

EQUIVALENCES BETWEEN SDR (Standard dimension ration) AND PN (Nominal pressure)

SDR	11	17	17.6	26	33	41
PPh PN	12.5	-	7.5	5	3.9	3.1
PN of HDPE-80	10	-	6	4	3.2	2.5
PN of HDPE 100	16	10	10	6.3	5	4

Linear expansion coefficients

PVC	0.08 mm per meter per degree C
PP from 0 to 30 °c	0.105 mm per meter per degree C
PP from 30 to 60 °c	0.14 mm per meter per degree C
PP from 60 to 90 °c	0.17 mm per meter per degree C
PE HD	0.20 mm per meter per degree
PVDF	0.12 mm per meter per degree C

Principles of setting up industrial pipes:

The installation of pipes and fittings must take into account the following criteria:

- The expansion and contraction of the piping occurs in the axial and radial direction, which is why there must be no hindrance in the case of overhead installation and the installation must be carried out with radial clearance and compensation possibilities.
- Fixing must be carried out so that variations in length are accepted by the correct installation of the fixed supports. Furthermore, the supporting surfaces must be sufficiently wide and conform to the external diameter to avoid any tension on the network. A contact angle with the tube greater than 90° is recommended. The interior of the fixing support must ensure that it does not damage the exterior of the supported element.

In certain cases, a rail/profile is less expensive (savings on supplies and installation time) than several collars close together.

The span between supports depends on the nature of the tube material, its dimensions, the weight of the fluid transported, the operating temperature and the arrangement of the piping.

The span tables on the following pages have been calculated with a fluid with a density of 1g/cm³ (d=1), with a maximum deflection of 2.5mm between 2 support collars and for a small horizontal pipe.

For vertical installation of the piping it is recommended to increase the values by a coefficient of 1.30

For fluids having a density different from that of reference, cited above, the range values can be modified as follows:

Density	Coefficient
GAS	1.30
Fluids 1.25 g/cm ³ (d=1.25)	0.90
Fluids 1.50 g/cm ³ (d=1.5)	0.85
Fluids 1.75 g/cm ³ (d=1.75)	0.80

Øm m	SDR 11 PEHD 100		PPh PN 10		PVC PN 10 and 16		PVDF PN 16	
	Distances in meters							
	20 °C	30 °C	20 °C	30 °C	20 °C	30 °C	20 °C	40 °C
16	0.70	0.63	0.75	0,70	0,80	0,70	0,85	0,80
20	0,80	0,72	0,80	0,75	0,90	0,80	0,95	0,90
25	0,9	0,81	0,85	0,85	0,95	0,85	1,00	0,95
32	1,0	0,90	1,00	0,95	1,05	0,90	1,10	1,00
40	1,15	1,04	1,10	1,05	1,20	1,10	1,25	1,15
50	1,30	1,17	1,25	1,20	1,40	1,30	1,40	1,30
63	1,45	1,31	1,40	1,35	1,50	1,40	1,50	1,40
75	1,55	1,40	1,55	1,50	1,65	1,55	1,65	1,55
90	1,75	1,58	1,65	1,60	1,80	1,70	1,80	1,65
110	1,95	1,76	1,85	1,80	2,00	1,90	2,00	1,85
125	2,10	1,89	2,00	1,90	-	2,15	-	-
140	2,20	1,98	2,10	2,05	2,25	2,30	-	-
160	2,35	2,12	2,25	2,20	2,40	2,60	-	-
200	2,65	2,39	2,50	2,45	2,70	2,60	-	-
225	2,80	2,52	2,65	2,60	2,70	2,80	-	-
250	2,90	2,61	2,80	2,75	2,90	3,00	-	-
280	3,05	2,75	2,95	2,90	3,10	3,10	-	-
315	3,25	2,93	3,15	3,05	3,25	3,25	-	-
355	3,40	3,06	3,35	3,25	3,45	3,45	-	-
400	3,55	3,20	3,55	3,45	3,70	3,60	-	-
450	3,75	3,38	-	-	-	-	-	-
500	3,90	3,51	-	-	-	-	-	-
560	4,05	3,65	-	-	-	-	-	-
630	4,25	3,83	-	-	-	-	-	-
710	4,40	3,96	-	-	-	-	-	-
800	4,60	4,14	-	-	-	-	-	-
900	4,80	4,32	-	-	-	-	-	-
1000	5.00	4.50	-	-	-	-	-	-

SDR of PEHD pipes 100	COEFFICIENT
7.4	1.05
9	1.03
13.6	0.95
17	0.90
21	0.86
26	0.84
33	0.82

PE HD					
Wall thickness in mm	Equalization: minimum height of the bead on the heating mirror at the end of equalization (minimum) (equalization under 0.15N/mm ² in mm	Heating: Heating time = 10 x wall thickness (heating $\pm 0.02N/mm^2$ In second	Maximum duration between end of heating and start of welding In second	Welding	
				Pressure build-up time In second	Cooling time under welding pressure $p=0.15N/mm^2$ In minutes
Up to 4.5	0,5	45	5	5	6
4,5 - 7	1	45 - 70	5 - 6	5 - 6	6 - 10
7 - 1	1,5	70 - 120	6 - 8	6 - 8	10 - 16
12 - 19	2	120 - 190	8 - 10	8 - 11	16 - 24
19 - 26	2,5	190 - 260	10 - 12	11 - 14	24 - 32
26 - 37	3	260 - 370	12 - 16	14 - 19	32 - 45
37 - 50	3.5	370 - 500	16 - 20	19 - 25	45 - 60
50 - 70	4	500 - 700	20 - 25	25 - 35	60 - 80

