GF Piping Systems

Welding Table

Schweiss-Tabelle
Table de Soudage

TOP - ECOS 250

Butt-Fusion Machine
Stumpfschweissmaschine
Machine à Souder Bout à Bout

1.Fusion data / Schweissdaten / Param. de soudage

1.1 Heating element butt-fusion of PE
Heizelement-Stumpfschweissen von PE
Soudage bout à bout pour PE

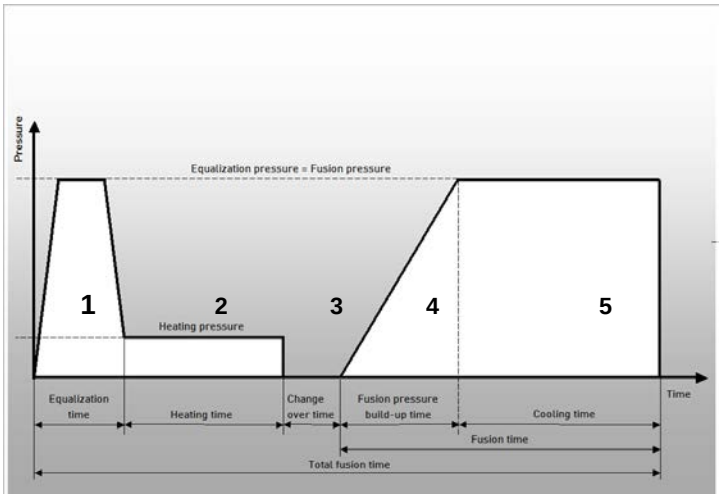
Fusion chart according to DVS 2207-1
Schweisstabelle entsprechend DVS 2207-1
Table de Soudage conformément aux DVS 2207-1

Heating element temperature: 220°C ± 10°C
Heizelementtemperatur : 220°C ± 10°C
Température de l'élément chauffant: 220°C ± 10°C

	1	2	3	4	5
Nominal wall thickness	**Equalization** Bead height on heating element after equalization	**Heat soak** Heat soak time = 10 x wall thickness	**Change-over**	**Join** Time until max pressure reached	**Cooling** Cooling time at fusion pressure
Nennwanddicke	**Angleichen** Wulsthöhe am Heizelement am Ende der Angleichzeit	**Anwärmen** Anwärmzeit = 10 x Wanddicke	**Umstellen**	**Fügen** Zeit bis zur vollen Druckaufbringung	**Abkühlen** Abkühlzeit unter Fügedruck
Épaisseur nominale du tuyau	**Formation du bourrelet** Épaisseur du bourrelet sur la plaque chauffante	**Chauffage** Temps de chauffe= 10 x épaisseur du tuyau	**Transition**	**Augment. de la pression** Temps pour atteindre la pression de soudage	**Refroidissement** Temps de refroidissement à la pression de soudage
	P1=0.15N/mm²	P2=0.01N/mm²			P5=0.15N/mm²
[mm]	Min. [mm]	[sec]	Max. [sec]	[sec]	Min. [min]
up to 4.5	0.5	45	5	5	See next table
4.5 – 7.0	1.0	45 – 70	5 – 6	5 – 6	
7.0 – 12.0	1.5	70 – 120	6 – 8	6 – 8	
12.0 – 19.0	2.0	120 – 190	8 – 10	8 – 11	
19.0 – 26.0	2.5	190 – 260	10 – 12	11 – 14	
26.0 – 37.0	3.0	260 – 370	12 – 16	14 – 19	
37.0 – 50.0	3.5	370 – 500	16 – 20	19 – 25	
50.0 – 70.0	4.0	500 – 700	20 – 25	25 – 35	
70.0 – 90.0	4.5	700 – 900	25 – 30	35	
90.0 – 110.0	5.0	900 –1100	30 – 35	35	
110.0 – 130.0	5.5	1100 – 1300	35	35	

