Mo	A 182	F22 Cl.3	(9)	A 217	WC9	(7) (10)	A 387	22 Cl. 2	(9)
1.13	5Cr-½ Mo	A 182	F5a	-	A 217	C5	(7)	-	-	-
2.1	18Cr-8Ni	A 182	F304	(12)	A 351	CF3	(11)	A 240	304	(12)
		A 182	F304H	-	A 351	CF8	(12)	A 240	304H	-
2.2	16Cr-12Ni-2Mo	A 182	F316	(12)	A 351	CF3M	(3)	A 240	316	(12)
		A 182	F316H	-	A 351	CF8M	(12)	A 240	316H	-
	18Cr-13Ni-3Mo	A 182	F317	(12)	-	-	-	A 240	317	(12)
		A 182	F317H	-	A 351	CF8A	(8)	A 240	317H	-
2.3	18Cr-8Ni	A 182	F304L	(11)	-	-	-	A 240	304L	(11)
	16Cr-12Ni-2Mo	A 182	F316L	-	-	-	-	A 240	316L	-
2.4	18Cr-10Ni-Ti	A 182	F321	(8)	-	-	-	A 240	321	(8)
		A 182	F321H	(13)	-	-	-	A 240	321H	(13)
2.5	18Cr-10Ni-Cb	A 182	F347	(8)	-	-	-	A 240	347	(8)
		A 182	F347H	(13)	-	-	-	A 240	347H	(13)
2.11	18Cr-10Ni-Cb	-	-	-	A 351	CF8C	(12)	-	-	-

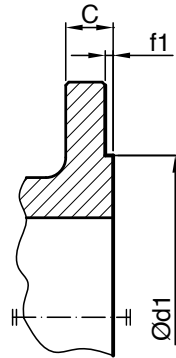
Napomena:

- Nakon produženog izlaganja na temperaturama iznad 425°C, karbidna faza ugljeničnog čelika može biti pretvorena u grafit. Dozvoljeno ali ne preporučljivo produženo izlaganje na temperaturama iznad 425°C.
- Samo umireni čelik se može koristiti na temperaturama iznad 455°C.
- Nije dozvoljena upotreba na temperaturama iznad 455°C.
- Nije dozvoljena upotreba na temperaturama iznad 345°C.
- Nakon produženog izlaganja na temperaturama iznad 455°C, karbidna faza ugljeničnog čelika može biti pretvorena u grafit. Dozvoljeno ali ne preporučljivo produženo izlaganje na temperaturama iznad 425°C.
- Nakon produženog izlaganja temperaturama iznad 470°C, karbidna faza ugljenično-molibden čelika može se pretvoriti u grafit. Dozvoljeno ali ne preporučljivo produženo izlaganje na temperaturama iznad 470°C
- Koristiti samo normalizovani i otpušteni materijal.
- Nije dozvoljena upotreba na temperaturama iznad 538°C.
- Dozvoljeno ali ne preporučljivo produženo izlaganje na temperaturama iznad 595°C.
- Nije dozvoljena upotreba na temperaturama iznad 595°C.
- Nije dozvoljena upotreba na temperaturama iznad 425°C.
- Na temperaturama iznad 538°C, koristiti kada je sadržaj ugljenika 0,04% ili veći.
- Za temperature iznad 538°C, koristiti samo ako su materijali toplotno obrađeni i to grejani na temperaturu od najmanje 1095°C.

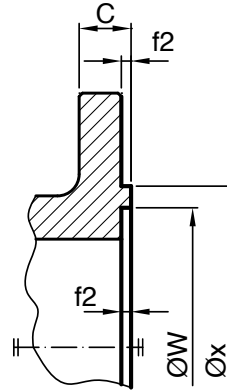
Oblici zaptivnih površina prirubnica prema EN 1092-1