PPh					
Wall thickness in mm	Equalization: minimum height of the bead before heating begins Tension $p=0.10N/mm^2$ Minimum value in mm	Heating: Heating time $p= \pm 0.01N/mm^2$ In second	Maximum duration between end of heating and start of welding In second	Welding	
				Pressure build-up time In second	Cooling time under welding pressure $p=0.10N/mm^2$ In minutes
2 - 3.9	0.5	45	4	4 - 6	4 - 6
4.3 - 6.9	0.5	45 - 70	5	6 - 8	6 - 12
7 - 11.4	1	70 - 120	6	8 - 10	12 - 20
12.2 - 18.2	1	120 - 190	8	10 - 15	20 - 30
20,1 - 25,5	1,5	190 - 260	10	16 - 20	30 - 40
28,3 - 32,3	1,5	260 - 370	12	21 - 25	40 - 50
34,7 - 40,2	2	370 - 500	14	26 - 35	50 - 60
41 - 50	2,5	500 - 700	16	36 - 45	60 - 70

PVDF					
Wall thickness in mm	Equalization: minimum height of the bead on the heating mirror at the end of equalization (minimum) (equalization under 0.10N/mm ² in mm	Heating: Heating duration = 10 x wall thickness + 40s (heating $\leq 0.02N/mm^2$ In second	Maximum duration between end of heating and start of welding In second	Welding	
				Pressure build-up time In second	Cooling time under welding pressure $p=0.15N/mm^2$ In minutes
1.9 - 3.5	0.5	59 - 75	3	3 - 4	5 - 6
3,5 - 5,5	0,5	75 - 95	3	4 - 5	6 - 8,5
5,5 - 10	0,5 - 1	95 - 140	4	5 - 7	8,5 - 14
10 - 15	1 - 1,3	140 - 190	4	7 - 9	14 - 19
15 - 20	1,3 - 1,7	190 - 240	5	9 - 11	19 - 25
20 - 25	1,7 - 2	240 - 290	5	11 - 13	25 - 32

HEATED SOCKET WELDING

Indicative values for heated socket welding on socket joints of fittings, at 20°C ambient temperature and with moderate air movements

PPh				
Ø Ext. Pipe In mm	Thick. Minimum of the pipe In mm	Heating In second	Max duration sleight of hand In second	Cooling In minutes
16	2	5	4	2
20	2.5	5	4	2
25	2,7	7	4	2
32	3	8	6	4
40	3,7	12	6	4
50	4,6	18	6	4
63	3,6	24	8	6
75	4,3	30	8	6
90	5,1	40	8	6
110	6.3	50	10	8

PVDF				
Ø Ext. Pipe In mm	Thick. Minimum of the pipe In mm	Heating In second	Max duration sleight of hand In second	Cooling In minutes
16	1.5	4	4	2
20	1,9	6	4	2
25	1,9	8	4	2
32	2,4	10	4	4
40	2,4	12	4	4
50	3	18	4	4
63	3	20	6	6
75	3	22	6	6
90	3	25	6	6
110	3	30	6	8

COOLING TIME PE HD ELECTROWELDABLE FITTINGS

Ø in mm	Cooling time for sleeves and shaped parts (in minutes)			Cooling time for stools (in minutes)	
	To be able to move the pipe	To test up to 6 bars	To test at more than 6 bars	To test the connection	For drilling
20 - 32	5	8	10	-	-
40 - 63	7	15	25	15	20
75 - 110	10	30	40	20	30
125	15	35	45	20	30
140	15	35	75	30	45
160	20	60	75	30	45
180 - 225	20	60	75	50	60
250 - 355	30	75	100	50	60
400 - 500	40	95	120	50	60

THEORETICAL PEAR-OFF RESISTANCE

Data expressed in daN

Ømm	PE HD 80		PE HD 100	
	SDR	13.6	11	17,6
90	2600	3155	2591	3996
110	3884	4712	3871	5969
125	5016	6085	4998	7708
140	6292	7633	6270	9669
160	8218	9970	8189	12629
180	10401	12618	10364	15983
200	12841	15578	12795	19732
225	16252	19716	16194	29974
250	20064	24341	19992	30832
280	25168	30533	25079	38675
315	31853	38644	31740	48948
355	40457	49081	403163	62169
400	51363	62313	51181	78929
450	65007	78864	64776	99895
500	80255	97363	79970	123327
560	100672	122133	100314	154701
630	127413	154574	126960	195794

MAXIMUM RECOMMENDED TENSILE FORCE OF HDPE

Data expressed in daN (according to ISO/TC practical code N 163 F)

Ømm	SDR				
	17.6	13.6	11	9	7,4
90	675	873	1080	1319	1605
110	1008	1304	1613	1971	2397
125	1302	16584	2082	2545	3096
140	1633	2113	2612	3193	3883
160	2132	2760	3412	4170	5072
180	2699	3493	4318	5278	6419
200	3332	4312	5331	6516	7925
225	4217	5457	6747	8247	10030
250	5206	6737	8330	10181	12382
280	6531	8452	10449	12771	15532
315	8265	10696	13225	16163	19658
355	10498	13585	16797	20529	24968
400	13328	17248	21325	26064	31699
450	16868	21829	26989	32987	40119
500	20825	26950	33320	40724	59530
560	26123	33806	41797	51085	62130
630	33062	42786	52899	64654	78633