Nominal wall thickness **Nennwanddicke** **Épaisseur nominale du tuyau**	**Cooling time at fusion pressure p = 0.15 N/mm2 ± 0.01 depending on the ambient temperature (Ta)** **Abkühlzeit unter Fügedruck p = 0,15 ± 0,01 N/mm² in Abhängigkeit von der Umgebungstemperatur (Ta)** **Temps de refroidissement à la pression p = 0,15 ± 0,01 N/mm² en fonction de la température ambiante (Ta)**		
mm	Ta ≤ 15°C Min. [min]	15°C < Ta ≤ 25°C Min. [min]	25°C < Ta ≤ 40°C Min. [min]
up to 4.5	4.0	5.0	6.5
4.5 – 7.0	4.0 – 6.0	5.0 – 7.5	6.5 – 9.5
7.0 – 12.0	6.0 – 9.5	7.5 – 12	9.5 – 15.5
12.0 – 19.0	9.5 – 14	12 – 18	15.5 – 24
19.0 – 26.0	14 – 19	18 – 24	24 – 32
26.0 – 37.0	19 – 27	24 – 34	32 – 45
37.0 – 50.0	27 – 36	34 – 46	45 – 61
50.0 – 70.0	36 – 50	46 – 64	61 – 85
70.0 – 90.0	50 – 64	64 – 82	85 – 109
90.0 – 110.0	64 – 78	82 – 100	109 – 133
110.0 – 130.0	78 – 92	100 – 118	133 – 157

Process steps for heating element butt fusion
Verfahrensschritte beim Heizelement-Stumpfschweissen
Graphique temps/pression pour le soudage bout à bout



t1 Equalization time / Angleichzeit / Temps de formation du bourrelet

t2 Heating time / Anwärmzeit / Temps de chauffe

t3 Change over time / Umstellzeit / Temps de retrait de l'élément chauffant

t4 Fusion pressure build-up time / Fügedruck Aufbauzeit / Temps de augmentation de la pression

t5 Cooling time / Abkühlzeit / Temps de refroidissement

Heating element butt fusion of **PE** according to DVS 2207-1
Heizelement-Stumpfschweissen von **PE** nach DVS 2207-1 /
Soudage bout à bout par élément chauffant pour **PE** conformément aux DVS 2207-1

Ø	Outside pipe diameter	Rohr - Aussendurchmesser	Diamètre extérieur du tuyau
e	Wall thickness	Wanddicke	Epaisseur nominale du tuyau
A	Fusion surface	Schweissfläche	Surface de soudage
P1	Equalization pressure	Angleich Druck	Pression de formation du bourrelet
P2	Heating pressure	Anwärmdruck	Pression de chauffe
P5	Fusion pressure	Fügedruck	Pression de soudage
Ta	Ambient Temperature	Umgebungstemperatur	Température ambiante

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	-	-	3,1	3,5	4,0	4,4	4,9	5,5	6,2
	A: Fusion surface		mm^2	-	-	-	1187	1501	1960	2422	2990	3784	4749
	p1/p5: Equalization/fusion pressure		bar	-	-	-	3	4	6	7	9	11	14
SDR	Bead size		mm	-	-	-	0,5	0,5	0,5	0,5	1,0	1,0	1,0
41	p2: Heating pressure		bar	-	-	-	1	1	1	1	1	1	1
	t2: Heating time		sec	-	-	-	31	35	40	44	49	55	62
	t3: Change over time		sec	-	-	-	5	5	5	5	5	5	6
	t4: Pressure build-up time		sec	-	-	-	5	5	5	5	5	5	6
	t5: Cooling time	Ta <= 40°C	min	-	-	-	7	7	7	7	7	8	9
		15°C < Ta <= 25°C	min	-	-	-	5	5	5	5	5	6	7
		Ta <= 15°C	min	-	-	-	4	4	4	4	4	5	5

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	-	3,4	3,9	4,3	4,9	5,5	6,2	6,9	7,7
	A: Fusion surface		mm^2	-	-	1139	1484	1833	2388	2991	3775	4728	5861
	p1/p5: Equalization/fusion pressure		bar	-	-	3	4	5	7	9	11	14	17
SDR	Bead size		mm	-	-	0,5	0,5	0,5	1,0	1,0	1,0	1,0	1,5
33	p2: Heating pressure		bar	-	-	1	1	1	1	1	1	1	1
	t2: Heating time		sec	-	-	34	39	43	49	55	62	69	77
	t3: Change over time		sec	-	-	5	5	5	5	5	6	6	6
	t4: Pressure build-up time		sec	-	-	5	5	5	5	5	6	6	6
	t5: Cooling time	Ta <= 40°C	min	-	-	7	7	7	7	8	9	9	10
		15°C < Ta <= 25°C	min	-	-	5	5	5	5	6	7	7	8
		Ta <= 15°C	min	-	-	4	4	4	4	5	5	6	6