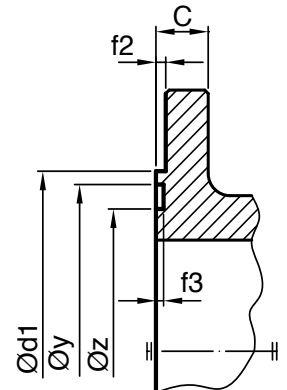
Crtež I.1.1 - Tip A
ravna



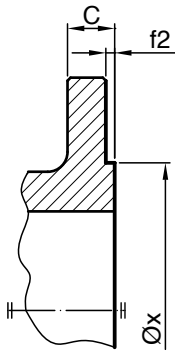
Crtež I.1.2 - Tip B
ispušt (B1 i B2)



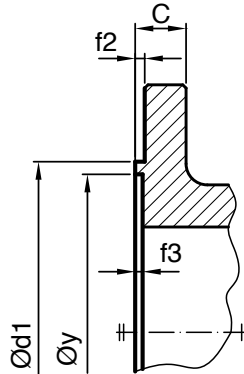
Crtež I.1.3 - Tip C
prstenasti ispušt



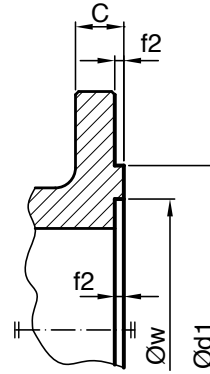
Crtež I.1.4 - Tip D
prstenasti upušt



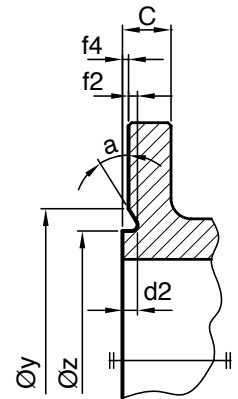
Crtež I.1.5 - Tip E
kružni ispušt



Crtež I.1.6 - Tip F
kružni upušt



Crtež I.1.7 - Tip G
O - prsten ispušt



Crtež I.1.8 - Tip H
O - prsten upušt

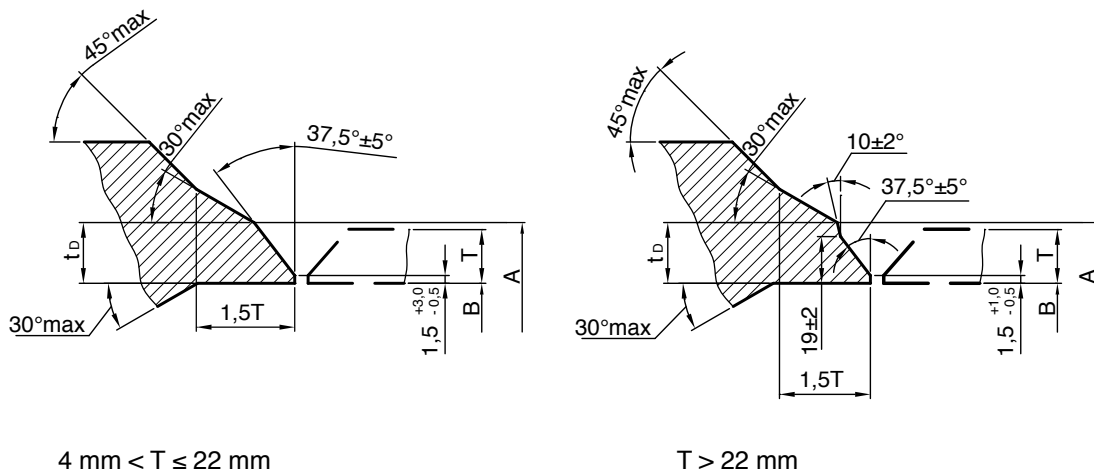
Mere (mm)