PE (DVS 2207-1)

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	-	4,2	4,8	5,4	6,2	6,9	7,7	8,6	9,6
	A: Fusion surface		mm^2	-	-	1406	1815	2277	2974	3764	4647	5847	7261
	p1/p5: Equalization/fusion pressure		bar	-	-	4	5	7	9	11	14	17	21
SDR	Bead size		mm	-	-	0,5	1,0	1,0	1,0	1,0	1,5	1,5	1,5
26	p2: Heating pressure		bar	-	-	1	1	1	1	1	1	1	1
	t2: Heating time		sec	-	-	42	48	54	62	69	77	86	96
	t3: Change over time		sec	-	-	5	5	5	6	6	6	7	7
	t4: Pressure build-up time		sec	-	-	5	5	5	6	6	6	7	7
	t5: Cooling time	Ta <= 40°C	min	-	-	7	7	8	8	9	10	11	13
		15°C < Ta <= 25°C	min	-	-	5	5	6	7	7	8	9	10
		Ta <= 15°C	min	-	-	4	4	5	5	6	6	7	8

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	4,1	5,0	5,7	6,4	7,3	8,2	9,1	10,3	11,4
	A: Fusion surface		mm^2	-	1104	1649	2130	2672	3490	4416	5452	6947	8519
	p1/p5: Equalization/fusion pressure		bar	-	3	5	6	8	10	13	16	20	25
SDR	Bead size		mm	-	0,5	1,0	1,0	1,0	1,5	1,5	1,5	1,5	1,5
22	p2: Heating pressure		bar	-	1	1	1	1	1	1	1	1	2
	t2: Heating time		sec	-	41	50	57	64	73	82	91	103	114
	t3: Change over time		sec	-	5	5	5	6	6	6	7	7	8
	t4: Pressure build-up time		sec	-	5	5	5	6	6	6	7	7	8
	t5: Cooling time	Ta <= 40°C	min	-	7	7	8	9	10	11	12	13	15
		15°C < Ta <= 25°C	min	-	5	6	6	7	8	9	9	10	11
		Ta <= 15°C	min	-	4	4	5	5	6	7	7	8	9

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	4,3	5,3	6,0	6,7	7,7	8,6	9,6	10,8	11,9
	A: Fusion surface		mm^2	-	1154	1743	2226	2793	3684	4616	5742	7268	8905
	p1/p5: Equalization/fusion pressure		bar	-	3	5	7	8	11	14	17	21	26
SDR	Bead size		mm	-	0,5	1,0	1,0	1,0	1,5	1,5	1,5	1,5	1,5
21	p2: Heating pressure		bar	-	1	1	1	1	1	1	1	1	2
	t2: Heating time		sec	-	43	53	60	67	77	86	96	108	119
	t3: Change over time		sec	-	5	5	6	6	6	7	7	8	8
	t4: Pressure build-up time		sec	-	5	5	6	6	6	7	7	8	8
	t5: Cooling time	Ta <= 40°C	min	-	7	7	8	9	10	11	13	14	15
		15°C < Ta <= 25°C	min	-	5	6	6	7	8	9	10	11	12
		Ta <= 15°C	min	-	4	5	5	6	6	7	8	9	9

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	4,3	5,1	6,3	7,1	8,0	9,1	10,2	11,4	12,8	14,2
	A: Fusion surface		mm^2	947	1364	2037	2631	3300	4310	5455	6734	8523	10522
	p1/p5: Equalization/fusion pressure		bar	3	4	6	8	10	13	16	20	25	31
SDR	Bead size		mm	0,5	1,0	1,0	1,5	1,5	1,5	1,5	1,5	2,0	2,0
17,6	p2: Heating pressure		bar	1	1	1	1	1	1	1	1	2	2
	t2: Heating time		sec	43	51	63	71	80	91	102	114	128	142
	t3: Change over time		sec	5	5	6	6	6	7	7	8	8	9
	t4: Pressure build-up time		sec	5	5	6	6	6	7	7	8	8	9
	t5: Cooling time	Ta <= 40°C	min	7	7	9	10	11	12	13	15	16	18
		15°C < Ta <= 25°C	min	5	6	7	8	8	9	10	11	13	14
		Ta <= 15°C	min	4	4	5	6	7	7	8	9	10	11