Tabela I.1.4

DN	PN 25	PN 40	PN 63	PN 100 (160)	f ₁	f ₂	f ₃	f ₄	w	x	y	z	a	d ₂					
	d ₁																		
↕ (mm)																			
10	Primenjuje se PN 100				2	4,5	4	2	24	34	35	23	41°	5					
15															40	29	39	40	28
20															45	36	50	51	35
25															58	43	57	58	42
32															68	51	65	66	50
40															78	61	75	76	60
50															88	73	87	88	72
65															102	95	109	110	94
80	122	106	120	121	105														
100	162	162	162	162	5	4,5	2,5	129	149	150	128	32°	6						
125	188	188	188	188										155	175	176	154		
150	218	218	218	218										183	203	204	182		
200	278	285	285	285										239	259	260	238		
250	335	345	345	345										292	312	313	291		
300	395	410	410	410										343	363	364	342		
350	450	465	465	465										395	421	422	394		
														5,5	5	3	395	421	422

*Za PN 160 forme prirubnica mogu biti samo B2, C i D

Oblici krajeva za sučeono zavarivanje prema EN 12627



Crtež I.1.9 - Oblik kraja za sučeono zavarivanje

Tabela I.1.5

- $\varnothing A$	- spoljni prečnik kraja za sučeono zavarivanje
- $\varnothing B$	- unutrašnji prečnik cevi
- T	- debljina zida cevi
- t_b	$\leq 1,5 * T$

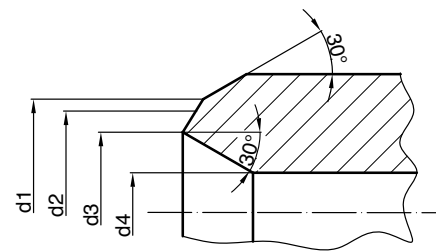
Mere(mm)

DN (nazivna veličina)	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350
$\varnothing A$ (mm)	22	28	35	44	50	62	77	91	117	144	172	223	278	329	362