PE (DVS 2207-1)

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	4,5	5,4	6,6	7,4	8,3	9,5	10,7	11,9	13,4	14,8
	A: Fusion surface		mm^2	997	1435	2144	2718	3434	4492	5691	7032	8908	10936
	p1/p5: Equalization/fusion pressure		bar	3	4	6	8	10	13	17	21	26	32
SDR	Bead size		mm	1,0	1,0	1,0	1,5	1,5	1,5	1,5	1,5	2,0	2,0
17	p2: Heating pressure		bar	1	1	1	1	1	1	1	1	2	2
	t2: Heating time		sec	45	54	66	74	83	95	107	119	134	148
	t3: Change over time		sec	5	5	6	6	7	7	7	8	8	9
	t4: Pressure build-up time		sec	5	5	6	6	7	7	7	8	9	9
	t5: Cooling time	Ta <= 40°C	min	7	8	9	10	11	13	14	15	17	19
		15°C < Ta <= 25°C	min	5	6	7	8	9	10	11	12	13	14
		Ta <= 15°C	min	4	5	6	6	7	8	9	9	10	11

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	5,6	6,7	8,1	9,2	10,3	11,8	13,3	14,7	16,6	18,4
	A: Fusion surface		mm^2	1221	1753	2590	3344	4195	5479	6965	8561	10868	13376
	p1/p5: Equalization/fusion pressure		bar	4	5	8	10	12	16	20	25	32	39
SDR	Bead size		mm	1,0	1,0	1,5	1,5	1,5	1,5	2,0	2,0	2,0	2,0
13,6	p2: Heating pressure		bar	1	1	1	1	1	1	1	2	2	3
	t2: Heating time		sec	56	67	81	92	103	118	133	147	166	184
	t3: Change over time		sec	5	6	6	7	7	8	8	9	9	10
	t4: Pressure build-up time		sec	5	6	6	7	7	8	9	9	10	11
	t5: Cooling time	Ta <= 40°C	min	8	9	11	12	13	15	17	19	21	23
		15°C < Ta <= 25°C	min	6	7	8	9	10	12	13	14	16	17
		Ta <= 15°C	min	5	6	7	8	8	9	10	11	12	14

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	6,8	8,2	10,0	11,4	12,7	14,6	16,4	18,2	20,5	22,7
	A: Fusion surface		mm^2	1460	2103	3142	4057	5089	6669	8412	10385	13144	16227
	p1/p5: Equalization/fusion pressure		bar	4	6	9	12	15	20	25	31	39	48
SDR	Bead size		mm	1,0	1,5	1,5	1,5	2,0	2,0	2,0	2,0	2,5	2,5
11	p2: Heating pressure		bar	1	1	1	1	1	1	2	2	3	3
	t2: Heating time		sec	68	82	100	114	127	146	164	182	205	227
	t3: Change over time		sec	6	6	7	8	8	9	9	10	10	11
	t4: Pressure build-up time		sec	6	6	7	8	8	9	10	11	12	13
	t5: Cooling time	Ta <= 40°C	min	9	11	13	15	16	19	21	23	26	28
		15°C < Ta <= 25°C	min	7	9	10	11	13	14	16	17	19	21
		Ta <= 15°C	min	6	7	8	9	10	11	12	13	15	17

PE (DVS 2207-1)

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	8,4	10,1	12,3	14,0	15,7	17,9	20,1	22,4	25,2	27,9
	A: Fusion surface		mm^2	1758	2535	3775	4882	6131	7991	10097	12498	15818	19467
	p1/p5: Equalization/fusion pressure		bar	5	7	11	14	18	24	30	37	47	57
SDR	Bead size		mm	1,5	1,5	2,0	2,0	2,0	2,0	2,5	2,5	2,5	3,0
9	p2: Heating pressure		bar	1	1	1	1	1	2	2	2	3	4
	t2: Heating time		sec	84	101	123	140	157	179	201	224	252	279
	t3: Change over time		sec	7	7	8	9	9	10	10	11	12	13
	t4: Pressure build-up time		sec	7	7	8	9	10	11	11	12	14	15
	t5: Cooling time	Ta <= 40°C	min	11	13	16	18	20	23	25	28	31	34
		15°C < Ta <= 25°C	min	9	10	12	14	15	17	19	21	23	26
		Ta <= 15°C	min	7	8	10	11	12	13	15	16	18	20