Dimenzije krajeva za sučeono zavarivanje prema DIN 3239 T1

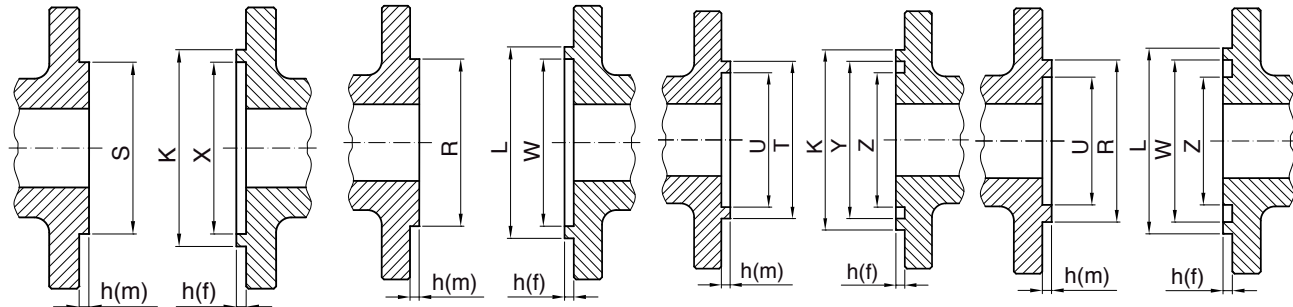
Mere (mm)
Tabela I.1.6

Nominalna veličina DN									
		red 1 (više od PN40)	red 2 (PN63)	red 3 (PN100)	red 4 (PN160)	red 5 (PN250)	red 6 (PN320)	red 7 (PN400)	red 8 (PN630)
10	d1	Koristiti red 4			20	Koristiti red 6	20	20	24
	d2	Koristiti red 4			18 (17,2)		18 (17,2)	18 (17,2)	22 (21,3)
	d3	Koristiti red 4			13		12	10	11
	d4	Koristiti red 4			10		10	8	9
15	d1	Koristiti red 4			24	24	24	31	35
	d2	Koristiti red 4			22 (21,3)	22 (21,3)	22 (21,3)	28 (26,9)	32 (30)
	d3	Koristiti red 4			17	16	15	17	16
	d4	Koristiti red 4			15	14	13	15	14
20	d1	31	---	---	---	---	---	---	---
	d2	28 (26,9)	---	---	---	---	---	---	---
	d3	22	---	---	---	---	---	---	---
	d4	20	---	---	---	---	---	---	---
25	d1	Koristiti red 3		37	37	39	39	48	52
	d2	Koristiti red 3		34 (33,7)	34 (33,7)	35 (33,7)	35 (33,7)	44 (42,4)	47 (44,5)
	d3	Koristiti red 3		28	27	27	24	28	24
	d4	Koristiti red 3		25	25	25	22	25	22
40	d1	Koristiti red 3		54	54	54	54	67	72
	d2	Koristiti red 3		49 (48,3)	49 (48,3)	49 (48,3)	49 (48,3)	61 (60,3)	66 (63,5)
	d3	Koristiti red 3		43	41	38	35	39	34
	d4	Koristiti red 3		40	39	36	33	37	32
50	d1	Koristiti red 3		67	67	67	71	83	92
	d2	Koristiti red 3		61 (60,3)	61 (60,3)	61 (60,3)	65 (63,5)	77 (76,1)	86 (82,5)
	d3	Koristiti red 3		54	52	47	47	49	46
	d4	Koristiti red 3		50	50	45	45	47	44
65	d1	Koristiti red 3		83	83	83	96	110	---
	d2	Koristiti red 3		77 (76,1)	77 (76,1)	77 (76,1)	90 (88,9)	104 (101,6)	---
	d3	Koristiti red 3		70	65	59	65	68	---
	d4	Koristiti red 3		65	63	57	63	65	---
80	d1	Koristiti red 3		96	96	110	110	122	---
	d2	Koristiti red 3		90 (88,9)	90 (88,9)	104 (101,6)	104 (101,6)	116 (114,3)	---
	d3	Koristiti red 3		82	76	79	76	76	---
	d4	Koristiti red 3		80	74	77	74	74	---
100	d1	Koristiti red 3		121	121	135	141	149	---
	d2	Koristiti red 3		115 (114,3)	115 (114,3)	129 (127)	135 (133)	143 (139,7)	---
	d3	Koristiti red 3		106	97	97	99	93	---
	d4	Koristiti red 3		100	95	95	97	91	---
125	d1	Koristiti red 2		147	147	161	178	204	---
	d2	Koristiti red 2		141 (139,7)	141 (139,7)	155 (152,4)	172 (168,3)	198 (193,7)	---
	d3	Koristiti red 2		131	129	119	126	130	---
	d4	Koristiti red 2		125	125	117	124	125	---
150	d1	Koristiti red 2		176	176	187	204	230	---
	d2	Koristiti red 2		170 (168,3)	170 (168,3)	181 (177,8)	198 (193,7)	224 (219,1)	---
	d3	Koristiti red 2		159	157	141	141	144	---
	d4	Koristiti red 2		150	150	139	139	142	---
200	d1	Koristiti red 2		228	228	254	254	283	---
	d2	Koristiti red 2		222 (219,1)	222 (219,1)	248 (244,5)	248 (244,5)	277 (273)	---
	d3	Koristiti red 2		207	205	185	180	187	---
	d4	Koristiti red 2		200	200	183	178	185	---
250	d1	282	282	282	282	309	334	---	---
	d2	276 (273)	276 (273)	276 (273)	276 (273)	303 (298,5)	328 (313,9)	---	---
	d3	260	258	256	230	231	238	---	---
	d4	250	250	250	228	229	236	---	---
300	d1	331	331	331	334	---	---	---	---
	d2	325 (323,9)	325 (323,9)	325 (323,9)	328 (323,9)	---	---	---	---
	d3	309	302	296	277	---	---	---	---
	d4	300	300	292	275	---	---	---	---
350	d1	365	365	365	---	---	---	---	---
	d2	359 (355,6)	356 (355,6)	359 (355,6)	---	---	---	---	---
	d3	338	330	323	---	---	---	---	---
	d4	330	330	320	---	---	---	---	---
400	d1	417	417	417	---	---	---	---	---
	d2	411 (406,4)	411 (406,4)	411 (406,4)	---	---	---	---	---
	d3	390	380	374	---	---	---	---	---
	d4	375	375	366	---	---	---	---	---
500	d1	518	518	518	---	---	---	---	---
	d2	512 (508)	512 (508)	512 (508)	---	---	---	---	---
	d3	480	475	470	---	---	---	---	---
	d4	472	472	458	---	---	---	---	---



Crtež I.1.10 Detalji kraja za sučeono zavarivanje

Oblici zaptivnih površina prirubnica prema ASME/ANSI B16.5



Crtež I.1.11
Mali ispust / Mali upust
SMF / SFF

Crtež I.1.12
Veliki ispust / Veliki upust
LMF / LFF

Crtež I.1.13
Mali prstenasti ispust / Mali
prstenasti upust
STF / SGF

Crtež I.1.14
Veliki prstenasti ispust / Veliki
prstenasti upust
LTF / LGF

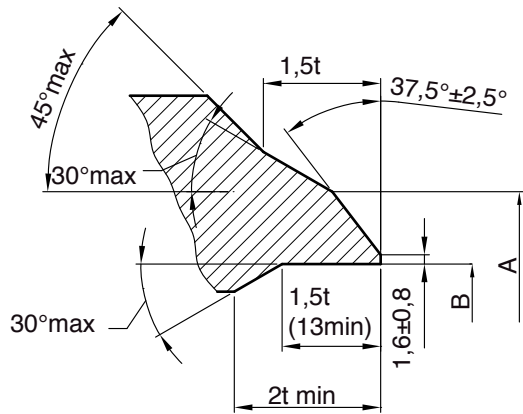
Mere (mm)

Tabela I.1.7

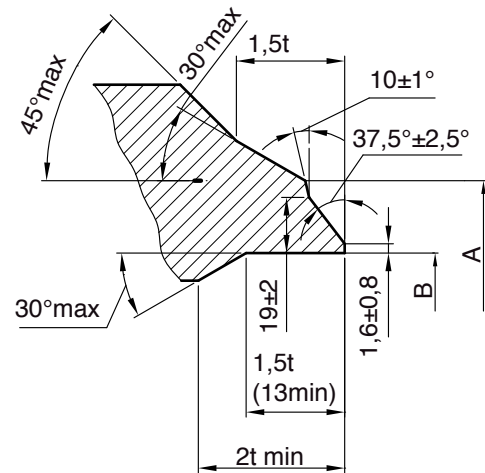
1	2	3	4	5	6	7	8	9	10	11	12	13											
													Spoljašnji prečnik			Unutrašnji prečnik	Spoljašnji prečnik			Unutrašnji prečnik	Spoljašnji prečnik (min.)	Visina	Dubina
													RF, LMF i LTF	SMF	STF	LTF i STF	LFF i LGF	SFF	SGF	LGF i SG	SFF i SGF	LFF i LGF	Class 150 do Class 2500
R	S	T	U	W	X	Y	Z	K	L	h(m)	h(f)												
15(1/2)	34,9	18,3	35,1	25,4	36,5	19,9	36,5	23,8	44	46	7	5											
20(3/4)	42,9	23,8	42,9	33,3	44,4	25,4	44,4	31,8	52	54	7	5											
25(1)	50,8	30,2	47,8	38,1	52,4	31,8	49,2	36,5	57	62	7	5											
32(1 ¼)	63,5	38,1	57,2	47,6	65,1	39,7	58,7	46,0	67	75	7	5											
40(1 ½)	73,0	44,4	63,5	54,0	74,6	46,0	65,1	52,4	73	84	7	5											
50(2)	92,1	57,2	82,6	73,0	93,7	58,8	84,1	71,4	92	103	7	5											
65(2 ½)	104,8	68,3	95,2	85,7	106,4	69,8	96,8	84,1	105	116	7	5											
80(3)	127,0	84,1	117,5	108,0	128,6	85,7	119,1	106,4	127	138	7	5											
100(4)	157,2	109,5	144,5	131,8	158,8	111,1	146,0	130,2	157	168	7	5											
125(5)	185,7	136,5	173,0	160,3	187,3	138,1	174,6	158,8	186	197	7	5											
150(6)	215,9	161,9	203,2	190,5	217,5	163,5	204,8	188,9	216	227	7	5											
200(8)	269,9	212,7	254,0	238,1	271,5	214,3	255,6	236,5	270	281	7	5											
250(10)	323,8	266,7	304,8	285,8	325,4	268,3	306,4	284,2	324	335	7	5											
300(12)	381,0	317,5	362,0	342,9	382,6	319,1	363,5	341,3	381	392	7	5											
350(14)	412,8	349,2	393,7	374,6	414,3	350,8	395,3	373,1	413	424	7	5											
400(16)	469,9	400,0	447,5	425,4	471,5	401,6	449,3	423,9	470	481	7	5											
450(18)	533,4	450,8	511,2	489,0	535,0	452,4	512,8	487,4	533	544	7	5											
500(20)	584,2	501,6	558,8	533,4	585,8	503,2	560,4	531,8	584	595	7	5											
600(24)	692,2	603,2	666,8	641,4	693,7	604,8	668,3	639,8	692	703	7	5											