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	10,3	12,3	15,1	17,1	19,2	21,9	24,6	27,4	30,8	34,2
	A: Fusion surface		mm^2	2094	3002	4502	5797	7286	9501	12010	14857	18791	23186
	p1/p5: Equalization/fusion pressure		bar	6	9	13	17	21	28	35	44	55	68
SDR	Bead size		mm	1,5	2,0	2,0	2,0	2,5	2,5	2,5	3,0	3,0	3,0
7,4	p2: Heating pressure		bar	1	1	1	1	1	2	2	3	4	5
	t2: Heating time		sec	103	123	151	171	192	219	246	274	308	342
	t3: Change over time		sec	7	8	9	9	10	11	12	13	14	15
	t4: Pressure build-up time		sec	7	8	9	10	11	12	13	15	16	18
	t5: Cooling time	Ta <= 40°C	min	13	16	19	22	24	27	30	34	38	42
		15°C < Ta <= 25°C	min	10	12	15	16	18	20	23	25	28	31
		Ta <= 15°C	min	8	10	11	13	14	16	18	20	22	25

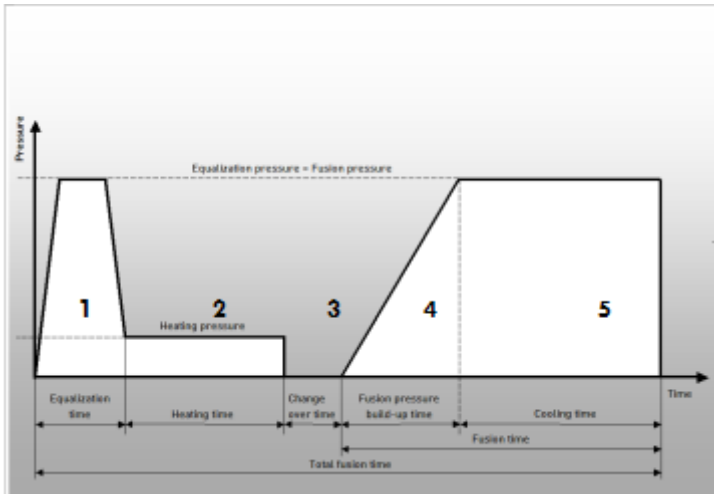
1.2 Heating element butt-fusion of PP
Heizelement-Stumpfschweissen von PP
Soudage bout à bout pour PP

Fusion chart according to DVS 2207-11
Schweisstabelle entsprechend DVS 2207-11
Table de Soudage conformément aux DVS 2207-11

	1	2	3	4	5
Nominal wall thickness	**Equalization** Bead height on heating element after equalization	**Heat soak** Heat soak time = 10 x wall thickness	**Change-over**	**Join** Time until max pressure reached	**Cooling** Cooling time at fusion pressure
Nennwanddicke	**Angleichen** Wulsthöhe am Heizelement am Ende der Angleichzeit	**Anwärmen** Anwärmzeit = 10 x Wanddicke	**Umstellen**	**Fügen** Zeit bis zur vollen Druckaufbringung	**Abkühlen** Abkühlzeit unter Fügedruck
Épaisseur nominale du tuyau	**Formation du bourrelet** Épaisseur du bourrelet sur la plaque chauffante	**Chauffage** Temps de chauffe= 10 x épaisseur du tuyau	**Transition**	**Augment. de la pression** Temps pour atteindre la pression de soudage	**Refroidisse-ment** Temps de refroidissement à la pression de soudage
	P1=0.10N/mm²	P2=0.01N/mm²			P5=0.10N/mm²
[mm]	Min. [mm]	[sec]	Max. [sec]	[sec]	Min. [min]
Fino a 4.5	0.5	up to 53	5	6	See next table
4.5 – 7.0	0.5	53 – 81	5 – 6	6 – 7	
7.0 – 12.0	1.0	81 – 135	6 – 7	7 – 11	
12.0 – 19.0	1.0	135 – 206	7 – 9	11 – 17	
19.0 – 26.0	1.5	206 – 271	9 – 11	17 – 22	
26.0 – 37.0	2.0	271 – 362	11 – 14	22 – 32	
37.0 – 50.0	2.5	362 – 450	14 – 17	32 – 43	
50.0 – 70.0	3.0	450 – 546	17 – 22	43	