Napomena: Visina ispusta RF (Raised face) za Class 150 i Class 300 iznosi 2mm dok je za sve ostale klase pritiska 7mm.

Oblici krajeva za sučeono zavarivanje prema ASME B16.25



3 mm < t ≤ 22 mm



t > 22 mm

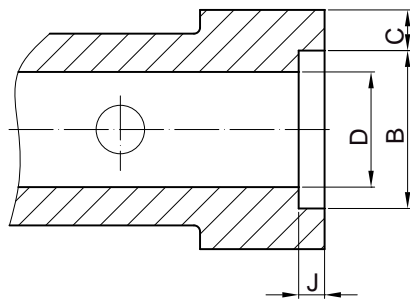
Crtež I.1.15 Detalji kraja za sučeono zavarivanje

Mere (mm)

Tabela I.1.8

DN (NPS)	Spoljašnji prečnik	A	Debljina zida											
			Sch. 20	Sch. 30	Sch. Std	Sch. 40	Sch. 60	Sch. XS	Sch. 80	Sch. 100	Sch. 120	Sch. 140	Sch. 160	Sch. XXS
6(1/8)	10,3	---	---	---	1,73	1,73	---	2,41	2,41	---	---	---	---	---
8(1/4)	13,7	---	---	---	2,24	2,24	---	3,02	3,02	---	---	---	---	---
10(3/8)	17,1	---	---	---	2,31	2,31	---	3,20	3,2	---	---	---	---	---
15(1/2)	21,3	---	---	---	2,77	2,77	---	3,73	3,73	---	---	---	4,78	7,47
20(3/4)	26,6	---	---	---	2,87	2,87	---	3,91	3,91	---	---	---	5,56	7,82
25(1)	33,4	---	---	---	3,38	3,38	---	4,55	4,54	---	---	---	6,35	9,09
32(1 ¼)	42,2	---	---	---	3,56	3,55	---	4,85	4,85	---	---	---	6,35	9,70
40(1 ½)	48,3	---	---	---	3,68	3,68	---	5,08	5,08	---	---	---	7,14	10,16
50(2)	60,3	---	---	---	3,91	3,91	---	5,54	5,53	---	---	---	8,74	11,07
65(2 ½)	73,0	75	---	---	5,16	5,16	---	7,01	7,01	---	---	---	9,52	14,02
80(3)	88,9	91	---	---	5,49	5,49	---	7,62	7,62	---	---	---	11,13	15,24
100(4)	114,3	117	---	---	6,02	6,02	---	8,56	8,55	---	11,13	---	13,49	17,12
125(5)	141,3	144	---	---	6,55	6,55	---	9,52	9,52	---	12,7	---	15,88	19,05
150(6)	168,3	172	---	---	7,11	7,11	---	10,97	10,97	---	14,27	---	18,26	21,95
200(8)	219,1	223	6,35	7,04	8,18	8,18	10,31	12,70	12,7	15,09	18,26	20,62	23,01	22,22
250(10)	273,0	278	6,35	7,8	9,27	9,27	12,7	12,70	15,08	18,26	21,44	25,4	28,58	25,40
300(12)	323,8	329	6,35	8,38	9,52	10,31	14,27	12,70	17,47	21,44	25,4	28,57	33,32	---
350(14)	355,6	362	7,92	9,52	9,52	11,12	15,08	12,70	19,05	23,83	27,76	31,75	35,71	---
400(16)	406,4	413	7,92	9,52	9,52	12,7	16,66	12,70	21,43	26,19	30,94	36,52	40,46	---
450(18)	457,2	464	7,92	11,13	9,52	14,27	19,05	12,70	23,82	29,36	34,92	39,67	45,24	---
500(20)	508,0	516	9,52	12,7	9,52	15,08	20,62	12,70	26,18	32,54	38,1	44,45	49,99	---
600(24)	609,6	619	9,52	14,27	9,52	17,47	24,61	12,70	30,96	38,89	46,02	52,37	59,51	---

Dimenzije kraja za preklopno zavarivanje prema ASME/ANSI B16.11



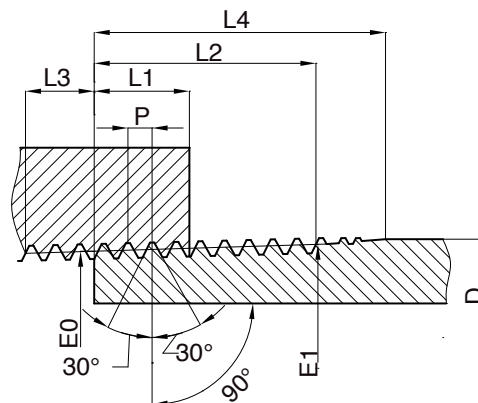
Crtež I.1.16 Detalj kraja za preklopno zavarivanje

Mere (mm)

Tabela I.1.9

DN (NPS)	B (mm)	J (min)	Class 3000 Sch. 80		Class 6000 Sch. 160		Class 9000 Sch. XXS	
			C (min)	D (min)	C (min)	D (min)	C (min)	D (min)
6(1/8)	10,8	9,5	3,18	6,1	3,43	3,2	---	---
8(1/4)	14,2	9,5	3,30	8,5	4,01	5,6	---	---
10(3/8)	17,6	9,5	3,5	11,8	4,37	8,4	---	---
15(1/2)	21,8	9,5	4,09	15	5,18	11	5,94	5,6
20(3/4)	27,2	12,5	4,27	20,2	6,04	14,8	6,93	10,3
25(1)	33,9	12,5	4,98	25,9	6,93	19,9	7,95	14,2
32(1 1/4)	42,7	12,5	5,28	34,3	9,93	28,7	7,95	22
40(1 1/2)	48,8	12,5	5,54	40,1	7,8	33,2	8,91	27,2
50(2)	61,2	16	6,04	51,7	9,5	42,1	10,89	37,4
65(2 1/2)	73,9	16	7,67	61,2	---	---	---	---
80(3)	89,8	16	8,3	76,4	---	---	---	---
100(4)	115,2	16	9,35	100,7	---	---	---	---

Dimenzije navojnih priključaka NPT prema ASME/ANSI B1.20.1



Crtež I.1.17 Detalj navoja

Mere (mm)

Tabela I.1.10

NPS	D	P	L1	L2	L3	L4	E0
1/8	10,29	0,94	4,572	6,703	2,822	9,967	9,233
1/4	13,72	1,412	5,08	10,206	4,234	15,103	12,126
3/8	17,14	1,412	6,896	10,358	4,234	15,255	15,545
1/2	21,34	1,814	8,128	13,556	5,443	19,85	19,263
3/4	26,67	1,814	8,611	13,861	5,443	20,155	24,58
1	33,4	2,21	10,16	17,343	6,627	20,006	30,825
1 1/4	42,16	2,21	10,668	17,953	6,627	25,616	39,55
1 1/2	48,26	2,21	10,668	18,377	6,627	26,04	45,621
2	60,32	2,21	11,074	19,251	6,627	26,878	57,633