Nominal wall thickness **Nennwanddicke** **Épaisseur nominale du tuyau**	**Cooling time at fusion pressure p = 0.10 N/mm² ± 0.01 depending on the ambient temperature (Ta)** **Abkühlzeit unter Fügedruck p = 0,10 ± 0,01 N/mm² in Abhängigkeit von der Umgebungstemperatur (Ta)** **Temps de refroidissement à la pression p = 0,10 ± 0,01 N/mm² en fonction de la température ambiante (Ta)**		
mm	Ta ≤ 15°C Min. [min]	15°C < Ta ≤ 25°C Min. [min]	25°C < Ta ≤ 40°C Min. [min]
up to 4.5	4.0	5.0	6.5
4.5 – 7.0	4.0 – 6.0	5.0 – 7.5	6.5 – 9.5
7.0 – 12.0	6.0 – 9.5	7.5 – 12	9.5 – 15.5
12.0 – 19.0	9.5 – 14	12 – 18	15.5 – 24
19.0 – 26.0	14 – 19	18 – 24	24 – 32
26.0 – 37.0	19 – 27	24 – 34	32 – 45
37.0 – 50.0	27 – 36	34 – 46	45 – 61
50.0 – 70.0	36 – 50	46 – 64	61 – 85

Process steps for heating element butt fusion
Verfahrensschritte beim Heizelement-Stumpfschweissen
Graphique temps/pression pour le soudage bout à bout



t1 Equalization time / Angleichzeit / Temps de formation du bourrelet

t2 Heating time / Anwärmzeit / Temps de chauffe

t3 Change over time / Umstellzeit / Temps de retrait de l'élément chauffant

t4 Fusion pressure build-up time / Fügedruck Aufbauzeit / Temps de augmentation de la pression

t5 Cooling time / Abkühlzeit / Temps de refroidissement

Heating element butt fusion of **PP** according to DVS 2207-11
Heizelement-Stumpfschweissen von **PP** nach DVS 2207-11
Soudage bout à bout par élément chauffant pour **PP** conformément aux DVS 2207-11

Ø	Outside pipe diameter	Rohr - Aussendurchmesser	Diamètre extérieur du tuyau
e	Wall thickness	Wanddicke	Épaisseur nominale du tuyau
A	Fusion surface	Schweissfläche	Surface de soudage
P1	Equalization pressure	Angleich Druck	Pression de formation du bourrelet
P2	Heating pressure	Anwärmdruck	Pression de chauffe
P5	Fusion pressure	Fügedruck	Pression de soudage

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	-	-	-	-	4,0	4,4	4,9	5,5	6,2
	A: Fusion surface		mm^2	-	-	-	-	-	1960	2422	2990	3784	4749
	p1/p5: Equalization/fusion pressure		bar	-	-	-	-	-	4	5	6	7	9
SDR	Bead size		mm	-	-	-	-	-	0,5	0,5	0,5	0,5	0,5
41	p2: Heating pressure		bar	-	-	-	-	-	1	1	1	1	1
	t2: Heating time		sec	-	-	-	-	-	47	52	57	64	72
	t3: Change over time		sec	-	-	-	-	-	5	5	5	5	6
	t4: Pressure build-up time		sec	-	-	-	-	-	6	6	6	6	7
	t5: Cooling time	Ta <= 40°C	min	-	-	-	-	-	7	7	7	8	9
		15°C < Ta <= 25°C	min	-	-	-	-	-	5	5	5	6	7
		Ta <= 15°C	min	-	-	-	-	-	4	4	4	5	5

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	-	-	-	4,3	4,9	5,5	6,2	6,9	7,7
	A: Fusion surface		mm^2	-	-	-	-	1833	2388	2991	3775	4728	5883
	p1/p5: Equalization/fusion pressure		bar	-	-	-	-	4	5	6	7	9	12
SDR	Bead size		mm	-	-	-	-	0,5	0,5	0,5	0,5	0,5	1,0
33	p2: Heating pressure		bar	-	-	-	-	1	1	1	1	1	1
	t2: Heating time		sec	-	-	-	-	51	57	64	72	80	89
	t3: Change over time		sec	-	-	-	-	5	5	5	6	6	6
	t4: Pressure build-up time		sec	-	-	-	-	6	6	6	7	7	8
	t5: Cooling time	Ta <= 40°C	min	-	-	-	-	7	7	8	9	9	10
		15°C < Ta <= 25°C	min	-	-	-	-	5	5	6	7	7	8
		Ta <= 15°C	min	-	-	-	-	4	4	5	5	6	7

PP (DVS 2207-11)

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	-	-	4,8	5,4	6,2	6,9	7,7	8,6	9,6
	A: Fusion surface		mm^2	-	-	-	1815	2277	2974	3764	4647	5847	7261
	p1/p5: Equalization/fusion pressure		bar	-	-	-	4	4	6	7	9	11	14
SDR	Bead size		mm	-	-	-	0,5	0,5	0,5	0,5	1,0	1,0	1,0
26	p2: Heating pressure		bar	-	-	-	1	1	1	1	1	1	1
	t2: Heating time		sec	-	-	-	56	63	72	80	88	98	109
	t3: Change over time		sec	-	-	-	5	5	6	6	6	6	7
	t4: Pressure build-up time		sec	-	-	-	6	6	7	7	8	8	9
	t5: Cooling time	Ta <= 40°C	min	-	-	-	7	8	8	9	10	11	13
		15°C < Ta <= 25°C	min	-	-	-	5	6	7	7	8	9	10
		Ta <= 15°C	min	-	-	-	4	5	5	6	6	7	8

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	-	6,3	7,1	8,0	9,1	10,2	11,4	12,8	14,2
	A: Fusion surface		mm^2	-	-	2037	2631	3300	4310	5455	6734	8523	10522
	p1/p5: Equalization/fusion pressure		bar	-	-	4	5	6	8	11	13	17	21
SDR	Bead size		mm	-	-	0,5	1,0	1,0	1,0	1,0	1,0	1,0	1,0
17,6	p2: Heating pressure		bar	-	-	1	1	1	1	1	1	2	2
	t2: Heating time		sec	-	-	73	82	91	104	116	128	143	157
	t3: Change over time		sec	-	-	6	6	6	6	7	7	7	8
	t4: Pressure build-up time		sec	-	-	7	7	8	9	10	10	12	13
	t5: Cooling time	Ta <= 40°C	min	-	-	9	10	11	12	13	15	16	18
		15°C < Ta <= 25°C	min	-	-	7	8	8	9	10	11	13	14
		Ta <= 15°C	min	-	-	5	6	7	7	8	9	10	11

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	-	8,2	10,0	11,4	12,7	14,6	16,4	18,2	20,5	22,7
	A: Fusion surface		mm^2	-	2103	3142	4057	5089	6669	8412	10385	13144	16227
	p1/p5: Equalization/fusion pressure		bar	-	4	6	8	10	13	16	20	26	32
SDR	Bead size		mm	-	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,5	1,5
11	p2: Heating pressure		bar	-	1	1	1	1	1	2	2	3	3
	t2: Heating time		sec	-	94	113	128	142	161	179	198	220	241
	t3: Change over time		sec	-	6	7	7	7	8	8	9	9	10
	t4: Pressure build-up time		sec	-	8	9	10	12	13	15	16	18	20
	t5: Cooling time	Ta <= 40°C	min	-	11	13	15	16	19	21	23	26	28
		15°C < Ta <= 25°C	min	-	9	10	11	13	14	16	17	19	21
		Ta <= 15°C	min	-	7	8	9	10	11	12	13	15	17

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	8,4	10,1	12,3	14,0	15,7	17,9	20,1	22,4	25,2	27,9
	A: Fusion surface		mm^2	1758	2535	3775	4882	6131	7991	10097	12498	15818	19467
	p1/p5: Equalization/fusion pressure		bar	3	5	7	10	12	16	20	25	31	38
SDR	Bead size		mm	1,0	1,0	1,0	1,0	1,0	1,0	1,5	1,5	1,5	2,0
9	p2: Heating pressure		bar	1	1	1	1	1	2	2	2	3	4
	t2: Heating time		sec	96	114	138	155	173	195	216	238	264	287
	t3: Change over time		sec	6	7	7	8	8	9	9	10	11	12
	t4: Pressure build-up time		sec	8	9	11	13	14	16	18	19	21	24
	t5: Cooling time	Ta <= 40°C	min	11	13	16	18	20	23	25	28	31	34
		15°C < Ta <= 25°C	min	9	10	12	14	15	17	19	21	23	26
		Ta <= 15°C	min	7	8	10	11	12	13	15	16	18	20

PP (DVS 2207-11)

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	10,3	12,3	15,1	17,1	19,2	21,9	24,6	27,4	30,8	34,2
	A: Fusion surface		mm^2	2094	3002	4502	5797	7286	9501	12010	14857	18791	23186
	p1/p5: Equalization/fusion pressure		bar	4	6	9	11	14	19	24	29	37	45
SDR	Bead size		mm	1,0	1,0	1,0	1,0	1,5	1,5	1,5	2,0	2,0	2,0
7,4	p2: Heating pressure		bar	1	1	1	1	1	2	2	3	4	5
	t2: Heating time		sec	117	138	166	187	208	233	258	283	311	339
	t3: Change over time		sec	7	7	8	8	9	10	11	11	12	13
	t4: Pressure build-up time		sec	10	11	14	15	17	19	21	23	26	29
	t5: Cooling time	Ta <= 40°C	min	13	16	19	22	24	27	30	34	38	42
		15°C < Ta <= 25°C	min	10	12	15	16	18	20	23	25	28	31
		Ta <= 15°C	min	8	10	11	13	14	16	18	20	22	25

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	12,5	15,0	18,3	20,8	23,3	26,6	29,0	33,2	37,4	-
	A: Fusion surface		mm^2	2454	3534	5280	6818	8552	11148	13757	17397	22042	-
	p1/p5: Equalization/fusion pressure		bar	5	7	10	13	17	22	27	34	43	-
SDR	Bead size		mm	1,0	1,0	1,0	1,5	1,5	2,0	2,0	2,0	2,5	-
6	p2: Heating pressure		bar	1	1	1	1	2	2	3	3	4	-
	t2: Heating time		sec	140	165	199	223	246	276	296	331	365	-
	t3: Change over time		sec	7	8	9	10	10	11	12	13	14	-
	t4: Pressure build-up time		sec	11	14	16	18	20	23	25	29	32	-
	t5: Cooling time	Ta <= 40°C	min	16	19	23	26	29	33	36	41	45	-
		15°C < Ta <= 25°C	min	12	15	17	20	22	25	27	31	34	-
		Ta <= 15°C	min	10	11	14	15	17	19	21	24	27	-

	Ø: Pipe outer diameter		mm	75	90	110	125	140	160	180	200	225	250
	e: Wall thickness		mm	15,1	18,1	22,1	25,1	28,1	32,1	36,1	-	-	-
	A: Fusion surface		mm^2	2842	4088	6103	7878	9878	12898	16320	-	-	-
	p1/p5: Equalization/fusion pressure		bar	6	8	12	15	19	25	32	-	-	-
SDR	Bead size		mm	1,0	1,0	1,5	1,5	2,0	2,0	2,0	-	-	-
5	p2: Heating pressure		bar	1	1	1	2	2	3	3	-	-	-
	t2: Heating time		sec	166	197	235	263	288	321	355	-	-	-
	t3: Change over time		sec	8	9	10	11	12	13	14	-	-	-
	t4: Pressure build-up time		sec	14	16	19	21	24	28	31	-	-	-
	t5: Cooling time	Ta <= 40°C	min	19	23	28	31	34	39	44	-	-	-
		15°C < Ta <= 25°C	min	15	17	21	23	26	30	33	-	-	-
		Ta <= 15°C	min	11	13	16	18	21	23	26	-	-	-

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